Board of Governors, State University System of Florida

Request to Offer a New Degree Program

(Please do not revise this proposal format without prior approval from Board staff)

University of West Florida	Fall 2019
University Submitting Proposal	**Proposed Implementation Term**
Hal Marcus College of Science and Engineering	Intelligent Systems and Robotics
Name of College(s) or School(s)	**Name of Department(s)/ Division(s)**
Artificial Intelligence and Robotics	Doctor of Philosophy in Intelligent Systems and Robotics
Academic Specialty or Field	**Complete Name of Degree**
11.0102	
Proposed CIP Code	

The submission of this proposal constitutes a commitment by the university that, if the proposal is approved, the necessary financial resources and the criteria for establishing new programs have been met prior to the initiation of the program.

Date Approved by the University Board of Trustees	**President**	**Date**
Signature of Chair, Board of Trustees	**Date**	**Provost and Senior Vice President**	**Date**

Provide headcount (HC) and full-time equivalent (FTE) student estimates of majors for Years 1 through 5. HC and FTE estimates should be identical to those in Table 1 in Appendix A. Indicate the program costs for the first and the fifth years of implementation as shown in the appropriate columns in Table 2 in Appendix A. Calculate an Educational and General (E&G) cost per FTE for Years 1 and 5 (Total E&G divided by FTE).

Implementation Timeframe	Projected Enrollment (From Table 1)		Projected Program Costs (From Table 2)				
	HC	FTE	E&G Cost per FTE	E&G Funds	Contract & Grants Funds	Auxiliary Funds	Total Cost
Year 1	7	3.85	81,564	314,020	0	0	314,020
Year 2	14	7.70					
Year 3	21	11.55					
Year 4	28	15.40					
Year 5	35	19.25	33,762	649,920	0	0	649,920

Note: This outline and the questions pertaining to each section must be reproduced within the body of the proposal to ensure that all sections have been satisfactorily addressed. Tables 1 through 4 are to be included as Appendix A and not reproduced within the body of the proposals because this often causes errors in the automatic calculations.

INTRODUCTION

I. Program Description and Relationship to System-Level Goals

A. Briefly describe within a few paragraphs the degree program under consideration, including (a) level; (b) emphases, including majors, concentrations, tracks, or specializations; (c) total number of credit hours; and (d) overall purpose, including examples of employment or education opportunities that may be available to program graduates.

(a) Doctor of Philosophy

(b) Intelligent Systems and Robotics

(c) 72 Semester Credit Hours beyond the bachelor's degree

(d) The University of West Florida (UWF) seeks to offer a Doctor of Philosophy (Ph.D.) degree program in Intelligent Systems and Robotics in CIP Code 11.0102. The degree program will be housed in the Department of Intelligent Systems and Robotics within the Hal Marcus College of Science and Engineering. The proposed degree program in CIP Code 11.0102 will be the first of its kind in the state of Florida. The proposed program comprised of 72 semester credit hours (SCH) beyond the bachelor's degree will be an affiliation between UWF and the Florida Institute for Human and Machine Cognition (IHMC). IHMC, located at 40 South Alcaniz Street, Pensacola, Florida is a not-for-profit research institute established by the Florida Legislature in 2004 (Florida Statute 1004.447).

The university has designed the Intelligent Systems and Robotics Ph.D. degree program to train the next generation of educators and researchers to develop technology combining human and machine elements. The goal is to have well-educated citizens who will work in diverse fields, strengthen UWF's research and scholarly activities, and create regional economic impacts. Beyond coursework, the program's cornerstone will be hands-on, leading-edge research in intelligent systems and robotics and will leverage the proximity and talent of UWF faculty and IHMC Researchers. Graduates from the degree program will work in a variety of high-tech industries such as advanced manufacturing, healthcare, defense, and transportation.

UWF is uniquely poised to execute and deliver this Ph.D. degree program, the first of its kind in Florida. Because of the close working relationship and physical proximity with IHMC, students and faculty will be able to leverage the infrastructure and expertise of this world-class institution.

Educating students in the subject of intelligent systems and robotics aligns with the Florida Board of Governors' 2025 Strategic Plan to have "well-educated citizens who are working in diverse fields, from science and engineering to medicine and bioscience to computer science, the arts and so much more."

B. Please provide the date when the pre-proposal was presented to CAVP (Council of Academic Vice Presidents) Academic Program Coordination review group. Identify any concerns that the CAVP review group raised with the pre-proposed program and provide a brief narrative explaining how each of these concerns has been or is being addressed.

During the September 11, 2015, conference call there were no concerns raised by the CAVP.

C. If this is a doctoral level program please include the external consultant's report at the end of the proposal as Appendix D. Please provide a few highlights from the report and describe ways in which the report affected the approval process at the university.

For development of this program, UWF engaged Dr. Ronald Arkin, Regents' Professor and Director of Mobile Robot Laboratory, College of Computing, Georgia Institute of Technology (Full Report in Appendix D). Highlights from Dr. Arkin's report (in italics) and the university's responses are as follows:

Reach a written accord between UWF and IHMC as soon as possible and formalize it with a MOU.

The Dean of the Hal Marcus College of Science and Engineering and the interim program director have been working with representatives of IHMC to develop an Affiliation Agreement. The Affiliation Agreement outlines the roles of the institutions regarding the Ph.D. degree program in Intelligent Systems and Robotics to include but not limited to items such as the use of facilities, term of the agreement, and roles of the parties. The leadership of UWF and IHMC as well as the respective general counsels for both organizations reviewed the Affiliation Agreement prior to execution. The signed Affiliation Agreement can be found in Appendix E.

Convene a search and the hire senior leadership in Intelligent Systems as soon as possible.

Dr. Mohamed Khabou, professor and chair of the UWF Department of Electrical and Computer Engineering is serving as the interim program director to continue development of the degree program, initiate student recruitment, complete faculty searches, and more. He has been working with the faculty in the departments of Engineering and Computer Science to develop the program of study and curriculum and determine program admission and graduation requirements. The HMCSE will initiate a search in fall, 2018 for a permanent program director scheduled to begin fall, 2019.

Start hammering out the specific details of the structure of the program, as these will delineate the responsibilities required.

The curriculum for the Ph.D. was reviewed and approved through all stages of the internal UWF Curriculum Coordination Review process. This process includes but is not limited to review by HMCSE College Council, Graduate Council, Academic Council, Office of the Registrar, and the Faculty Senate. The UWF Faculty Senate approved the full program on April 13, 2018.

Expand the program to be available in other units, particularly ECE, not only CS.

The program development includes the creation of a separate, interdisciplinary Department of Intelligent Systems and Robotics. Program students will utilize expertise from a variety of UWF departments, including Mechanical Engineering, Computer Science, Electrical and Computer Engineering, and Mathematics and Statistics.

Do not require an M.S. for admissions to the program. Do not create courses on specialized topics solely for Ph.D. students. Ensure that MS students can enroll and receive credit towards their degree

UWF faculty developed admission standards and a curriculum that allows the program to admit a select body of highly qualified students at the post baccalaureate and post master's degree levels. The program of study developed outlines clear requirements and path to completion for students admitted to the degree program with a master's degree and those highly qualified students admitted to the degree program without a master's degree. The UWF Faculty Senate approved the admission standards and program of study on April 13, 2018.

D. Describe how the proposed program is consistent with the current State University System (SUS) Strategic Planning Goals. Identify which specific goals the program will directly support and which goals the program will indirectly support (see link to the SUS Strategic Plan on the resource page for new program proposal).

The Ph.D. in Intelligent Systems degree program aligns with the Florida Board of Governor's Strategic Priorities and Goals for 2012-2025:

Teaching and Learning

The program will directly support the goal of increasing the number of advanced degrees from Florida universities awarded in a STEM discipline. UWF's first Ph.D. degree program, Intelligent Systems and Robotics, presents students with an opportunity to interact with and learn from award winning scientists from IHMC. The program builds upon the existing strength of UWF's computer science and engineering programs and adds IHMC Researchers all of whom will be involved in mentoring students, overseeing Ph.D. dissertations, and bringing about cutting-edge research opportunities.

Scholarship, Research and Innovation

UWF's Intelligent Systems and Robotics degree program will strengthen the quality and reputation of scholarship, research, and innovation in the state. This degree program will be Florida's first doctoral program in the field of intelligent systems and robotics. The collaborative approach with IHMC will enhance research productivity. With a strong research emphasis focusing on technologies in which innovation can be transformative, the proposed Ph.D. degree program will attract student scholars and researchers and enhance Florida's reputation for scholarship, research, and innovation. Graduates of this program will find work in this highly innovative field thereby increasing the state and region's commercialization activity. In the 2016-2024 time frame, the United States (U.S.) Bureau of Labor Statistics Occupational Outlook Handbook projects 19% growth for Computer and Information Technology Research Scientists (http://www.bls.gov/ooh/computer-and-information-technology/computer-and-information-research-scientists.htm).

Community and Business Engagement

Both UWF and IHMC are engaged in vibrant community and business engagement activities, especially with kindergarten through high school students. Examples of community and business engagement activities that promote STEM education and recruit the next generation of STEM scientists and entrepreneurs include IHMC's Science Saturday Program, UWF's involvement with Science Olympiad, IEEE SoutheastCon Hardware competition, and BEST Robotics, and hosting of regular community seminar events by both.

E. If the program is to be included in a category within the Programs of Strategic Emphasis as described in the SUS Strategic Plan, please indicate the category and the justification for inclusion.

Please see the Programs of Strategic Emphasis (PSE) methodology for additional explanations on program inclusion criteria at the resource page for new program proposal.

The proposed program fits in the current Programs of Strategic Emphasis category Science, Technology, Engineering, and Math (STEM). Within that category, CIP code 11 lists as follows:

11 Computer and Information Sciences and Support Services (all)

The CIP code for the proposed degree program is 11.0102, Artificial Intelligence.

F. Identify any established or planned educational sites at which the program is expected to be offered and indicate whether it will be offered only at sites other than the main campus.

The academic program will be offered at UWF's main Pensacola campus and will be affiliated with IHMC located at 40 South Alcaniz Street Pensacola, Florida (Florida Statute 1004.447 (6) (b)). There are no plans for offering the program at any other sites.

INSTITUTIONAL AND STATE LEVEL ACCOUNTABILITY

II. Need and Demand

A. Need: Describe national, state, and/or local data that support the need for more people to be prepared in this program at this level. Reference national, state, and/or local plans or reports that support the need for this program and requests for the proposed program which have emanated from a perceived need by agencies or industries in your service area. Cite any specific need for research and service that the program would fulfill.

The U.S. Bureau of Labor Statistics predicts that in order for the U.S. to retain its preeminence in science and technology, it needs to produce over one million more STEM professionals over the next decade. (http://www.bls.gov/opub/mlr/2015/article/stem-crisis-or-stem-surplus-yes-and-yes.htm).

The proposed degree program will serve a significant need in Florida and will prepare UWF graduates to be regional, state, and national leaders as well as innovators in this emergent field. Producing graduates with doctoral degrees in Intelligent Systems and Robotics will ensure that Florida trains and retains a workforce ideally suited to current and future challenges. Graduates of the degree program will provide leadership, expertise, and innovation for Florida to progress to the forefront of these advances.

Intelligent systems are technologically advanced machines that perceive and respond to the world around them. Intelligent systems take many forms including:

- brain-controlled prosthetic limbs that allow amputees to return to work,
- crawling robots that can find survivors buried in rubble at disaster scenes, and
- semi- and fully-autonomous vehicles transporting passengers and goods to their desired destination with little or no intervention.

The National Robotics Initiative conducted a joint study in 2012 called Roadmap Results: Summary of Major Findings (http://archive2.cra.org/ccc/files/docs/2013-Robotics-Roadmap):

- Robotics technology holds the potential to transform the future of the country and is expected to become as ubiquitous over the next decades as computer technology is today.
- Through adoption of robots in flexible manufacturing, it is possible to generate production systems that are economically competitive to outsourcing to other countries with lower wages.
- A key driver in adopting robotics technology is the aging population that results in an aging workforce but it also poses a number of challenges to the healthcare system.
- Robotics technology has advanced sufficiently to allow for "human augmented" labor that enables acting on the vision of co-workers who assist people with dirty, dull, and dangerous tasks, and it facilitates a new generation of systems for domestic support to improve quality of life for the broader population. In addition, robots have already proven their value in removing first-responders and soldiers from immediate danger.
- Robotics technology offers a unique opportunity to invest in an area that has a real potential for new jobs, increased productivity, and to add to worker safety in the short-term. It will allow an acceleration of inshoring of jobs, and longer-term, will offer improved quality of life in a society that is expected to experience significant aging.
- Each of the areas covered by the roadmap identifies both near- and long-term applications of robotics technology, establishing 5-, 10-, and 15-year goals for critical capabilities required to provide such applications, and identifies the underlying technologies needed to enable these critical capabilities.
- While some critical capabilities and underlying technologies are domain-specific, the systems effort identified a number of critical capabilities that are common across the board, including robust 3-D perception, planning and navigation, human-like dexterous manipulation, intuitive human-robot interaction, and safe robot behavior.

National:

Across the country, employers seeking to remain competitive pursue graduates with this cutting-edge knowledge to help move their business forward. Universities struggle to find high quality, research faculty to meet the teaching and research needs of this rapidly growing field. An example of worldwide demand is demonstrated by the International Federation of Robotics report that predicts international robotics sales will increase five-fold by 2018 to 2,300,000 units (https://ifr.org/ifr-press-releases/news/ifr-forecast-1.7-million-new-robots-to-transform-the-worlds-factories-by-20). (See Appendix J for full-text article)

The national demand for experts in intelligent systems and robotics is large, yet technology firms and universities struggle to find people with the talent and skill their organizations need. Recent publications in the *Wall Street Journal*, *The Economist*, and *The New York Times* describe how technology giants such as Microsoft, Amazon, and Google search for employees with knowledge in intelligent systems and robotics. Private industries seeking intelligent systems and robotics expertise are funding university programs and offering new graduates with a Ph.D. six figure salaries. (WSJ http://www.wsj.com/articles/artificial-intelligence-experts-are-in-high-demand-1430472782 The Economist https://www.economist.com/news/business/21695908-silicon-valley-fights-talent-universities-struggle-hold-their NYT https://www.nytimes.com/2017/10/22/technology/artificial-intelligence-experts-salaries.html) (See Appendix J for full-text articles)

As intelligent systems and robotics is an emergent and multi-disciplinary field, the closest occupations with data are Computer and Information Research Scientists (15-1111), Computer Hardware Engineers (17-2061), and Mechanical Engineers (17-2141). All of these occupations command high salaries and have better than average growth potential as is shown in Table 1 below.

Table 1. *U.S. Ph.D. Job projections in closely related fields.*

Job Projections for Ph.D. Graduates in Intelligent Systems and Robotics						
United States	**SOC**	**Employment**		**Change**		**Median Salary**
	Code	**2016**	**2026**	**Percent**	**Numeric**	**2016**
Computer and Information Research Scientists	15-1111	27,900	33,200	19.0%	5,400	$111,840
Computer Hardware Engineers	17-2061	73,600	77,600	5.0%	4,000	$115,120
Mechanical Engineers	17-2141	288,800	314,100	9.0%	25,300	$84,190

Source: Occupational Outlook Handbook, Bureau of Labor Statistics https://www.bls.gov/ooh/

In addition, a search for Computer and Research professional job openings on the Computer Research Association site (https://cra.org/ads/ internet accessed 04/25/2018) found 42 positions advertised domestically in the professional and post-doctoral categories at two months old or less.

State:

Graduates of the Intelligent Systems and Robotics degree program will be competitive in filling employment needs in a number of qualified target industries in the State of Florida Job Creation Plan - Aviation/Aerospace, Homeland Security/Defense, and Infotech. Job growth for the field of Computer and Information Research Scientists and the related engineering fields is projected to rise through 2024 as shown in Table 2 below. Demand for Computer and Information Research Scientists will increase 4.5% with an overall increase in new jobs through 2024.

Table 2. *Florida Ph.D. Job projections in closely related fields.*

Job Projections for Ph.D. Graduates in Intelligent Systems and Robotics					
Florida	**SOC Code**	**Employment**		**Change**	
		2016	**2024**	**Percent**	**Numeric**
Computer and Information Research Scientists	15-1111	539	563	4.5%	24
Computer Hardware Engineers	17-2061	2,219	2,436	9.8%	71
Mechanical Engineers	17-2141	7,233	8,153	12.7%	344

Source: www.floridajobs.org

The Ph.D. in Intelligent Systems and Robotics is a new degree program and no SUS graduate income data is available for this CIP code 11.0102. However, graduate wage data is available

under the related CIP code of 11.0101. As shown in Table 3 below, the full-time average quarterly earnings for doctoral graduates in this field range from $12,908 to $37,500 according to a report published by the Florida Department of Education. These reported quarterly earnings equate to annual salaries ranging from $51,632 to $150,000.

Table 3. *Quarterly and annual earnings in closely related field (CIP 11.0101) for doctoral level graduates (research & professional).*

CIP 11.0101 - Doctorate in Computer & Information Science for 2015-2016		
Graduates	**Full Time Average Quarterly Earnings**	**Annual Earnings***
Florida Atlantic University	$19,584	$78,336
Florida International University	$12,908	$51,632
Florida State University	$25,785	$103,140
University of Central Florida	$37,500	$150,000
University of Florida	$24,957	$99,828

Source: http://www.fldoe.org/core/fileparse.php/7592/urlt/1516SUS-Program.pdf
*Calculated field

A strong program in intelligent systems and robotics serving advanced manufacturing, healthcare, defense, and other high-tech industries will provide significant economic benefit to the state. There is substantial grant funding potential for this degree program. One example is the National Robotics Initiative, led by the National Science Foundation and jointly sponsored by National Aeronautics and Space Administration, Department of Defense, Department of Energy, United States Department of Agriculture, and National Institutes of Health.

In the two-year period 2014-2016, the National Robotics Initiative awarded almost $150,000,000 in grants in years 2014-2016. Among the 30 states receiving awards, Florida ranked number 18, in the lower half. Florida's grant funding from the National Robotics Initiative was $2,094,253 distributed among five recipients. Pennsylvania ranked first with 31 grants totaling $22,033,789, ten times more than Florida. Georgia received 13 grants totaling $7,260,910, more than three times more than Florida.
(https://www.nsf.gov/awards/award_visualization.jsp?org=NSF&pims_id=503641&ProgEleCode=8013&from=fund).

Local:

Northwest Florida is home to a critical mass of national defense installations within a two- hour commute of UWF:

- Eglin Air Force Base,
- Naval Air Station Pensacola,
- Hurlburt Field,
- Naval Air Station Whiting Field,
- Tyndall Air Force Base

In a cascade effect, the regional economy supports the defense industry. Table 4 below is a small sample of local organizations that would benefit from the highly skilled labor pool that this degree program will produce.

Table 4. *Sample of local organizations that would benefit from UWF's Intelligent Systems and Robotics degree program.*

Aviation/Aerospace	Homeland Security Defense	Information Technology
VT Mae	Information Warfare Training Command Center Corry Station	Avalex
Airbus	Torch Technologies	Torch Technologies
Lockheed Martin	Lockheed Martin	L3 Technologies
Boeing	Applied Research Associates	General Dynamics IT
UTC Aerospace Systems	Ingalls Shipbuilding	TEKsystems

Sources: State of Florida Job Creation Plan and http://www.floridasgreatnorthwest.com/business-information/target-sectors/aerospace-defense

During the first year of the Intelligent Systems and Robotics degree program, the director and IHMC will form a local industry advisory council to provide guidance and insight on a variety of topics in the Ph.D. program. The overall goal of the industry advisory will be to provide a direct link between local and regional industries with the program.

B. Demand: Describe data that support the assumption that students will enroll in the proposed program. Include descriptions of surveys or other communications with prospective students.

There are currently three universities in the United States that offer a Ph.D. in artificial intelligence: Carnegie Mellon University in Pennsylvania, Georgia Institute of Technology in Georgia, and the University of Pittsburgh in Pennsylvania. The Ph.D. in Intelligent Systems and Robotics proposed by UWF would be the fourth doctoral-level degree program in the country in this field of study.

Because of high national demand for graduates with a Ph.D. in this field and the small number of doctoral level programs available, UWF anticipates students from other states as well as other countries to apply to the Intelligent Systems and Robotics Ph.D. degree program (See Appendix A Table 1-B). An additional area of prospective candidates for the Intelligent Systems and Robotics degree program will come from IHMC, which consistently attracts master's level research associates from around the world.

UWF expects some interest to come from high-performing graduates of undergraduate programs offered in the HMCSE. The university has a strong undergraduate Electrical and Computer Engineering degree program and in fall 2016, launched a B.S. in Mechanical Engineering degree program. UWF has an Artificial Intelligence and Robotics lab and an Unmanned Systems Lab with active undergraduate research programs. Recently, a student team competed in the IEEE SoutheastCon hardware competition and won second place with an autonomous robot that was only seconds slower than the winning team from University of Alabama. Table 5 below displays the five-year degree productivity for the UWF departments that are closely associated with the proposed degree program.

Table 5. *Annual degrees awarded by related departments of the Hal Marcus College of Science & Engineering, 2013-2017.*

Level	Department	2013	2014	2015	2016	2017	5 Year Total
Under-graduate	Computer Science	57	69	77	77	82	362
	Electrical & Computer Engineering	50	57	67	53	74	301
	Information Technology*	-	-	-	-	-	0
	Mechanical Engineering*	-	-	-	-	-	0
Graduate	Computer Science	50	46	42	30	23	191
Totals		**157**	**172**	**186**	**160**	**179**	**854**

*New programs in 2016

The graduates depicted in Table 5 reflect a pool of potential applicants as well. In spring 2018, the HCMSE surveyed students currently enrolled in degree programs in the Departments of Electrical and Computer Engineering, Mechanical Engineering, and Computer Science to determine their potential interest in a Ph.D. in Intelligent Systems and Robotics. Of the 149 respondents, 98 students or 65.8% responded with "yes" he or she would be interested in a Ph.D. in Intelligent Systems and Robotics. Considering current national demand for this highly advanced skillset, the limited number of Ph.D. degree programs in this field, and future potential demand from current UWF students in closely related fields, UWF asserts that there is sufficient demand for this Ph.D. degree program in Intelligent Systems and Robotics and projects growth over a five-year period.

C. If substantially similar programs (generally at the four-digit CIP Code or 60 percent similar in core courses), either private or public exist in the state, identify the institution(s) and geographic location(s). Summarize the outcome(s) of communication with such programs with regard to the potential impact on their enrollment and opportunities for possible collaboration (instruction and research). In Appendix C, provide data that support the need for an additional program.

The Ph.D. in Intelligent Systems and Robotics will be the first Ph.D. degree program within the state of Florida with CIP code 11.0102, Artificial Intelligence. Among the SUS institutions in Florida, there are five universities with doctoral degree programs in Computer Science CIP 11.0101. Table 6 below reflects the name and location of these institutions.

Table 6. *Florida Institutions that Offer a Ph.D. in a similar program with CIP 11.0101.*

Institution Name	Public/Private	Location	Program Name
Florida Atlantic University	Public	Boca Raton	Ph.D. in Computer Science
Florida International University	Public	Miami	Ph.D. in Computer Science
Florida State University	Public	Tallahassee	Ph.D. in Computer Science
University of Central Florida	Public	Orlando	Ph.D. in Computer Science
University of Florida	Public	Gainesville	Ph.D. in Computer Science

Prior to submission of this proposal, UWF's Interim Dean of the Hal Marcus College of Science and Engineering reached out to the other SUS institutions offering doctoral programs that may have some similarities. None of the respondents expected UWF's Ph.D. in Intelligent Systems and Robotics to impact their programs. In fact, UCF's chair said, "I applaud your initiative in creating this program, as there is a great demand from industry (and academia) for Ph.D.s in these fields."

UWF projects admissions to the program of 7-8 students annually for a projected enrollment of 35 doctoral students by year 5. Based on national and state need for graduates in this field, SUS graduate enrollment data shown in Table 7, and doctoral degrees awarded by SUS institutions in CIP 11.0101 shown in Table 8, UWF believes there to be sufficient demand for this degree program, and does not predict any negative impact on the SUS institutional enrollment or degree production.

Table 7. *All graduate levels program enrollment numbers at SUS institutions.*

CIP Code: 11.0101 Computer and Information Sciences, General					
	2013	2014	2015	2016	2017
FAU	109	83	75	109	106
FIU	131	129	133	135	117
FSU	163	166	142	153	164
UCF	179	215	238	253	285
UF	105	216	346	695	582
Total	687	809	934	1,345	1,254

Source: flbog.edu/resources/iud/enrollment_results.php

Table 8. *Doctoral degrees awarded by SUS institutions.*

CIP Code: 11.0101 Computer and Information Sciences, General					
	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
FAU	2	2	3	2	4
FIU	5	8	11	15	8
FSU	7	8	7	9	6
UCF	16	11	6	13	9
UF	-	-	-	-	7
Total	30	29	27	39	34

Source: flbog.edu/resources/iud/degrees_results.php

While UWF has not currently developed any formal collaboration agreements with other SUS institutions for the Ph.D. degree program, IHMC currently has active affiliation agreements with several SUS institutions. UWF is open to the idea of collaboration opportunities with similar programs in the area of intelligent systems and robotics where beneficial to all parties. (See Appendix C for Summary of Similar Programs)

D. Use Table 1 in Appendix A (1-A for undergraduate and 1-B for graduate) to categorize projected student headcount (HC) and Full Time Equivalents (FTE) according to primary sources. Generally undergraduate FTE will be calculated as 30 credit hours per year and graduate FTE will be calculated as 24 credit hours per year. Describe the rationale underlying enrollment projections. If students within the institution are expected to change majors to enroll in the proposed program at its inception, describe the shifts from disciplines that will likely occur.

This program will be the first Ph.D. program at UWF and its first doctoral level program in STEM, therefore students are not expected to transfer into this program. UWF and the Hal Marcus College of Science and Engineering anticipate increased enrollment in its undergraduate programs as a result of implementing this new Ph.D. program.

The university does expect some applicants from other Florida universities who will be interested in the Intelligent Systems and Robotics degree program. As the degree program will limit acceptance to a cohort of 7-8 students per year for a projected year 1 FTE of 3.85, UWF does not anticipate a noticeable impact on SUS enrollment in similar programs. Due to the affiliation with IHMC and their history of global recruitment for both researchers and students, UWF anticipates being able to recruit nationally and internationally to attract the highest quality students into the program. Table 1-B in Appendix A shows seven new students per year resulting in a total enrollment of 35 students for a projected FTE of 19.25 by Year 5.

E. Indicate what steps will be taken to achieve a diverse student body in this program. If the proposed program substantially duplicates a program at FAMU or FIU, provide, (in consultation with the affected university), an analysis of how the program might have an impact upon that university's ability to attract students of races different from that which is predominant on their campus in the subject program. <u>The university's Equal Opportunity Officer shall review this section of the proposal and then sign and date Appendix B to indicate that the analysis required by this subsection has been completed</u>.

Neither FAMU nor FIU have expressed concerns about any potential impact the Ph.D. in Intelligent Systems and Robotics may at their institutions.

At this time, neither FAMU nor FIU offers Ph.D. programs in Intelligent Systems and Robotics. FAMU has Ph.D. programs in Electrical, Mechanical, and Computer Engineering. Students in those programs take courses in robotics through the Center for Intelligent Systems, Control, and Robotics (CISCOR), but artificial intelligence is not the focus of the program. FIU has some individual courses in Intelligent Systems including EEL 6267 "Application of Intelligent Systems to Power System Operations," but no program with the same emphases as the one proposed at UWF.

Consistent with its mission, UWF has admissions policies that balance attention to access, inclusiveness, and quality. In addition, UWF encourages applications from qualified persons and does not discriminate on the basis of age, color, disability, gender (including gender identity and sex), marital status, national origin, race, religion, sexual orientation, or veteran status. Also,

UWF's New Academic Program Approval Policy requires that programs appropriately address diversity. Therefore, the university and its degree programs take proactive measures to achieve a diverse student body. Recruitment efforts extend to many geographic regions to attract prospective students.

The proposed Ph.D. in Intelligent Systems and Robotics degree program will be marketed to multiple student segments: students from agencies and industries in UWF's service area, students from other UWF programs, students from other institutions, and students from other countries. Program faculty and staff will use multiple outreach methods to ensure diversity in the program. The faculty have and will continue to showcase UWF's Ph.D. in Intelligent Systems and Robotics degree program and discuss coursework and career goals with all interested applicants. The Hal Marcus College of Science and Engineering will implement a comprehensive marketing campaign to promote the proposed degree program to the aforementioned student segments.

The Hal Marcus College of Science and Engineering currently attracts a diverse student body to its programs, and program coordinators anticipate a continued diversity of students in the new degree program (Figure 1).

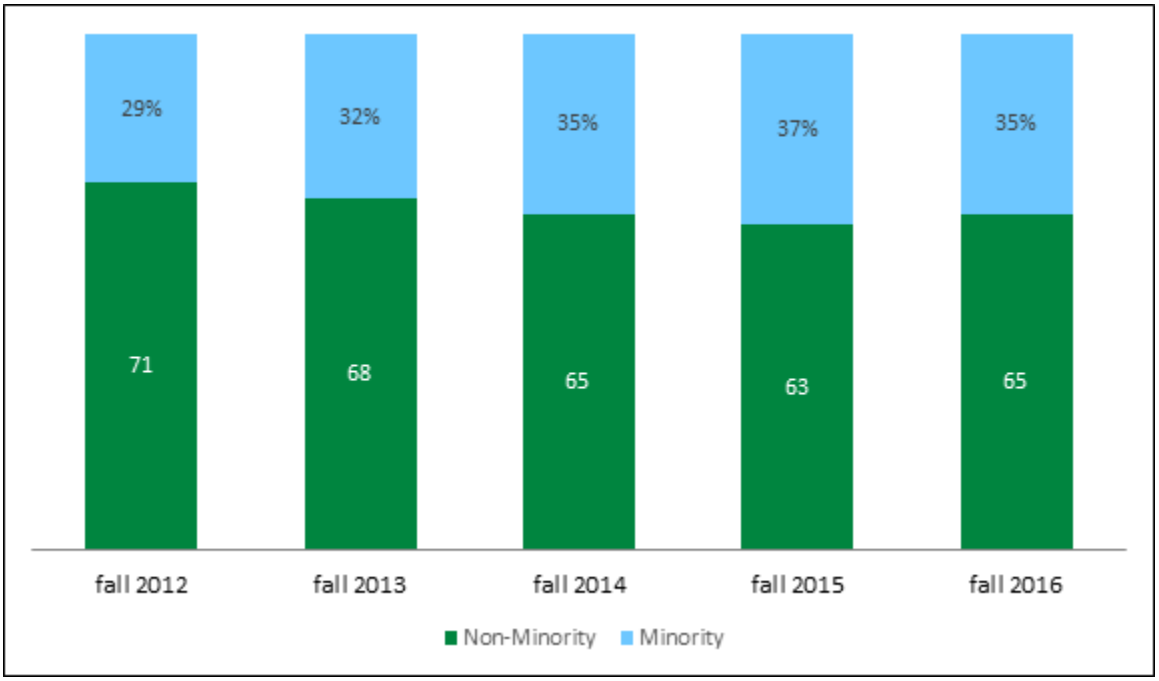

Figure 1. Five-year comparison of diversity in UWF's current Computer Science, Computer Engineering, and Electrical Engineering degree programs

III. Budget

A. Use Table 2 in Appendix A to display projected costs and associated funding sources for Year 1 and Year 5 of program operation. Use Table 3 in Appendix A to show how existing Education & General funds will be shifted to support the new program in Year 1. In narrative form, summarize the contents of both tables, identifying the source of both current and new resources to be devoted to the proposed program. (Data for Year 1 and Year 5 reflect snapshots in time rather than cumulative costs.)

Expected expenses for Year 1 of the program are $314,020, all of which will come from E&G. For faculty salaries and benefits, a Year 1 budget allocation of $229,772 is for the program

director and one additional new faculty hire. The funds for the two new faculty lines in Year 1 and two additional faculty lines by Year 5 will come from the funds provided by the Florida Legislature's World Class Faculty and Scholar Program (2018 Florida Statute Title XLVIII Chapter 1004.6497).

The portion of existing UWF faculty salaries at $45,248 will be reallocated from the departments of Computer Science and Engineering. HCMSE will also reallocate a portion of existing staff of $14,000 in Year 1 to assist in programmatic duties for the Ph.D. degree program.

Due to initial enrollment of 7-8 students and the requirement of core and foundational courses, UWF anticipates that all teaching duties and research supervision of doctoral students will be handled by UWF faculty in Year 1. At this time, there is no projected need for OPS expenses in Year 1. Should the need arise for involvement of IHMC Researchers with doctoral student research in Year 1, these services will be paid with a portion of the Hal Marcus endowment to UWF for College of Science and Engineering to the extent these activities qualify as high impact and/or other UWF foundation funds which are currently available to enhance academic programming. The program has allocated $125,000 for graduate assistantships also to be paid from Hal Marcus College of Science and Engineering endowment funds in Year 1.

UWF estimates that the new program will incur $25,000 in expenses in Year 1 to be allocated to E&G. Although this is a new program, after consultation with the Dean of UWF Libraries, the existing collection of journals, electronic databases, and other library holdings are sufficient to implement and sustain this program through Year 5. There is no additional library allocation for this program for Year 1 or Year 5.

In Year 5, Table 2 shows a total Continuing Base for faculty salaries of $582,903, which includes $229,772 (salary and benefits) for two new faculty lines (funded by 2018 Florida Statute Title XLVIII Chapter 1004.6497) added in years two and three of the program. The staff member cost is shown in A&P Salaries & Benefits in Year 5 at $17,017 to account for salary increases and the increased cost of benefits at a rate of 5% per year.

Due to the intensive nature of the research between faculty and Ph.D. students and to support projected enrollment growth, UWF will leverage IHMC Researchers to serve as adjuncts, research mentors, and dissertation committee members for students in the program with an OPS cost of $371,250 in Year 5. Assistantships & Fellowships are estimated at $500,000 in Year 5 to support more students due to enrollment growth. UWF will utilize Hal Marcus College of Science and Engineering endowment funds as well as other UWF foundation funds currently available to fund both the OPS expense and Assistantships & Fellowships. Grant funds are anticipated and will be pursued to reduce E&G costs to the university and foundation funds.

Further estimated degree program expenses are $50,000 in Year 5 and will be allocated to E&G.

The projected Year 1 E&G Cost per FTE is projected to be $81,564, higher than the SUS average of $22,872. This is due to startup costs of hiring two new faculty and low overall degree program enrollment of a new Ph.D. program in Year 1.

By Year 5, the E&G Cost per FTE is projected to be $33,762, still higher than the SUS average of $22,872. This is due primarily to four new faculty lines dedicated to the Ph.D. degree program. It should be noted that the university plans to utilize the World Class Faculty and

Scholars Program (funded by 2018 Florida Statute Title XLVII Chapter 1004.6497) for this purpose.

UWF expects the benefits of this degree program to the university, region, and state to be significant in terms of advancing research, reputation, and grant opportunities for the university and the Ph.D. degree program. Faculty at UWF and IHMC Researchers will actively pursue grants and external funding. For the purpose of this proposal, only Hal Marcus College of Science and Engineering endowment funds and other UWF foundation funds which are currently available have been applied.

B. Please explain whether the university intends to operate the program through continuing education, seek approval for market tuition rate, or establish a differentiated graduate-level tuition. Provide a rationale for doing so and a timeline for seeking Board of Governors' approval, if appropriate. Please include the expected rate of tuition that the university plans to charge for this program and use this amount when calculating cost entries in Table 2.

The University will not offer the program on a cost-recovery basis, nor will it seek approval for market tuition rate.

C. If other programs will be impacted by a reallocation of resources for the proposed program, identify the impacted programs and provide a justification for reallocating resources. Specifically address the potential negative impacts that implementation of the proposed program will have on related undergraduate programs (i.e., shift in faculty effort, reallocation of instructional resources, reduced enrollment rates, greater use of adjunct faculty and teaching assistants). Explain what steps will be taken to mitigate any such impacts. Also, discuss the potential positive impacts that the proposed program might have on related undergraduate programs (i.e., increased undergraduate research opportunities, improved quality of instruction associated with cutting-edge research, improved labs and library resources).

The proposed Ph.D. degree program will have no negative impacts on existing UWF programs. There are no competing doctoral programs from which the proposed program might draw resources nor students. The other doctoral level degree program at UWF is an Ed.D. in an unrelated field of study. The faculty and Dean of the Hal Marcus College of Science and Engineering anticipate that the program will have positive impacts on enrollments in the related undergraduate and master's degree programs in computer science, cognitive psychology, engineering, biomedical science, and other related science disciplines.

D. Describe other potential impacts on related programs or departments (e.g., increased need for general education or common prerequisite courses, or increased need for required or elective courses outside of the proposed major).

As a doctoral level program, the Ph.D. in Intelligent Systems and Robotics will have no impact upon general education or common prerequisite courses.

E. Describe what steps have been taken to obtain information regarding resources (financial and in-kind) available outside the institution (businesses, industrial organizations, governmental entities, etc.). Describe the external resources that appear to be available to support the proposed program.

UWF has designed the new degree program specifically to affiliate with IHMC in order to maximize the benefit of their existing facilities, research, grant funding, and scientists.

IV. Projected Benefit of the Program to the University, Local Community, and State

Use information from Tables 1 and 2 in Appendix A, and the supporting narrative for "Need and Demand" to prepare a concise statement that describes the projected benefit to the university, local community, and the state if the program is implemented. The projected benefits can be both quantitative and qualitative in nature, but there needs to be a clear distinction made between the two in the narrative.

Nationally, only three universities offer a specific Ph.D. program in Intelligent Systems and Robotics. UWF's degree program in Intelligent Systems and Robotics will attract talented students from around the world to Florida and will draw from, and bolster UWF's existing baccalaureate and master's degree programs in engineering and computer science. The Intelligent Systems and Robotics degree program will provide opportunities for the university to achieve national distinction through the production of high quality doctoral graduates. In turn, UWF will be providing critical support to in-demand high technology career fields from medical device development to remote exploration to industrial robotics.

The creation of the proposed Ph.D. in Intelligent Systems and Robotics degree program will have clear benefits to the university. Specifically, it will achieve the following:

- Complement the existing Electrical and Computer Engineering and Computer Science programs and strengthen some aspects within their curricula (e.g., robotics, unmanned systems, etc.).
- Provide more research and collaboration opportunities within the university and with outside entities through the affiliation with IHMC.

The proposed program will also have clear benefits to the local community and state:

- The program matches a national demand for graduates in intelligent systems and robotics with the existing Northwest Florida hub for advanced manufacturing and military bases.
- Graduates with a Ph.D. in Information Science earn a median annual salary of $96,587 (source: Florida Dept of Education).
- The program will enhance the local economy by helping engender more high-tech industry and well-paying jobs in Northwest Florida.

V. Access and Articulation – Bachelor's Degrees Only

A. If the total number of credit hours to earn a degree exceeds 120, provide a justification for an exception to the policy of a 120 maximum and submit a separate request to the Board of Governors for an exception along with notification of the program's approval. (See criteria in Board of Governors Regulation 6C-8.014)

Not applicable, this is a doctoral level program.

B. List program prerequisites and provide assurance that they are the same as the approved common prerequisites for other such degree programs within the SUS (see link to the Common Prerequisite Manual on the resource page for new program proposal). The courses in the Common Prerequisite Counseling Manual are intended to be those that are

required of both native and transfer students prior to entrance to the major program, not simply lower-level courses that are required prior to graduation. The common prerequisites and substitute courses are mandatory for all institution programs listed, and must be approved by the Articulation Coordinating Committee (ACC). This requirement includes those programs designated as "limited access."

If the proposed prerequisites are not listed in the Manual, provide a rationale for a request for exception to the policy of common prerequisites. NOTE: Typically, all lower-division courses required for admission into the major will be considered prerequisites. The curriculum can require lower-division courses that are not prerequisites for admission into the major, as long as those courses are built into the curriculum for the upper-level 60 credit hours. If there are already common prerequisites for other degree programs with the same proposed CIP, every effort must be made to utilize the previously approved prerequisites instead of recommending an additional "track" of prerequisites for that CIP. Additional tracks may not be approved by the ACC, thereby holding up the full approval of the degree program. Programs will not be entered into the State University System Inventory until any exceptions to the approved common prerequisites are approved by the ACC.

Not applicable, this is a doctoral level program.

C. If the university intends to seek formal Limited Access status for the proposed program, provide a rationale that includes an analysis of diversity issues with respect to such a designation. Explain how the university will ensure that Florida College System transfer students are not disadvantaged by the Limited Access status. NOTE: The policy and criteria for Limited Access are identified in Board of Governors Regulation 6C-8.013. Submit the Limited Access Program Request form along with this document.

Not applicable, this is a doctoral level program.

D. If the proposed program is an AS-to-BS capstone, ensure that it adheres to the guidelines approved by the Articulation Coordinating Committee for such programs, as set forth in Rule 6A-10.024 (see link to the Statewide Articulation Manual on the resource page for new program proposal). List the prerequisites, if any, including the specific AS degrees which may transfer into the program.

Not applicable, this is not an AS-to-BS capstone degree program.

Institutional Readiness

VI. Related Institutional Mission and Strength

A. Describe how the goals of the proposed program relate to the institutional mission statement as contained in the SUS Strategic Plan and the University Strategic Plan (see link to the SUS Strategic Plan on the resource page for new program proposal).

The Ph.D. in Intelligent Systems and Robotics degree program strongly aligns with the University of West Florida 2017-2025 Strategic Plan as follows:

Strategic Direction 1.1: Provide high-quality learning and co-curricular experiences that inspire students to become enlightened and engaged global citizens and successful professionals.

UWF values research opportunities for students at all levels through initiatives that allow students to develop research and professional skills as well as develop the ability to think

critically, acquire confidence, and inspire creativity. These professional skills and personal qualities are highly valued by employers seeking future employees who will seek to sustain and grow their businesses.

The doctoral degree program in Intelligent Systems and Robotics is an example of the type of high quality research opportunity that UWF will provide students to collaborate with seasoned researchers working on the cutting edge of innovation. UWF faculty and IHMC Researchers will mentor the doctoral students as they expand their creativity and critical thinking skills by adding to be body of knowledge and innovation in the field of intelligent systems and robotics.

Strategic Direction 3.3: Augment and invest in academic and research programs that meet professional, personal, scholastic, and workforce needs.

The Northwest region of Florida and the state of Florida as a whole have identified the need for a workforce skilled in information technology and engineering fields to support growth in defense, aerospace, advanced manufacturing, and healthcare. To meet existing and future workforce demands, UWF has developed the doctoral degree program in Intelligent Systems and Robotics to enhance the pool of highly-skilled professionals and researchers to support economic growth at the regional, state, and national levels.

B. Describe how the proposed program specifically relates to existing institutional strengths, such as programs of emphasis, other academic programs, and/or institutes and centers.

UWF has strong, well-attended undergraduate programs in Computer Science and Engineering as well as master's degree programs in Computer Science and Information Technology. These programs will provide future students for the Ph.D. program. In support of the program, the affiliation with IHMC provides access to significant human and physical resources. IHMC has recently completed an $8,000,000 building that houses their robotics program and provides an excellent adjunct to UWF's recent $32,000,000 Science and Engineering building that houses the departments of Computer Science, Electrical and Computer Engineering, and Mechanical Engineering. In addition, UWF faculty and students are active in a variety of research activities related to intelligent systems and robotics. A few highlights are below:

- 2nd place in the IEEE SoutheastCon Hardware Competition held in Tampa, FL in April 2018 by UWF's Robotics team
- NSA National Center of Academic Excellence designation for UWF's Center for Cyber Security
- Artificial Intelligence Research Group comprised of faculty, undergraduate and graduate students
- Faculty research projects in intelligent systems and robotic mobility aids

IHMC Researchers are working on advancing autonomous capabilities of robots and software agents with the aim of creating more effective machine teammates. IHMC's national and international reputation in robotics is highlighted by their success in the following competitions including:

- 2nd place in the 2015 DARPA Robotics Challenge (U.S. Defense Advanced Research Projects Agency)

- 2nd place 2017 World Cybathlon (competition for disabled athletes aided by wearable robotics)
- 1st place in the science and medicine category at the 12th Annual People's Choice Podcast Awards
- Seven IHMC Researchers are NAI Fellows named by the National Academy of Inventors

C. Provide a narrative of the planning process leading up to submission of this proposal. Include a chronology in table format of the activities, listing both university personnel directly involved and external individuals who participated in planning. Provide a timetable of events necessary for the implementation of the proposed program.

The preliminary planning phase took place in summer and early fall, 2015 with the preparation of the CAVP Pre-proposal. The detailed planning process commenced in fall, 2015 with a meeting of UWF and IHMC personnel. Numerous planning meetings were held to formulate the curriculum, to identify and hire an external consultant, to establish a funding model, and to develop the proposal. Details are presented in Tables 9 and 10 below.

Table 9. *Planning process*

Date	Participants	Planning Activity
Nov. 20, 2015	Provost, HMCSE Dean, members of UWF and IHMC	Kickoff meeting
Dec 2015 – Feb 2016	Committee	Discussions of curriculum, funding, library and physical assets, general concerns of external consultant
Feb 26, 2016	Coffey, Bagui, HMCSE Dean	Update to the Dean, feedback on emerging plan
March 1, 2016	Coffey & Ken Wright at Moffett Cancer Center	Phone conversation and email exchange for information regarding an exemplar collaborative program
March 2016 – May 2016	Meetings with IHMC, consultation with ASPIRE	Begin curriculum discussions; external consultant selection; development of timeline; plan updates; discussions of library and physical resources; etc.
May 25, 2016	Coffey, Heise, Day, Arkin	Preliminary agreement with Dr. Ron Arkin at Georgia Tech to serve as external consultant
June 30, 2016	External Consultant, Committee, UWF faculty, ASPIRE, Provost, IHMC	On-campus visit by the external consultant
August, 2016	External Consultant	External Consultant Report
Aug, 2016 May, 2017	Committee, HMCSE Dean	Work on recommendations from the first External Consultant report
Dec 2017	HMCSE Dean	Initiation of paperwork to hire IS&R faculty
Dec 2017 - March 2018	Committee, ASPIRE	Modifications to the curriculum, continued preparation of the Request to Offer
Jan, 2018 - April 2018	Coffey, Beamer, Schwartz, Moorer, Graduate Counsel, Dean's Office and others	Preparation, review, and approval of Program and Course CCRs

Table 10. *Events leading to implementation*

Date	Implementation Activity
September 2015	CAVP Conference call - No concerns
December, 2015 – June 2016	Meetings of the committee (as documented above) to formulate the proposal, create an advisory board, prepare CCRs, and identify an external consultant
June, 2016	Completed contract with External Consultant
July, 2016	First version of the proposal sections pertaining to curriculum, faculty, and library and physical resources submitted for review by the external consultant. Edits to the proposal made on the basis of feedback.
August, 2016	Proposal sections pertaining to the funding model submitted for review by the external consultant. Edits to the proposal made based on feedback.
October 2016	Feedback from external consultant
August, 2017 - May, 2018	Development of the Affiliation Agreement between UWF and IHMC, formalizing the prerogatives and responsibilities of each in the program
December, 2017 - March, 2018	Continued development of the Request to Offer the new degree program
March, 2018 - May, 2018	Internal approvals for the program (UWF Faculty Senate, Provost, President)
June, 2018 (anticipated)	Approval of the Proposal by the University of West Florida Board of Trustees
November, 2018 (anticipated)	Approval of the Proposal by the Florida Board of Governors
December, 2018 (anticipated)	Submission of Substantive Change Prospectus to SACSCOC
June, 2019 (anticipated)	Approval by SACSCOC Board of Trustees
Spring and summer 2019 (anticipated)	Advertise the program with stipulation “pending SACSCOC approval”; make acceptance decisions for first class
August, 2019 (anticipated)	Launch Program

VII. Program Quality Indicators - Reviews and Accreditation

Identify program reviews, accreditation visits, or internal reviews for any university degree programs related to the proposed program, especially any within the same academic unit. List all recommendations and summarize the institution's progress in implementing the recommendations.

Pursuant to Florida Board of Governor’s Regulation 8.015, all academic departments at UWF conduct program reviews every seven years. The Department of Computer Science conducted its last program review in 2013-2014. The program review committee recommended the department pursue disciplinary accreditation. The Department of Computer Science received a positive evaluation of its readiness review in 2017 and is on track for ABET accreditation by fall, 2018. The Department of Electrical and Computer Engineering, also housed in the Hal Marcus College of Science and Engineering, currently has ABET accreditation for undergraduate degrees in Computer Engineering and Electrical Engineering. The new (fall, 2016) Department of

Mechanical Engineering has the Bachelor's degree in Mechanical Engineering which will go through the ABET review in the 2018-19 academic year. ABET does not accredit doctoral programs.

VIII. Curriculum

A. Describe the specific expected student learning outcomes associated with the proposed program. If a bachelor's degree program, include a web link to the Academic Learning Compact or include the document itself as an appendix.

By completing the Ph.D. in Intelligent Systems and Robotics degree program, students will attain the following competencies:

Content

- Analyze, synthesize, and evaluate concepts and models for intelligent systems and robotics, including analyses based on relevant mathematics, statistics, engineering, and concepts related to machine learning, knowledge representation, and reasoning.
- Construction and complete a dissertation that advances knowledge in a focused area of research related to intelligent systems and robotics.
- Design and create specific hardware and/or software that demonstrates proof of concept in conjunction with coursework and dissertation.

Critical Thinking

- Identify, describe, and appraise the significance of unresolved research questions pertaining to intelligent systems and robotics.

Communication

- Analyze, synthesize, and communicate research results in oral and written form.

Integrity/Values

- Demonstrate and apply salient professional ethics to the implementation of research.

Project Management

- Design and conduct team-based research in the field of intelligent systems and robotics, and draw defensible conclusions from that research.

B. Describe the admission standards and graduation requirements for the program.

Admission and graduation requirements are available from the University of West Florida Catalog (http://catalog.uwf.edu) and in (See Appendix F).

Admission Standards:

- Submission of the Graduate Record Exam (GRE). Attainment at the 70% percentile is preferred.
- Hold a master's degree in Computer Science, Mathematics, Engineering, Physics, or a similar technical degree. Bachelor's candidates with strong relevant industrial experience will be considered. Incoming students who do not hold a master's degree in an approved area will be required to complete a minimum of 48 SCH of content-based coursework (9

SCH of post-bachelor courses, 9 SCH of doctoral core courses, and 30 SCH of doctoral electives) in addition to the required 24 SCH of dissertation. Students may petition to satisfy preparatory coursework by proficiency examination. Any coursework taken from outside the program must be approved by the student's advisor and program director.

- Master's or bachelor's cumulative GPA - minimum of a 3.0 GPA; however, successful applicants will typically have GPAs well above the minimum.
- Submission of a personal statement describing prior experiences and accomplishments in intelligent systems and robotics, and an indication of the student's goals in pursuing the current degree.
- A minimum of three letters of recommendation are required from academic and professional recommenders attesting to the applicant's graduate studies potential. At least one of the letters of recommendation submitted must be from an academic reference. Please be sure to advise recommenders of the following requirements: All letters of recommendation must be on official letterhead of the recommender's institution or organization and must have their official written signature.
- Those without a background in algorithm analysis, data structures, and advanced computer programming skills will require additional preparatory work.
- Applicants from countries where English is not the official language must also demonstrate proficiency in English. The Admissions Committee reserves the right to conduct telephone interviews with these applicants. For a complete listing of admission requirements for international applicants, please visit the International Graduate Admission section of the catalog.

Advancement to Candidacy

- Completion of 18 or 48 SCH for candidates entering the program with an approved master's or bachelor's degree, respectively.
- Passing a comprehensive qualifying exam with written and oral components.

Dissertation

- All doctoral candidates are required to work with a faculty mentor to conduct, document, and publicly defend a piece of original research.

Graduation Requirements

- Students will complete 9 SCH of core didactic coursework in Intelligent Systems and Robotics (specified in the next sections)
- Students will complete *at least* 9 SCH of didactic coursework in their specialization area
    - Students who enter the degree program without a master's are required to complete 39 SCH
- Students may select elective hours of didactic coursework or mentored research experience
- Students will complete a Qualifying Examination
- Students will complete a minimum of 24 SCH of dissertation. The dissertation will consist of original research designed and conducted under the supervision of a dissertation advisor. The student will assemble a dissertation committee consisting of the research advisor and a minimum of three other members. The student will write a dissertation proposal, defend it before the committee, and conduct the dissertation research study once the proposal has been approved by the committee. The student will

then write the results in the dissertation document and defend the study before the committee.

C. Describe the curricular framework for the proposed program, including number of credit hours and composition of required core courses, restricted electives, unrestricted electives, thesis requirements, and dissertation requirements. Identify the total numbers of semester credit hours for the degree.

The curricular framework for the proposed program is 42 SCH minimum for students who enter the program with an approved master's degree. Degree requirements outlined as follows:

- Complete 6 required courses (18 SCH):
  - 3 core courses
  - 3 specialization courses
  - Additional courses as deemed necessary by student's advisor
- Pass Qualifying Exam
- Make requests for committee: composed of research advisor and a minimum of three other members
- Obtain approval of dissertation proposal
- Complete 24 SCH dissertation minimum
- Defend dissertation

The curricular framework for the proposed program is 72 SCH minimum for students who enter the program without an approved master's degree. Degree requirements outlined as follows:

- Complete 16 required courses (48 SCH)
  - 3 core courses (9 SCH)
  - 3 specialization courses (9 SCH)
  - 10 courses in specialization or as program-approved electives (30 SCH)
  - Additional courses as deemed necessary by student's advisor
- Pass Qualifying Exam
- Make requests for committee: composed of research advisor and a minimum of three other members
- Obtain approval of dissertation proposal
- Complete 24 SCH dissertation minimum
- Defend dissertation

The curricular framework allows flexibility for the creation of individualized programs to meet student needs. The first semester provides foundational coursework. The second semester is comprised of specialization courses pertaining to the student's area of interest. Following advancement to candidacy, the program requires 24 SCH of dissertation.

UWF Policy states that doctoral students who have completed the required coursework in their program of study and enrolled in dissertation credits are considered full time students. This policy allows for the Ph.D. degree program to require fewer dissertation credits than similar programs at other institutions. As such, the expected time to degree for the students is five years post-bachelor's degree and four years post-master's degree. This length of time for degree completion is comparable to other Ph.D. programs in the State University System of Florida.

D. Provide a sequenced course of study for all majors, concentrations, or areas of emphasis within the proposed program.

The sequenced courses of study below in Tables 11 and 12 reflect minimum semester credit hour requirements of 9 SCH Core Courses, 9 SCH Electives, 24 SCH Dissertation and benchmarks of qualifying exam, dissertation proposal, and dissertation defense. Students without an approved master's degree must complete an additional 30 SCH of electives in the degree program.

Table 11. *Sequenced course of study for students in proposed Intelligent Systems and Robotics degree program for Students with an approved master's degree*

Students with an Approved Master's Degree					
Semester	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Fall	3 Core Courses (9 SCH)	Dissertation (3 SCH) Dissertation Proposal	Dissertation (3 SCH)	Dissertation (3 SCH) Dissertation Defense	
Spring	3 Elective Courses (9 SCH)	Dissertation (3 SCH)	Dissertation (3 SCH)		
Summer	-Additional Courses as needed per Advisor -Advanced topics per advisor -Qualifying Exam -Dissertation Topic/ Prospectus Preparation (3 SCH)	Dissertation (3 SCH)	Dissertation (3 SCH)		

Table 12. *Sequenced course of study for students in Intelligent Systems and Robotics degree program for students without an approved master's degree*

Students without an Approved Master's Degree					
Semester	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Fall	3 Core Courses (9 SCH)	-Additional Courses as needed per Advisor (6 SCH)	-Additional Courses as needed per Advisor -Qualifying Exam -Dissertation Topic/Prospectus Preparation (3 SCH)	Dissertation (3 SCH)	Dissertation (3 SCH)
Spring	3 Specialization Courses (9 SCH)	-Additional Courses as needed per Advisor (6 SCH)	Dissertation (3 SCH) Dissertation Proposal	Dissertation (3 SCH)	Dissertation (3 SCH) Dissertation Defense
Summer	-Additional Courses as needed per Advisor (6 SCH)	-Additional Courses as needed per Advisor (6 SCH)	Dissertation (3 SCH)	Dissertation (3 SCH)	

E. Provide a one- or two-sentence description of each required or elective course.

Core Courses (Required – all students take these courses)

EEL6XXX Foundations of Intelligent Systems and Robotics (3 SCH)
Models and methods of intelligent systems and robotics focusing on mathematical and algorithmic underpinnings. Semantic and geometric representations of people, robots and their environments, sensing and perception, collision avoidance, planning, reasoning, search, reasoning and planning under uncertainty, motion planning and control, neural networks, Markov models, ethics.

ISC6529 Research Methods for Intelligent Systems and Robotics (3 SCH)
Models and methods of intelligent systems and robotics focusing on computational methods and their algorithmic performance. Optimization theory, sampling theory, partially observable Markov decision processes, recursive Bayesian filters including Kalman and particle filters, supervised and unsupervised machine learning, deep learning, incremental sampling and search.

EEL6XXX Special Topics in Intelligent Systems and Robotics (3 SCH) An independent research-oriented seminar course in the foundations of intelligent systems and robotics. The course is interdisciplinary in nature, providing an integrated view of the relationships

between hardware and software in intelligent systems. Students conduct individual or small-group research, present research findings to the class and conduct discussions of the work they present. Admission to the class is by permission of the instructor.

Elective Courses

EGM6XXX Engineering Foundations for Robotics (3 SCH)
This course is focused on robot modeling and it covers robot kinematics such as forward kinematics, inverse kinematics, and differential kinematics. In addition, it deals with robot dynamics, trajectory generation, and tracking. Advanced topic on high-level control such as admittance and impedance control will also be covered.

CAP6XXX Intelligent Agents (3 SCH)
The course will cover the underlying theory of intelligent agents, their implementation, and applications of single and multi-agent systems. The course will consider common agent architectures and various methods of agent cooperation. Students will construct their own agents in order to solve a range of problems. The course will employ simulations of multi-agent systems involving both cooperating and competing agents.

CAP6XXX Advanced Data Mining (3 SCH)
This course will cover advanced topics in data mining including large-scale data mining using Map-reduce, similarity search (including minwise hashing and locality sensitive hashing), mining data streams, mining social networks, relational data mining, and matrix factorization methods for data mining.

EEL6XXX Multivariable Linear Control Systems (3 SCH)
This course focuses on input-output and state space representation of linear continuous time dynamic systems. Analysis and synthesis techniques for multi-input (MIMO) control systems. Design and analysis of single and multi-variable feedback control systems in transform and time domain. Study of the stability and robustness of feedback loops. Approaches for optimal and robust feedback control design, chiefly H2, H-infinity, and mu synthesis.

EEL6XXX Bipedal Walking Robots (3 SCH)
This course is the study of walking robots and what it means to balance. It first considers static balance and basic quadrupedal walking based on static stability, followed by dynamic balancing and the study of the fundamentals of the inverted pendulum. The course will then work through a series of increasingly complex bipedal walkers. Throughout the course various ways to interpret stability including static stability, center of mass, center of pressure, zero moment point and capturability are considered. The course also addresses how complex movement including running and trotting are achieved. The course considers how disturbances affect walking, such as unexpected step-downs and pushes. Consideration is given to how walking robots can be made robust to such disturbances. This course will be conducted mostly in simulation using the IHMC Simulation Construction Set software. Advanced students may be able to take advantage of the walking robots at the IHMC Robotics Lab. The course work will involve reading material focused on different approaches to walking several programming projects.

EEL6XXX Wearable Robotics (3 SCH)
This course introduces various concepts and components of autonomous systems in an autonomous mobile robotics context. The main concepts covered include locomotion, vehicle kinematics, autonomous navigation and intelligent path planning and perception. System components include various types of sensors and actuators and state-of-the-art technologies.

ISC7248 Deep Reinforcement Learning (3 SCH)
This course addresses deep learning and reinforcement learning and their combination in deep reinforcement learning. The course covers various reinforcement learning techniques including dynamic programming, value iteration, policy iteration, and actor-critic methods. It covers various deep learning techniques including convolution neural networks and learning through backpropagation. These techniques will be combined for learning policies for various control applications. Extensive software projects will utilize open source libraries from several sources. Students will implement solutions to various problems, including agents that learn to play video games, as well as complex dynamic systems, such as bipedal walking robot simulations.

CEN7XXX Human Agent/Robot Teamwork (3 SCH)
This course in an introduction to current methods used in computational visual perception. It presents concerns pertaining to both low level and high level perception. The course addresses fundamental aspects of image processing, the description and representation of visual features, image synthesis methods, and computational models of face, object and scene recognition. The course contains a consideration of how current knowledge pertaining to human perception may inform the development of machine vision systems.

CEN7XXX Topics in Natural Language Processing (3 SCH)
This course provides an introduction to the underlying theory of natural language processing from probability, statistics, and machine learning. The course covers a broad range of topics in natural language processing, including tokenization and parsing, probabilistic parsing, text classification, information extraction, meaning extraction, and question answering. The course includes a survey of algorithms including n-gram language modeling, naive Bayes classifiers, vector-space models, hidden Markov models, and probabilistic dependency and constituent parsing.

CEN7XXX Advanced Topics in Intelligent Systems and Robotics (3 SCH)
This course is available to allow students to explore theory pertaining to special topics related to their area of research interest. This course is optional and available to enrich the student's understanding in preparation for dissertation work. Course goals, readings, and deliverables are determined by the student and advisor. Enrollment is by permission.

Dissertation

ISC 8980 Dissertation 1-6 SCH (will be taken for at least 24 SCH of credit total)
Major individual research in a relevant research area. The dissertation reflects intensive research produced by the student and collaboratively developed with the student's graduate committee. Graded on a satisfactory/unsatisfactory basis only. Admission to candidacy, completion of all other doctoral program requirements and permission are required.

F. For degree programs in the science and technology disciplines, discuss how industry-driven competencies were identified and incorporated into the curriculum and indicate whether any industry advisory council exists to provide input for curriculum development and student assessment.

For an interdisciplinary research degree at the doctoral level, there are no relevant industry competencies for the program. During the first year of the Intelligent Systems and Robotics degree program, the director and IHMC will form an industry advisory council to provide guidance and insight on a variety of topics in the Ph.D. program. The overall goal of the industry advisory will be to provide a direct link between local and regional industries with the program.

G. For all programs, list the specialized accreditation agencies and learned societies that would be concerned with the proposed program. Will the university seek accreditation for the program if it is available? If not, why? Provide a brief timeline for seeking accreditation, if appropriate.

At this time, there are no specialized accreditation agencies nor learned societies specific to Intelligent Systems and Robotics. However, there are several learned societies that the program may pursue such as ISEE Computational Intelligence Society and IEEE Robotics and Automation Society. UWF's Department of Computer Science is a member of Computer Research Association.

H. For doctoral programs, list the accreditation agencies and learned societies that would be concerned with corresponding bachelor's or master's programs associated with the proposed program. Are the programs accredited? If not, why?

The Electrical and Computer Engineering programs at UWF are ABET accredited. The new Mechanical Engineering degree program (fall, 2016) will seek ABET accreditation during the 2018-19 academic year. The Department of Computer Science has received a positive evaluation of its readiness review and is on track for ABET accreditation review in fall, 2018. ABET does not accredit doctoral level programs.

I. Briefly describe the anticipated delivery system for the proposed program (e.g., traditional delivery on main campus; traditional delivery at branch campuses or centers; or nontraditional delivery such as distance or distributed learning, self-paced instruction, or external degree programs). If the proposed delivery system will require specialized services or greater than normal financial support, include projected costs in Table 2 in Appendix A. Provide a narrative describing the feasibility of delivering the proposed program through collaboration with other universities, both public and private. Cite specific queries made of other institutions with respect to shared courses, distance/distributed learning technologies, and joint-use facilities for research or internships.

The Ph.D. degree program in Intelligent Systems and Robotics will be offered in traditional face-to-face format at the UWF main, Pensacola Campus. The program will not require specialized services for the delivery of the courses. As a research focused doctoral degree program, much of the instruction will be based on the training and education gained through the student's research experiences and discussions with their research advisors. The affiliation agreement with IHMC includes hands on research opportunities for the students at the 40 South Alcaniz Street Pensacola, Florida facility.

While UWF has not currently developed any formal collaboration agreements with other SUS institutions for the Ph.D. degree program, IHMC currently has active affiliation agreements with several SUS institutions. UWF is open to the idea of collaboration opportunities with similar programs in the area of intelligent systems and robotics where beneficial to all parties. In addition, students will be encouraged to spend substantial periods of time collaborating with UWF and IHMC faculty on research projects.

IX. Faculty Participation

A. Use Table 4 in Appendix A to identify existing and anticipated full-time (not visiting or adjunct) faculty who will participate in the proposed program through Year 5. Include (a) faculty code associated with the source of funding for the position; (b) name; (c) highest degree held; (d) academic discipline or specialization; (e) contract status (tenure, tenure-earning, or multi-year annual [MYA]); (f) contract length in months; and (g) percent of annual effort that will be directed toward the proposed program (instruction, advising, supervising internships and practica, and supervising thesis or dissertation hours).

The following UWF Faculty information is in Appendix A Table 4:

- Mohamed Khabou
- Oscar Chuy
- John Coffey
- Eman El-Sheikh
- Thomas Reichherzer
- Sikha Bagui

B. Use Table 2 in Appendix A to display the costs and associated funding resources for existing and anticipated full-time faculty (as identified in Table 4 in Appendix A). Costs for visiting and adjunct faculty should be included in the category of Other Personnel Services (OPS). Provide a narrative summarizing projected costs and funding sources.

In addition to the full-time UWF faculty included in Table 4, the university will hire a total of four new faculty for the program over the next five years. One new faculty line will be for the program director and one additional new faculty member who will both begin in Year 1, fall, 2019. In both 2020 and 2021 respectively, an additional full-time UWF faculty will begin in the program. Funding for the four new faculty lines will be come from the Florida Legislature's World Class Faculty and Scholar Program (2018 Florida Statute Title XLVIII Chapter 1004.6497).

The Year 1 budget for this program includes:

- $45,248 apportioned Reallocated Base Faculty Salaries and Benefits for existing UWF faculty
- $229,772 New Recurring Faculty Salary and Benefits for two new faculty lines (to be supported through the World Class Faculty and Scholars Program)

The Year 5 budget for this program includes:

- $582,903 Continuing Base Faculty Salaries and Benefits. This amount includes salary and benefits for the Year 1 faculty plus two new hires who will begin in Year 2 and Year 3 of the program (to be supported through the World Class Faculty and Scholars Program)

- $371,250 OPS expense for the IHMC Researchers who will be participating in the program and advising students in their dissertation studies to be paid with Hal Marcus College of Science and Engineering endowment funds and other foundation funds at UWF.

C. Provide in the appendices the abbreviated curriculum vitae (CV) for each existing faculty member (do not include information for visiting or adjunct faculty).

Curriculum Vitae for the following UWF faculty are in Appendix G

- Mohamed Khabou
- Oscar Chuy
- John Coffey
- Eman El-Sheikh
- Thomas Reichherzer
- Sikha Bagui

Due to the collaboration with IHMC and the important contribution that the IHMC Researchers will provide to this degree program, biographical information on participating IHMC Researchers is in Appendix H and an IHMC Research Statement is in Appendix I.

D. Provide evidence that the academic unit(s) associated with this new degree have been productive in teaching, research, and service. Such evidence may include trends over time for average course load, FTE productivity, student HC in major or service courses, degrees granted, external funding attracted, as well as qualitative indicators of excellence.

The departments of Electrical and Computer Engineering and Computer Science, which will be associated with the proposed Intelligent Systems and Robotics degree program, have been very productive in teaching, research, and service including participation in numerous departmental, college-level, and university-level committees, service to the profession as reviewers, and community outreach. The UWF faculty who will be lending their expertise to the Intelligent Systems and Robotics degree program are experienced scholars, researchers, and teachers.

Details are available in Appendix G faculty curriculum vitarum. Tables 13-19 highlight some of the recent associated faculty productivity to include teaching awards, grant activity, supervision of student research, faculty research projects, recent peer-reviewed publications, semester credit hour activity, and patents.

Table 13. *Sample of participating faculty teaching awards*

Faculty	UWF Teaching Award	Year
Mohamed Khabou	Faculty Excellence in Teaching Award	2013
Sikha Bagui	Excellence in Teaching and Advising Award	2012,
	Excellence in Undergraduate Teaching and Advising Award	2003, 2001-2002
John Coffey	Distinguished Teaching Award	1997
Eman El-Sheikh	President's Award for Leadership in Diversity	2014

Table 14. *2016-2018 Grant activity for faculty of the Hal Marcus College of Science and Engineering*

Faculty	**Grant Name**	**Grant Amount**
Jaromy Kuhl John Pecore	NSF Robert Noyce Scholars	$1,300,000
Thomas Reichherzer	Florida Center for Cybersecurity Collaborative Seed Grant	$40,000
Anthony Pinto	NSA-DHS CAE Regional Resource Center for the South-Eastern Region	$200,000
	NSA GenCyber Summer Camp	$90,000
Ezhil Kalaimannan	Florida Cybersecurity Center Capacity Building Grant	$75,000
Oscar Chuy	Development of Robotic Mobility Aid	$24,600
Lakshmi Prayaga Oscar Chuy	Florida Center for Cybersecurity Cyber Jedi in Smart Cities	$83,000
Two-Year Total		**$1,788,000**

Table 15. *Supervision of student research by faculty of the Hal Marcus College of Science and Engineering - Recent Projects*

Faculty Mentor	**Recent Project**
Oscar Chuy	Chuy, O. Y., Collins, E., Sharma, A., & Kopinsky, R., "Using Dynamics to Consider Torque Constraints in Manipulators Planning with Heavy Loads", ASME Journal of Dynamic Systems, Measurement and Control, v. 139, n. 5, May 2017.
	Adam Moore, Stabilization of Attendant Wheelchair Based on User's Pose, Summer Undergraduate Research Program (SURP), Hal Marcus College of Science and Engineering, University of West Florida, 2017.
	Jonathan Herrero, Control Evaluation of Attendant Wheelchair, Summer Undergraduate Research Program (SURP), Hal Marcus College of Science and Engineering, University of West Florida, 2017.
	Lash, S., Role of Arm Configuration to the Stability of Human-Robot Physical Interaction, Summer Undergraduate Research Program (SURP), Hal Marcus College of Science and Engineering, University of West Florida, 2016.
	Petsigner, E., Electric Powered Wheelchair Control Addressing User and Terrain Interaction, Summer Undergraduate Research Program

Faculty Mentor	Recent Project
	(SURP), College of Science and Engineering, University of West Florida, 2016.
	M. Peters, A. Vignolo, and J. Bromen, Design of an Autonomous Quadrotor, Senior Design, Jan 2015 – Dec 2016, Dept. of Engineering, Hal Marcus College of Science and Engineering, University of West Florida.
	M. Cherry and M. Pekarek, Design of an Android Jeopardy Game Using Google Chromecast and Bluetooth Controllers, Senior Design, Jan 2015 – Dec 2016, Dept. of Engineering, Hal Marcus College of Science and Engineering, University of West Florida.
	B. Avellon, M. Humes and, S. Taylor, Design of an Autonomous Robot, Senior Design, Aug. 2015 –Apr 2016, Dept. of Engineering, Hal Marcus College of Science and Engineering, University of West Florida.
	J. Davis, K. Dang, and K. Tan, Unmanned Ground Vehicle Competition, Senior Design, Aug. 2015 –Apr 2016, Dept. of Engineering, Hal Marcus College of Science and Engineering, University of West Florida.
Mohamed Khabou	K. R. Latourelle, N. M. Latourelle, and D. E. Radcliffe, "Design of and Electronic Apiary Unit", (2015)
	William Posey, Branden Sherrell, and Colby Cohron, "Design of an Integrated Circuit Storage and Retrieval System", (2015)
	Bryan Rhodes, Mark Shipps, Hunter Hardy and Jimmy Kocher, "Design of a smart Cooler System", (2015)
Eman El-Sheikh	AI Research Group & Lab (2010 – present).
	Brett Rowberry (2015). An Intelligent iOS Application for People Counting.
	Omer Useche (2015). An Intelligent System for Measuring Attention Levels of Students in Online Course Environments.
Sikha Bagui	Joseph Sheehan, 2015-2016, Malware Analysis.
	Xingang Fang, Chem-informatics, 2014-2015
	Renan Lordello, SQL Injection Attacks, Summer 2015.
	Clark Mitchell, Malware Analysis - Datamining, Summer 2015
John Coffey	Keegan Anderson, Honors Thesis “dldld: An Experiment in Subversive Game Design. 2017.
	Scott Frame, Master’s Project “Comparison of Functional and Imperative Programming Techniques for Mathematical Software Development”, 2014.
	Ryan Petris, Master’s Thesis “Load Balancing Using Server and Client Collaboration”, 2015.
	Steve Satterfield, Doctoral Dissertation “Educational Recommender System for Health Concerns in the Elderly”, 2018 to present.

Table 16. *Recent faculty research projects*

Faculty	Project
Oscar Chuy	**Stability of Human Robot Physical Interaction**, 2016 – Present
	Human CoG State Estimation (Collaboration with Smart Design Lab, Tohoku University, Japan), 2017 – Present
	Fast Motion Planning Using Experience (Collaboration with Florida State University), 2015 – Present
	Electric Powered Wheelchair Self- Balancing Mode, (subcontract from University of Pittsburgh and Carnegie Mellon University, A National Science Foundation Engineering Research Center for Quality of Life Technologies), 8/2013-7/2014.
Thomas Reichherer	**Wearable Devices Security** - The use of wearable devices is on an upward curve with a range of devices now available from a number of manufacturers. The security and privacy issues relating to the hardware, software and the data collected by these devices, however have not been studied extensively. In this project, hardware and software security aspects of different kinds of wearable devices and their communication protocols were studied. Various attack vectors and different kind of attacks were investigated. Specifically, attacks on the integrity, confidentiality and the privacy of the data were examined. Finally, solutions and patches for security against the attack vectors and vulnerabilities are proposed. Research results have been published.
	Smart Home Technology - This project aims to build smart home systems consisting of sensor networks and smart software systems integrated into homes to monitor human activities in the home for the purpose of improving the safety and the quality of life of all people living in the home. The security and privacy issues relating to the hardware, software and the data collected by these devices, however have not been studied extensively. In collaboration with graduate and undergraduate students, several methods were developed to capture and analyze sensor data for recognizing human activities and to monitor individuals and suggest corrective actions in situation where activities may cause harm. Different methods of human-machine interaction are being investigated and applied to provide just-in-time support. A prototype sensor network and middleware services has been built and tested. Additional middleware services are being developed to perform activity recognition and an evaluation of the entire system by end users will be conducted soon. The research is described in several publications.
Mohamed Khabou	**Using Smart Device Technology to Improve Quality of life for Older Adults**. (2015-present). Cooperating with Dr. Reichherzer from the Computer Science Department and Dr. Rodney Guttmann the Director of the Center on Aging to combine off-the-shelf devices with novel computer algorithms to build a SMILE (Smart Independent Living for Elders) home in which older adults and their families can monitor and improve their daily lives.
	Effect of Distance Learning on Student Learning Outcomes. (2008-present). Omer Useche (2015). Cooperate with Electrical and Computer

Faculty	Project
	Engineering Department colleagues and Dr. Claudia Stanny from the Center for University Teaching, Learning, and Assessment (CUTLA) on studying the effect of distance learning on the student performance in class and instructor evaluation.
Eman El-Sheikh	**AI Research Group** (2010 – present).
	Developed and taught a new undergraduate Computer Science course, CAP4601 **Artificial Intelligence**, which is designed to give students an introduction to core AI principles, programming techniques, and applications.
	Developed and taught a new undergraduate Computer Science course, CAP4053 **AI Programming for Interactive Environments**, which is a follow-up course to CAP4601 to give students additional experience in using AI techniques for developing interactive environments including games, simulations, and educational environments.
John Coffey	**NUCES Project.** Researcher, Programmer and Knowledge Engineer. Created knowledge bases, designed and programmed (25,000 loc in C) a Multimedia graphical interface for a large scale expert system. Created Multimedia Model Editor and Model Player, the precursor to CMapTools. Database supervisor.
	Project Quorum - Programmer on large scale joint project with IBM Latin America. Automated file transfer between OS-2 machines by writing Rexx and C programs to UUencode and upload the files to mainframes, send files across SNA networks, UUdecode and download files on the other end.
	Knowledge Preservation at NASA Lewis Research Center - Elicited knowledge regarding Launch Vehicle System Integration from senior NASA engineers and represented that knowledge in multimedia knowledge models. Demonstrated three different arrangements of the knowledge to target various audiences and uses.
	Navy Meteorological and Oceanographic Facility - METOC. Assisted in performing Cognitive Work Analysis of the installation, and in the creation of new ways to represent meteorological data.

Table 17. *Recent peer-reviewed publications by faculty of the Hal Marcus College of Science and Engineering*

Year	Manuscript
2017	**Chuy, O. Y**., Collins, E., Sharma, A., & Kopinsky, R., Using Dynamics to Consider Torque Constraints in Manipulators Planning with Heavy Loads, ASME Journal of Dynamic Systems, Measurement and Control, Vol. 139, No. 5, May 2017. doi: 10.1115/1.4035168
	Chuy, O. Y., Collins, E., Sharma, A., & Kopinsky, R. Robot Trajectory Planning and Control for Input Constrained Systems: Application to Manipulators Lifting Heavy Loads. IEEE Transaction on Control Systems Technology. (Under Review)
	Coffey, J.W. (2017). No Warranty Express or Implied: Why do We Have so many Problems with the Computer Systems that Pervade our Lives? Journal of Systemics, Cybernetics and Informatics, ISSN: 1690-4524 (to appear).
	Coffey, J.W. (2017). A Framework for a Multi-Faceted, Educational, Knowledge-

Year	Manuscript
	Based Recommender System. Journal of Systemics, Cybernetics and Informatics, ISSN: 1690-4524 (to appear).
	Coffey, J. W. Logic and Proof in Computer Science: Categories and Limits of Proof Techniques. Philosophic Perceptions of Logic and Order. J. Horne (ed). IGI Global: Hershey, PA. 2017.
	Bagui, S., Xingang F. and Bagui, S. (2017). "Improving Virtual Screening Predictive Accuracy of Human Kallikrein 5 inhibitors using Machine Learning Models, *Computational Biology and Chemistry*, 69, 110-119.
	Daimi, K., Francia, G., Ertual, L., Encinas, L., and **El-Sheikh, E.** (2017). Computer and Network Security Essentials, Springer International Publishing, ISBN 978-3-319-58423-2, 2017.
	Warren, C., Reed, A., **El-Sheikh, E**., and Le-Khac, N.A. (2017). Privacy Preserving Internet Browsers – Forensic Analysis. Computer and Network Security Essentials (Daimi, K., Francia, G., Ertual, L., Encinas, L., and El-Sheikh, E., Eds.). Springer International Publishing, ISBN 978-3-319-58423-2, 2017.
2016	**Coffey, J.W.**, Baskin, A., **Reichherzer, T.,** and Wilde, N. (2016). A Semi-automated Approach to the Recovery of SOA System Structures from Low-Level Artifacts, International Journal of Software Engineering and Knowledge Engineering, 26(1), pp 41–62.
	Coffey, J. W., and Owsnicki-Klewe, B. (2016). Introducing a Reflective Activity into the Design Process of an Advanced Computer Programming Course. Journal of Computing Sciences in Colleges, 31(5). pp. 29-37.
	Reichherzer, T., Coffey, J. W., Gonen, B., Gillett, I. (2015). Knowledge Modeling in the Health Care Domain: Capturing Semantics to Bridge the Gap between Complex Data Models and Object Models, In Desfray, P., Filipe, J., Hammoudi, S., Pires, L. F. (Eds), *Model-Driven Engineering and Software Development*. Springer Verlag, pp. 328-338.
	Coffey, J. W., Baskin, A. and Snider, D. (2016) Knowledge Elicitation and Conceptual Modeling to Foster Security and Trust in SOA System Evolution. In El-Sheikh, E., Zimmerman, A., and Jain, L. (Eds), Emerging Trends in the Evolution of Service-Oriented and Enterprise Architectures. Springer. (to appear)
	Lorenzetti, C., Maguitman, A., Leake, D., Menczer, F., and **Reichherzer, T.** (2016). Mining for Topics to Suggest Knowledge Model Extensions. *ACM Transactions on Knowledge Discovery from Data*, Vol. 11, Issue 2, article no. 23.
	Reichherzer, T., Satterfield, S., Belitsos, J., Chudzynski, J., Watson, L. (2016) An Agent-Based Architecture for Sensor Data Collection and Reasoning in Smart Home Environments for Independent Living. In Khoury, R., Drummond, C. (Eds) *Lecture Notes in Computer Science*, Vol. 9673, Springer-Verlag, pp. 15 – 20.
	Fridge, E., and **Bagui, S.** (2016). Impact of Automated Software Testing Tools on Reflective Thinking and Student Performance in Introductory Computer Science and Programming Classes, International Journal of Information and Communication Technology Education (IJICTE), 12(1), 24-40.
	Bagui, S., and Spratlin, S. (2017). A Review of Data Mining Algorithms on Hadoop's MapReduce, *International Journal of Data Science*, in press.

Year	Manuscript
	Bagui, S., Xingang, F., Kalaimmanan, E., Bagui, S., and Sheehan, J. (2017). Comparison of Machine Learning Algorithms for classification of VPN and non-VPN Network Traffic Flow Using Time-Related Features, *Journal of Cyber Security Technology*, 1(2), 108-126.
	Bagui, S., **Bagui, S**, and Hemasinha, R. (2016). The Statistical Classification of Breast Cancer Data, *International Journal of Statistics and Applications*, 6(1), 15-22.
	El-Sheikh, E., Zimmermann, A., and Jain, L. (2016). Emerging Trends in the Evolution of Service-Oriented and Enterprise Architectures, Springer International Publishing ISBN 978-3-319-40562-9, DOI 10.1007/978-3-319-40564-3.
	Wilde, N., Gonen, B., **El-Sheikh, E.,** and Zimmermann, A. (2016). Approaches to the Evolution of SOA Systems. Trends in the Evolution of Service-Oriented and Enterprise Architectures (E. El-Sheikh, A. Zimmermann and L. Jain, Eds.). Springer International Publishing ISBN 978-3-319-40562-9, DOI 10.1007/978-3-319-40564-3.
	Zimmermann, A., Schmidt, R., Sandkuhl, K., **El-Sheikh, E.,** Jugel, D., Schweda, C., Möhring, M., Wißotzki, M., Lantow, B. (2016). Leveraging Analytics for Digital Transformation of Enterprise Services and Architectures. Trends in the Evolution of Service-Oriented and Enterprise Architectures (E. El-Sheikh, A. Zimmermann and L. Jain, Eds.). Springer International Publishing ISBN 978-3-319-40562-9, DOI 10.1007/978-3-319-40564-3.
2015	**Coffey, J. W**. (2015). Concept Mapping and Knowledge Modeling: A Multi-disciplinary, Educational, Informational, and Communication Technology. Journal of Systemics, Cybernetics and Informatics, 13(6), pp. 122-128. ISSN: 1690-4524.
	Coffey, J. W. (2015). Relationship between design and programming skills in an Advanced Computer Programming Class. Journal of Computing Sciences in Colleges, 30(5). pp. 39-45.
	Reichherzer, T., Coffey, J., Gonen, B., Gillett, I. (2015). Knowledge Modeling in the Health Care Domain: Capturing Semantics to Bridge the Gap between Complex Data Models and Object Models, In Desfray, P., Filipe, J., Hammoudi, S., Pires, L. F. (Eds), *Model-Driven Engineering and Software Development*. Springer Verlag, pp. 328-338.
	Bagui, S. and Earp, R. (2015). *Practical Guide to Using SQL in Oracle*, 2nd edition, BVT Publishing. ISBN: 978-1-62751-647-1 (e-Book) or ISBN: 978-1-62751-648-8 (loose leaf version).
	Bagui, S., and Nguyen, L. (2015). Database Sharding: To provide fault tolerance and scalability of Big Data on the Cloud, *International Journal of Cloud Applications and Computing (IJCAC)*, Vol. 5(2), 36-52.

Table 18. *Fall student credit hours (SCH) generated by related departments of the Hal Marcus College of Science & Engineering 2013-2017*

Level	Department	2013 SCH	2014 SCH	2015 SCH	2016 SCH	2017 SCH	5 Year SCH Avg.
Under-graduate	Computer Science	5,050	5,390	5,068	5,287	4,889	5,137
	Electrical & Computer Engineering	2,752	2,846	2,884	3,574	2,820	2,975
	Information Technology*	-	-	-	-	802	802
	Mechanical Engineering*	-	-	-	-	1,266	1,266
Graduate	Computer Science	665	555	572	625	499	583
Totals		**8,467**	**8,791**	**8,524**	**9,486**	**10,276**	**9,109**

*New program fall 2016

Table 19. *Patent awards and applications by related faculty in the Hal Marcus College of Science and Engineering*

Faculty	Innovation	U.S. Patent
Collins, El and **Chuy O.**	Slip mitigation control for electric gound vehicles	Application: US 15/131,689
Ford, K.M., Canas, A.J., & **Coffey, J.**	Concept map-based multimedia computer system for facilitating user understanding of a domain of knowledge.	#5,506,937

X. Non-Faculty Resources

A. Describe library resources currently available to implement and/or sustain the proposed program through Year 5. Provide the total number of volumes and serials available in this discipline and related fields. List major journals that are available to the university's students. Include a signed statement from the Library Director that this subsection and subsection B have been reviewed and approved.

UWF Libraries shelve more than 800,000 print volumes. Electronic resources include more than 160,000 e-books and access to approximately 80,000 journal and other serial titles through a discovery system.

A review of holdings in relevant Library of Congress classifications (TJ211 and TJ217.5) indicates that UWF collection includes access to 2,000+ resources related to intelligent systems, including 822 print titles. The library has access to 139 topic-specific journals and an additional 287 topic-related journals.
Indexing, abstracting and full text databases licensed by UWF with coverage of intelligent systems include:

- ACM Digital Library (Association for Computing Machinery)
- Applied Science and Technology Source (EBSCO)

- ASME Digital Journal Collection (American Society of Mechanical Engineers)
- Computer Database (Gale)
- Computer Science Collection (ProQuest)
- Engineering Village (also known as INSPEC) (Elsevier)
- IEEE Explorer
- ScienceDirect (Elsevier)
- Science Full Text Select (H.W. Wilson)
- SciFinder (CAS -- division of the American Chemical Society)
- SciTech Collection (ProQuest)
- SpringerLINK
- Telecommunications (ProQuest)
- Web of Science (Elsevier)
- Wiley Online Library

Full-text dissertations and theses are available through ProQuest Dissertations and Theses: Full-Text.

The UWF Libraries have access to following journals identified as core for intelligent systems:

- Advanced Robotics
- Advances in Robotics & Automation
- Autonomous Agents and Multi-Agent Systems
- Autonomous Robots
- Control and Intelligent Systems (2006 - 2010)
- Enterprise Information Systems
- Frontiers in Robotics and AI
- Human-Computer Interaction
- IAES International Journal of Robotics and Automation (IJRA)
- IBM Journal of Research and Development (1996 - 2009)
- IEEE Communications Surveys and Tutorials
- IEEE Intelligent Systems
- IEEE Transactions on Automation Science and Engineering
- IEEE Transactions on Pattern Analysis and Machine Intelligence
- IEEE Transactions on Robotics
- IEEE Wireless Communications
- Information Sciences
- Intelligent Systems Report: ISR (1991 - 2001)
- Intelligent Service Robotics
- International Journal of Advanced Robotic Systems
- International Journal of Applied Electronics in Physics and Robotics
- International Journal of Computer Vision
- International Journal of Humanoid Robotics
- International Journal of Hybrid Intelligent Systems
- International Journal of Intelligent Control and Systems
- International Journal of Intelligent Systems
- International Journal of Intelligent Systems and Applications
- International Journal of Intelligent Unmanned Systems
- International Journal of Knowledge-Based and Intelligent Engineering Systems
- International Journal of Mechanical Engineering and Robotics Research
- International Journal of Robotics Research

- International Journal of Robotics and Automation
- International Journal of Social Robotics
- International Journal on Intelligent Electronic Systems
- International Journal on Smart Sensing and Intelligent Systems
- ISRN Robotics
- Journal of the ACM
- Journal of Ambient Intelligence and Smart Environments
- Journal of Automation, Mobile Robotics & Intelligent Systems
- Journal of Control and Systems Engineering
- Journal of Field Robotics
- Journal of Information Technology
- Journal of Intelligent & Fuzzy Systems
- Journal of Intelligent and Robotic Systems
- Journal of Intelligent Systems
- Journal of Mechanisms and Robotics
- Journal of Robotic Systems (1984 - 2005)
- Journal of Robotics
- Journal of Robotics & Machine Learning
- MIS Quarterly
- Robotica
- Robotics and Autonomous Systems
- Robotics
- Robotics & Machine Learning
- Robotics Today (1997 - 2001)
- Robotics World (1993 - 2006)
- User Modeling and User-Adapted Interaction

Other:
Researchers access UWF library resources from the library's website (https://secure.uwf.edu/library/). Students, faculty and staff with Internet connections may access online library resources 24/7 with their UWF login information. Audiovisual and online resources complete the teaching and learning resources for intelligent systems students.

If needed resources are not available at the UWF Libraries, students and faculty have direct access to interlibrary loan, a free service that provides electronic articles within a few days and print books within a week.

In order to help library users navigate through the variety of available print and electronic resources, librarians publish web based research guides: http://libguides.uwf.edu/. Online tutorials (https://secure.uwf.edu/library/research_help/tutorials/) address common research concerns of students across disciplines and a general library orientation.

Each academic discipline is assigned a Reference Librarian to serve as a department liaison providing library instruction, collection development, and reference assistance for the students and faculty in that discipline. Students may request assistance at the reference desk in person or by phone, email, or chat. Students may also schedule an in person or online appointment with the liaison, who is equipped with Skype and Chat.

In addition to being able to access databases and materials in full-text online, UWF students and faculty may take advantage of these online library services:

- access required readings on electronic reserves
- request books and articles from Interlibrary Loan
- request Intercampus Loan (to/from the Fort Walton Beach Campus library)
- renew books
- submit a reference question via text, email, or chat
- request rush processing of an item that is on order
- suggest the purchase of a particular book or journal
- request an item that is checked out to be recalled for use
- have UWF and Interlibrary Loan books delivered to your home address if you live over 50 miles from campus
- borrow materials from public state universities and colleges in Florida.

B. Describe additional library resources that are needed to implement and/or sustain the program through Year 5. Include projected costs of additional library resources in Table 2 in Appendix A. Please include the signature of the Library Director in Appendix B.

After consultation with the Dean of UWF Libraries, the existing collection of journals, electronic databases, and other library holdings are sufficient to implement and sustain this program through Year 5. There is no library allocation for this program for Year 1 or Year 5.

C. Describe classroom, teaching laboratory, research laboratory, office, and other types of space that are necessary and currently available to implement the proposed program through Year 5.

UWF main Pensacola campus

The Departments of Computer Science and Electrical and Computer Engineering are housed in Building 4, a recent, $32,000,000 building located on the UWF main Pensacola campus. In addition to classrooms and laboratories, Building 4 contains faculty and administrative offices for the academic departments. There is office space available for the new faculty in this building. Nine technology-enhanced classrooms are available for general use in Building 4.

The Department of Computer Science utilizes two technology-enhanced classrooms and four laboratories for:

- general computing research,
- artificial intelligence and projects,
- cybersecurity, and
- smart home research.

The Department of Electrical and Computer Engineering utilizes three technology-enhanced classroom and laboratories for:

- autonomous vehicles and robotics,
- control systems,
- circuits, and
- power systems.

IHMC 40 South Alcaniz Street Pensacola, Florida

IHMC has two general-purpose meeting rooms and a large presentation room. IHMC opened a new research building in fall 2016 that hosts a state-of-the-art robotics and exoskeleton high bay laboratory. The first floor contains the Visual Vestibular Balance Device, a one-of-a-kind human balance system that can provide multiple axes of simple or complex rotational stimuli, while recording neurophysiological responses. IHMC lab space is large enough for a number of robotics projects and is currently at about 70% capacity. The UWF Ph.D. students will add to the vibrancy and creativity of the lab.

The second floor of the new facility features an observation corridor overlooking the high bay robotics laboratory that provides viewing access of robotics work. The second and third floors contain smart classrooms and lab space. The third floor also contains one large laboratory space and offices.

Below is a list of IHMC specialized laboratories:

- Media Lab
- Testing Lab
- Cyber Lab
- Augmentics Lab
- Robotic High Bay
- Spatial Disorientation (Guedry) Lab

This Ph.D. degree program will leverage these facilities and IHMC's international reputation.

D. Describe additional classroom, teaching laboratory, research laboratory, office, and other space needed to implement and/or maintain the proposed program through Year 5. Include any projected Instruction and Research (I&R) costs of additional space in Table 2 in Appendix A. Do not include costs for new construction because that information should be provided in response to X (E) below.

The Ph.D. in Intelligent Systems and Robotics degree program will be offered at the UWF main Pensacola campus. The program will be affiliated with IHMC. The IHMC facility is 12.2 miles from the UWF main campus. No additional classroom or laboratory research space will be needed to implement the program nor to support this degree program through Year 5.

E. If a new capital expenditure for instructional or research space is required, indicate where this item appears on the university's fixed capital outlay priority list. Table 2 in Appendix A includes only Instruction and Research (I&R) costs. If non-I&R costs, such as indirect costs affecting libraries and student services, are expected to increase as a result of the program, describe and estimate those expenses in narrative form below. It is expected that high enrollment programs in particular would necessitate increased costs in non-I&R activities.

No new capital expenditures for instructional or research space is required to implement this program.

F. Describe specialized equipment that is currently available to implement the proposed program through Year 5. Focus primarily on instructional and research requirements.

Beginning in Year 1 and continuing to Year 5, the Intelligent Systems and Robotics degree program will use specialized equipment that is currently available at UWF and IHMC.

UWF main Pensacola Campus

The Department of Computer Science houses a six-node Hadoop cluster, a distributed computing environment that is capable of storing and analyzing large amounts of unstructured data.

In UWF Building 4

- The Computing Research Laboratory has extensive hardware and software capabilities including:
    - 24 Dell PCs,
    - 36 Cisco Catalyst 2900XL Switches,
    - 12 Cisco 3600 Routers and
    - 18 Cisco 2500 Routers

- The Multiplatform Laboratory utilized almost exclusively for Computer Science students contains:
    - Dell computers running Windows 10 with a variety of software including:
        - JGrasp
        - Netbeans
        - Eclipse
        - Dia
        - Microsoft Office
        - OpenOffice

    - Dell computers running Linux with:
        - all common Linux/UNIX GNU compilers and utilities
        - secure remote access capabilities to Linux servers
        - OpenOffice

    - Apple OS X computers running MacOS X which have:
        - a variety of compilers
        - Microsoft Office
        - OpenOffice

- The UWF Department of Electrical and Computer Engineering has a range of specialized equipment including:
    - WAM Barrett manipulator
    - KUKA manipulator
    - Custom built robotic walker/wheelchair
    - Custom built Autonomous Ground Vehicle

- The UWF Department of Mechanical Engineering has the following specialized equipment:
    - Bridgeport “J head” milling machine
    - Clausing 5904 Lathe

In UWF Building 72

- The UWF Department of Exercise Science in the Usha Kundu College of Health has:
    - a biomechanics lab
    - a Vicon Motion Capture System

IHMC 40 South Alcaniz Street, Pensacola

IHMC has a wide range of specialized equipment to support the program. The Simulation Construction Set is an in-house simulation library environment developed specifically for development and testing of robotic systems. The robots, logging server, and lab computers, are connected over a 10 GB network. Data at the facility can be logged from a robot at the rate of 10,000 variables at one millisecond record rate, plus four high definition video streams, which become synchronized with that data. This data is stored on a 100TB server and can be analyzed using log replay and analysis software. Additional resources at IHMC which the faculty and students in the Intelligent Systems and Robotics program will utilize include:

A 500 square foot in-house metal prototyping facility outfitted with

- hand tools,
- power tools and
- computer numerical control (CNC) machines
- mill
- 3D printer
- carbon fiber layup prototyping shop
- wood shop used to construct environment mock-ups and simulate real world usage scenarios

Robotic equipment including:

- Boston Dynamics Atlas humanoid robot
- NASA Valkyrie Robot
- Pioneer DX and Pioneer AT mapping and navigation robots
- Several different quadrotor aircraft
- A turtle-bot like robot

Many sensors including:

- Cameras
- Carnegie sensor head
- Sony Kinect, SIC LIDARs
- Hokuyo LI
- FLIR
- Velodyne

Virtual Reality hardware and software including:

- Occulus Rift Virtual Reality System
- HTC Vive Virtual Reality System
- Microsoft HoloLens, mixed reality holographic computer and head-mounted display
- Google Tango augmented reality computing platform

Software licenses for many software products, including:

- Matlab base license with signal processing, optimization, and control toolboxes
- Jira and Confluence collaboration tools

- GotoMeeting subscription
- SolidWorks Premium 3D CAD
- AutoCAD
- Altium Designer 10
- MasterCAM X Mill
- Microsoft Office

G. Describe additional specialized equipment that will be needed to implement and/or sustain the proposed program through Year 5. Include projected costs of additional equipment in Table 2 in Appendix A.

Between equipment located on the UWF main campus in Pensacola and the IHMC facility at 40 South Alcaniz Street Pensacola, FL, no additional specialized equipment needs are anticipated to implement or support this program through Year 5.

H. Describe any additional special categories of resources needed to implement the program through Year 5 (access to proprietary research facilities, specialized services, extended travel, etc.). Include projected costs of special resources in Table 2 in Appendix A.

Between equipment located on the UWF main Pensacola campus and the IHMC facility at 40 South Alcaniz Street, no additional special categories of resources are needed to implement nor anticipated to support this program through Year 5.

I. Describe fellowships, scholarships, and graduate assistantships to be allocated to the proposed program through Year 5. Include the projected costs in Table 2 in Appendix A.

The proposed level of support in this proposal is $25,000 assistantship per student, per year. In Year 1, the university plans to award up to five assistantships at $25,000 each for a total of $125,000. In Year 5, the university plans to award up to twenty assistantships at $25,000 each for a total of $500,000. The funds for these assistantships will come from the Hal Marcus College of Science and Engineering endowment funds or other foundation funds currently available to UWF. In return for the assistantships, students will be expected to provide teaching and/or research assistance.

J. Describe currently available sites for internship and practicum experiences, if appropriate to the program. Describe plans to seek additional sites in Years 1 through 5.

The curriculum provides applied research experiences that are implementation-focused research. Students will find internship positions at IHMC. Through the local industry advisory council to be established in Year 1 of the program, more internship opportunities should be available before Year 5.

APPENDICES:

Appendix A

Table 1a Projected Headcount from Potential Sources (Baccalaureate Degree Program)
Table 2 Projected Costs and Funding Sources
Table 3 Anticipated Reallocation of E&G Funds
Table 4 Anticipated Faculty Participation

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Affiliation Agreement Between University of West Florida and the Institute for Human and Machine Cognition

Appendix F

University of West Florida Graduate Admissions and Graduation Requirements

Appendix G

Curriculum Vitarum

Appendix H

Biographical Information Institute for Human and Machine Cognition Researchers

Appendix I

Research Statement Institute for Human and Machine Cognition

Appendix J

Copies of Articles from *International Federal of Robotics, The New York Times, Wall Street Journal,* and *The Economist*

Appendix A

Table 1b Projected Headcount from Potential Sources (Graduate Degree Program)

Table 2 Projected Costs and Funding Sources

Table 3 Anticipated Reallocation of E&G Funds

Table 4 Anticipated Faculty Participation

APPENDIX A

TABLE 1-B
PROJECTED HEADCOUNT FROM POTENTIAL SOURCES
(Graduate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Individuals drawn from agencies/industries in your service area (e.g., older returning students)	5	2.75	7	3.85	8	4.4	9	4.95	10	5.5
Students who transfer from other graduate programs within the university**	0	0	0	0	0	0	0	0	0	0
Individuals who have recently graduated from preceding degree programs at this university	0	0	1	0.55	1	0.55	2	1.1	2	1.1
Individuals who graduated from preceding degree programs at other Florida public universities	1	0.55	2	1.1	4	2.2	5	2.75	7	3.85
Individuals who graduated from preceding degree programs at non-public Florida institutions	0	0	0	0	0	0	0	0	0	0
Additional in-state residents***	0	0	1	0.55	2	1.1	3	1.65	4	2.2
Additional out-of-state residents***	1	0.55	2	1.1	4	2.2	6	3.3	8	4.4
Additional foreign residents***	0	0	1	0.55	2	1.1	3	1.65	4	2.2
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	**7**	**3.85**	**14**	**7.7**	**21**	**11.55**	**28**	**15.4**	**35**	**19.25**

APPENDIX A

TABLE 2

PROJECTED COSTS AND FUNDING SOURCES

Instruction & Research Costs (non-cumulative)	Year 1 Funding Source								Year 5 Funding Source						
	Reallocated Base* (E&G)	Enrollment Growth (E&G)	New Recurring (E&G)	New Non-Recurring (E&G)	Contracts & Grants (C&G)	Philanthropy Endowments	Enterprise Auxiliary Funds	**Subtotal coulumns 1+…+7**	Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Philanthropy Endowments	Enterprise Auxiliary Funds	**Subtotal coulumns 9+…+ 14**
Columns	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Faculty Salaries and Benefits	45,248	0	229,772	0	0	0	0	**$275,020**	582,903	0	0	0	0	0	**$582,903**
A & P Salaries and Benefits	14,000	0	0	0	0	0	0	**$14,000**	17,017	0	0	0	0	0	**$17,017**
USPS Salaries and Benefits	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Other Personal Services	0	0	0	0	0	0	0	**$0**	0	0	0	0	371,250	0	**$371,250**
Assistantships & Fellowships	0	0	0	0	0	125,000	0	**$125,000**	0	0	0	0	500,000	0	**$500,000**
Library	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Expenses	0	0	25,000	0	0	0	0	**$25,000**	50,000	0	0	0	0	0	**$50,000**
Operating Capital Outlay	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Special Categories	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Total Costs	**$59,248**	**$0**	**$254,772**	**$0**	**$0**	**$125,000**	**$0**	**$439,020**	**$649,920**	**$0**	**$0**	**$0**	**$871,250**	**$0**	**$1,521,170**

*Identify reallocation sources in Table 3.

**Includes recurring E&G funded costs ("reallocated base," "enrollment growth," and "new recurring") from Years 1-4 that continue into Year 5.

***Identify if non-recurring.

Faculty and Staff Summary

Total Positions	Year 1	Year 5
Faculty (person-years)	1.73	3.23
A & P (FTE)	1	1
USPS (FTE)	0	0

Calculated Cost per Student FTE

	Year 1	Year 5
Total E&G Funding	$314,020	$649,920
Annual Student FTE	3.85	19.25
$81	$81,564	$33,762

Table 2 Column Explanations

APPENDIX A

TABLE 3
ANTICIPATED REALLOCATION OF EDUCATION & GENERAL FUNDS*

Program and/or E&G account from which current funds will be reallocated during Year 1	Base before reallocation	Amount to be reallocated	Base after reallocation
Reallocated portion of faculty expenses from Department of Computer Science and Engineering in HMCSE to the Department of Intelligent Systems & Robotics in HMCSE	45,248	45,248	**$0**
Reallocated portion of A & P Salaries & Benefits expenses from Department of Computer Science and Engineering in HMCSE to the Department of Intelligent Systems & Robotics in HMCSE	14,000	14,000	
	0	0	
	0	0	
	0	0	
	0	0	
Totals	$59,248	$59,248	**$0**

APPENDIX A

TABLE 4
ANTICIPATED FACULTY PARTICIPATION

Faculty Code	Faculty Name or "New Hire" Highest Degree Held Academic Discipline or Speciality	Rank	Contract Status	Initial Date for Participation in Program	Mos. Contract Year 1	FTE Year 1	% Effort for Prg. Year 1	PY Year 1	Mos. Contract Year 5	FTE Year 5	% Effort for Prg. Year 5	PY Year 5
A	Mohammed Khabou, PhD. Electrical Engineering	Professor	Tenured	2018	9	0.75	0.05	0.04	9	0.75	0.05	0.04
A	Oscar Chuy, Ph.D. Engineering	Assistant Professor	Tenure Earning	Fall 2019	9	0.75	0.05	0.04	9	0.75	0.05	0.04
A	John Coffey, Ed.D. C&I Math, Statistics, Science	Professor	Tenured	Fall 2019	9	0.75	0.05	0.04	9	0.75	0.05	0.04
A	Eman El-Sheik, Ph.D. Computer Science	Professor	Tenured	Fall 2019	9	0.75	0.05	0.04	9	0.75	0.05	0.04
A	Thomas Reichherzer, Ph.D. Computer Science	Associate Professor	Tenured	Fall 2019	9	0.75	0.05	0.04	9	0.75	0.05	0.04
A	Sikha Bagui, Ed.D. C&I Computer Software Engineering	Professor	Tenured	Fall 2019	9	0.75	0.05	0.04	9	0.75	0.05	0.04
C	Program Director, Ph.D. Computer Science	Professor	Tenured	Fall 2019	9	0.75	1.00	0.75	9	0.75	1.00	0.75
C	New Hire, Ph.D. Computer Science	Associate Professor	Tenure Earning	Fall 2019	9	0.75	1.00	0.75	9	0.75	1.00	0.75
C	New Hire, Ph.D. Computer Science	Associate Professor	Tenure Earning	Fall 2020	9	0.75	0.00	0.00	9	0.75	1.00	0.75
C	New Hire, Ph.D. Computer Science	Associate Professor	Tenure Earning	Fall 2021	9	0.75	0.00	0.00	9	0.75	1.00	0.75
	Total Person-Years (PY)							**1.73**				**3.23**

Faculty Code		Source of Funding	PY Workload by Budget Classsification Year 1		Year 5
A	Existing faculty on a regular line	Current Education & General Revenue	0.23		0.23
B	New faculty to be hired on a vacant line	Current Education & General Revenue	0.00		0.00
C	New faculty to be hired on a new line	New Education & General Revenue	1.50		3.00
D	Existing faculty hired on contracts/grants	Contracts/Grants	0.00		0.00
E	New faculty to be hired on contracts/grants	Contracts/Grants	0.00		0.00
		Overall Totals for	**Year 1** **1.73**		**Year 5** **3.23**

Appendix B

Signatures

Please include the signature of the Equal Opportunity Officer, Dean of University College, and the Dean of University Libraries.

5/8/18

Kim LeDuff, PhD **Date**
Equal Opportunity Officer/ Vice President
Academic Engagement

5/8/2018

Robert Dugan **Date**
Dean of University Libraries

This appendix was created to facilitate the collection of signatures in support of the proposal. Signatures in this section illustrate that the Equal Opportunity Officer has reviewed section II. E. of the proposal, the Dean and AVP of University College has reviewed sections on General Education III. D., V. A. and VIII. B. & D. and the Library Director has reviewed sections X. A. and X. B.

UWF also requires that a Request to Offer a New Degree Program is reviewed by the Chief Technology Officer.

5-7-2018

Melanie Haveard **Date**
Chief Technology Officer

Please include the signature of the Equal Opportunity Officer and the Library Director.

Appendix C

Summary of Similar Programs

Summary of Similar Programs

The proposed Ph.D. degree program in Intelligent Systems and Robotics will train the next generation of educators and researchers to develop technology combining human and machine elements. Intelligent systems are advanced machines that are able to assess and respond to the world around them with varying amounts of human intervention. Intelligent systems take many forms including:

- Brain-controlled prosthetic limbs that allow amputees to return to work,
- Crawling robots that can find survivors buried in rubble at disaster scenes or the battlefield, and
- Semi- or fully-autonomous vehicles transporting passengers and goods to their desired destination with little or no intervention.

Intelligent systems seek to enhance human existence in the areas of advanced manufacturing, healthcare, defense, and transportation by performing dangerous or mundane tasks once performed by humans and thereby directly improving human quality of life.

The Ph.D. in Intelligent Systems and Robotics will be the first Ph.D. within the state of Florida with CIP code 11.0102 Artificial Intelligence. There are three doctoral programs at universities in the United States that currently offer a doctoral degree in artificial intelligence: Carnegie Mellon University, Georgia Institute of Technology, and University of Pittsburgh.

Among the SUS institutions in Florida, there are five universities that have doctoral degree programs in Computer Science CIP 11.0102 and four universities that offer a doctoral degree in computer engineering CIP 14.0901. While there are components of each of these degree programs that address advanced study in topics like machine learning, artificial intelligence, or robotics, these programs do not focus exclusively on the elements of intelligent systems and robotics that make this field of study unique. University of Florida added a Ph.D. degree program in Human Centered Computing (CIP 11.0104) focuses on user design interfaces while UWF's program focuses on the interaction of intelligent systems with robotics and automation.

Appendix D

External Consultant's Report

Recommendation Report

Ronald C. Arkin, Consultant

These recommendations are based on the Proposal to Offer a New Degree Program received by the consultant in June of 2016 with accompanying appendices, and a visit to the campus on June 30, 2016 where meetings with IHMC faculty, Aspire, the Provost, leadership of IHMC, and IHMC researchers provided aspirations, clarification, concerns, and perspective on the goals and potential implementation of this program.

My recommendations are as follows:

1. Although self-evident, it must necessarily be stated: Always focus on quality. Anything that compromises that puts the program in jeopardy.
2. Immediately convene a search and the hire senior leadership in Intelligent Systems as soon as possible. Someone needs to build the program and create strength in UWF in the area. This individual also has to be the outward face of the Ph.D. program to all stakeholders. Preferably a Full Professor, but a seasoned Associate Professor with experience in building or managing academic programs may also be feasible. Consider using an executive recruiting service to expedite the process. Include a partial appointment in IHMC (or Fellowship) both as a draw, as well as a formal bridge between the two entities. Allocate faculty lines for this senior individual to use for future hiring.
3. Reach a written accord between UWF and IHMC as soon as possible and formalize it with an MOU. This requires agreement on several items (not limited to):
    A. First, clarify what is possible from a legal and accreditation perspective (State, University System, SACS) for IHMC researchers in terms of Ph.D. advising, faculty governance, etc. Then determine what is desirable from both arties.
    B. Agree upon and expressly state the title of the IHMC faculty participating in the program (Adjunct/Joint faculty? with or without advising ability? With or without voting rights with respect to faculty governance?).
    C. Address directly any potential conflicts of interest between the two entities (financial, administrative, resource allocation, time commitment and priorities), and resolve them.
    D. Make clear how the funds will flow between the units, and the timing of the financials (cost reimbursement? Time-based?).
    E. Explicitly enumerate the roles, expectations, and responsibilities for all of the parties (faculty, leadership).
    F. Expressly state how admissions will be conducted and the role of IHMC in that process.
    G. Expressly state how Ph.D. advising will be handled in terms of advisorships (sole of co-advising only for IHMC?), committee memberships (must there be at least one UWF regular faculty member on each committee?), etc.

Move towards a formal contractual agreement after the MOU is in place that delineates the financial and personnel details for a fixed time period – indicating a strong commitment on both sides to ensure the success of the program.

4. Continue to align the expectations of both UWF faculty and IHMC through continued discussions, meetings, and even seminars to ensure that there is little or no lingering apprehension about the relationship. This needs to be managed from the top in both UWF and IHMC.
5. Clarify the costs associated with the program. They currently make little sense to me. Make explicit the uses for the non-recurring money (line items), any recurring costs (line items), and how much will pass through to IHMC for the first 5 years of the program when ideally steady state should bereached.
6. Consider an expanded timeline for implementation - perhaps to a start of Fall 2019 for enrollment of the first Ph.D. students instead of Fall 2018, to ensure that quality is the first and foremost driver of the process. This is the first Ph.D. program for UWF and it needs to be a flagship. It cannot and should not fail. If there is any doubt of its success you should consider aborting the processnow.
7. Engage marketing and communications and allocate funds for them to promote the effort in the months ahead. Tying this directly to the IHMC relationship is the win-win that you need. But approval for a promotional strategy moving ahead is needed.
8. Start hammering out the specific details of the structure of the program, as these will delineate the responsibilities required. Comprehensive and/or qualifying exams need to be decided upon, so that when student recruiting begins you can have explicit requirements for graduation posted on a website. They will need to know what these exams look like and what material will be covered in them.
9. Consider a minor as a course requirement to ensure the interdisciplinary nature of the program and the relevance of coursework to dissertation research (9 credits). A minor can be self proposed by a student and approved by the faculty (or designated PhD advisor).
10. Expand the program to be available in other units, particularly ECE, not only CS. ME and Psychology (Cognitive Science) can follow later if appropriate and the faculty are interested. It will be the same degree but matriculation will occur in different departments.
11. Clarify what the residency requirement for student is for the Ph.D. program and determine how it can be satisfied (esp., with respect to students doing research off campus continuously such as atIHMC).
12. Do not require an M.S. for admissions to the program. You want the best students worldwide to apply, and many BS students have excellent research experience nowadays. You cut off a major source of quality if you restrict your pool so severely. Also industrial experience in and of itself is not important. Quality research experience is.
13. Consider joining CollegeNet to manage your PhD admissionsprocess:

https://corp.collegenet.com/products/admissions/admissions.html
This makes it easier for students to apply, as many Universities and colleges (including ours) use this service. There may be others as well.

14. Do not create courses on specialized topics solely for Ph.D. students. A class size of 5- 10 is not cost effective. Ensure that MS students can enroll and receive credit towards their degree, and if appropriate allow advanced undergraduates to enroll.
15. Grow your own quality students by offering research experiences for undergraduates. It's trivial to get funds for these purposes on existing NSF grants. Couple this with internships at IHMC.
16. Recognize the fact that many high quality applicants will come from outside the United States (e.g., India and China) and reflect this in your numbers (e.g., Table 1-B)
17. Update Table 4 to represent more realistic numbers for the workload of faculty.
18. Include funding for a 0.5 FTE Staff member responsible for advising PhD students.
19. It is recommended that course reductions be given to faculty that bear significant advising responsibilities. Teaching loads of 2-2 (down from the existing 3-3) for 3 PhD advisees seems reasonable to me. Include funds to offset the additional teaching staff that will be required as a consequence.
20. Arrange for personnel exchanges via leaves or sabbaticals between IHMC and UWF to cement the relationship even more than it already is.

These initial recommendations are for your consideration and I look forward to your comments and hopefully actions.

Appendix E

Affiliation Agreement between University of West Florida and

the Institute for Human and Machine Cognition

AGREEMENT BY AND BETWEEN THE FLORIDA INSTITUTE FOR HUMAN AND MACHINE COGNITION AND UNIVERSITY OF WEST FLORIDA BOARD OF TRUSTEES

This Affiliation Agreement ("Agreement") is made and entered into by and the Florida Institute for Human & Machine Cognition ("IHMC"), a not-for-profit research institute of the State University System of Florida, and the University of West Florida, for and on behalf of the University of West Florida Board of Trustees, a public body corporate ("UWF"). In consideration of the promises made in this Agreement, the receipt and sufficiency of which are hereby acknowledged, IHMC and UWF agree as follows:

I. UWF-IHMC Joint Ph.D. in Intelligent Systems and Robotics.

A. UWF and IHMC will cooperate to institute the Ph.D. Program in Intelligent Systems and Robotics (the "Program"), an interdisciplinary Ph.D. program, as set forth in the program description attached hereto as Attachment "1".

B. UWF and IHMC further agree:

i. To jointly seek sources of external support to fund this collaborative effort, including joint legislative initiatives and Triumph Gulf Coast calls for proposals.

ii. To make available to the public, other researchers, and faculty those facts, methods and new findings that are discovered through the joint research of the Parties, and to disseminate research findings by a variety of methods, including publications of all types, seminars, and workshops in accordance with Florida law; provided, however, that such activities do not compromise the filing of patent applications involving newly developed technology or know-how resulting from this collaboration.

iii. To share physical facilities and support services in ways that will expand and provide more cost effective Ph.D. research projects and mutual interest activities for the Parties.

iv. To jointly hire research personnel that complement the purpose and objectives of this Agreement.

v. To each make available personnel (administrative and other), office space, services, facilities, and equipment under control of the parties (within limits of statutory authorities, and as budget, insurance and other considerations permit). Each party shall continue to provide salaries, benefits, and travel costs of its respective employees during such time as they are involved in this Program, except where otherwise agreed to in writing.

C. UWF and IHMC also agree to comply with the recommendations and requirements of the other Party's applicable institutional review boards regarding cooperative projects; and to serve as members of the other Party's appropriate review boards as permitted and mutually agreed upon.

D. The University of West Florida shall maintain ultimate authority for the administration of the Program in all matters pertaining to academic integrity, including but not limited to, curriculum, faculty oversight, and degree attainment.

E. This Agreement is subject to and contingent upon the Program receiving final approval by the UWF Board of Trustees, the Florida Board of Governors, and the Southern Association for Colleges and Schools Commission on Colleges.

II. Duties of the Parties.

Throughout the term of this Agreement, the Parties agree to:

A. Use reasonable efforts to satisfy and comply with all Program Policies;

B. Share responsibility for creating an appropriate learning environment for Program students which promotes the development of explicit and appropriate professional attributes;

C. Provide Program faculty consistent with circulated objective criteria and standards for teaching, research, and other academic activities in accordance with applicable requirements;

D. Cooperate and consult with each other regarding the assignment of duties to and evaluation of the performance of academic responsibilities by those faculty;

E. Share the Legislatively appropriated funds provided for the Program that are in the UWF base budget as provided herein and any funding received from other external sources, such as the World Class Faculty and Scholar Program, the State University Professional and Graduate Degree Excellence Program, and Triumph Gulf Coast awards;

F. Promptly notify each other of issues related to alleged or claimed Program student, faculty and/or staff negligence or misconduct, including receipt of related documents, as appropriate;

G. Comply with all applicable laws and accreditation standards in the performance of their respective responsibilities and obligations under this Agreement; and

H. Seek opportunities to discuss further programmatic collaborative efforts as both Parties deem desirable.

I. Reimburse salaries and benefits for compensation of shared employees, consistent with level of effort.

III. Term.

This Agreement is for a term of ten (10) years (the "Term") beginning with the 2017/2018 academic year and expiring on June 30, 2028 unless renewed or sooner terminated in accordance with this Agreement. The Term may be renewed and extended by written agreement of the Parties. In order to fully effectuate this Agreement, various addenda may also be entered into and each of them may have their own effective and termination dates, but in no event will they begin before or end after the term of this Agreement.

IV. Costs/Expenses.

A. Both parties acknowledge that significant expenses have been incurred in the planning for, and securing of necessary approvals for the Program implementation. It is expected that UWF will request funding from the Florida Legislature each year and that support for the Program will be received annually. Additional support through Triumph Gulf Coast proposals and other grant/contract funding will be aggressively pursued with the assistance of both IHMC and UWF.

B. IHMC research scientists with an appointment in the UWF Department for Intelligent Systems and Robotics will receive compensation from UWF for mentoring Ph.D. students in the Program and for teaching lecture courses in the Program. The compensation will be based on actual work assignments. UWF shall fund the work conducted by the IHMC scientists including standard benefits required for such participation from funds designated for the Ph.D. program. These funds will be provided directly to IHMC. The work assignment will be determined by the Program Director to include teaching lecture courses and leading the mentoring dissertations.

V. Status of IHMC Scientists at UWF

Select IHMC scientists will be provided an appointment in the UWF Department for Intelligent Systems and Robotics to facilitate participation in the program. Selection of faculty for participation in the program will be based on possessing the appropriate qualifications as determined by UWF policy and accreditation requirements. Initial selection will be based on UWF's sole determination that faculty possess the appropriate qualifications and satisfy accreditation standards. Final participation will be approved by the Program Director, UWF Vice President for Academic Affairs (or designee) and the IHMC Chief Executive Officer (or designee). IHMC scientists will be appointed in the Department with the title of UWF Director of Research Professor. It is the specific intent of the parties that the IHMC scientists will have administrative duties and are not in-unit faculty for purposes of the collective bargaining agreement between UWF and the United Faculty of Florida. The position will afford the following privileges:

A. Serve as the committee chair or a member of dissertation committees with full administrative and management responsibilities for the committee.

B. Teach select lecture courses within the program on an as needed basis and based on the approval of the Program Director

C. Participate in Program curriculum planning

As faculty in the Program, IHMC research scientists will be expected to provide information and data required for assessment and reporting requirements associated with the operation of the Program at UWF. This includes, but is not limited to, contribution to the Department annual reports, annual faculty evaluations, and assessment of student learning outcomes.

Faculty serving as chair of a dissertation committee agree to meet all requirements associated with this role. The Program Director will clearly communicate the duties and requirements associated with serving as chair of a dissertation committee prior to approving the committee.

IHMC research scientists identified for this Program and approved by UWF shall also carry the title of UWF Director of Research as an administrative out of unit faculty member at the level of Professor while engaged in mentoring, supervising research activities, dissertations or teaching courses under this Program.

VI. Standing Joint Curriculum Committee

A standing joint curriculum committee will be developed and serve in an advisory fashion to the Program on matters such as curriculum, development and assessment of student learning outcomes. The Program Director will serve as the committee chair. The curriculum committee should have equal representation from both IHMC and UWF. The composition of the committee is open to all IHMC research scientists with appropriate area of expertise and qualifications. IHMC research scientists participating in this Joint Ph.D. shall be voting members of that Committee. UWF representation on the committee will be determined by the Program Director and approved by the UWF Provost or President. IHMC representation on the committee will be determined by the IHMC CEO.

VII. Status of UWF Ph.D. Program Director at IHMC

A. UWF and IHMC agree to jointly participate in the selection of a Ph.D. Program Director. The program director will be a full-time UWF employee who will be responsible for the administration of this Program.

It is anticipated that this Program Director will have a 12 month 0.75 FTE benefitted appointment at UWF and a 0.25 FTE unbenefited appointment at IHMC, however this may be varied based on available funding and the requirements of the position at any given time. The Program Director selected will carry the title of IHMC Senior Research Scientist in addition to the title selected by UWF.

B. Both UWF and IHMC will identify physical space at their respective locations and will provide the necessary administrative support for the Ph.D. Program Director as needed to carry out his or her respective work obligations.

VIII. Termination of Agreement. Notwithstanding anything in this Agreement to the contrary, IHMC and UWF may terminate this Agreement before the expiration date of this Agreement as follows:

A. The Parties may agree to terminate this Agreement by mutual written agreement.

B. Either Party may terminate this Agreement without cause by giving written notice of termination to the other Party at least five years in advance of the effective date of termination specified by such notice to ensure that all currently enrolled and accepted students are able to complete the Program.

C. Either Party may terminate this Agreement by giving written notice to the other Party if (a) an accreditation letter cites one or more deficiencies in the Program that relate to the terms of this Agreement or IHMC's or UWF's performance under this Agreement, and the Parties are unable to agree on a modification of this Agreement to correct the cited deficiency or IHMC or UWF fails to cure the cited performance deficiency within 90 days after the date when such Party is notified of the deficiency.

D. If (a) there is a change in any law, regulation or rule, state or federal, that affects this Agreement or the activities of either Party under this Agreement, or any change in the judicial or administrative interpretation of such law, regulation or rule, or (b) any of the provisions of this Agreement are found to be in violation of the laws existing at the time of such determination, and (c) either Party reasonably believes in good faith that the change, interpretation or determination will have an adverse effect on that Party's business operations or its rights or obligations under this Agreement, or on the basis of written opinion of counsel renders performance under this Agreement in violation of any law, rule or regulation, then the Party may, upon written notice, require the other Party to enter into good faith negotiations to renegotiate the terms of this Agreement and to take any action necessary to maintain compliance with such laws, rules or regulation. If the Parties are unable to reach an agreement concerning the modification of this Agreement within the earlier of thirty (30) calendar days after the date of the notice seeking renegotiation or the effective date of the legal change, then either Party may immediately terminate this Agreement by written notice to the other Party.

E. Either party may terminate this Agreement on ninety (90) days advance written notice to the other in the event of a financial exigency that is material to the implementation of this Agreement.

F. The performance of the UWF of any of its obligations under this Agreement shall be subject to and contingent upon the availability of funds appropriated by the Florida Legislature or otherwise lawfully expendable for the purpose of this Agreement for the current and future Term(s). UWF shall provide written notice to IHMC of the non-availability of such funds and the intent to terminate this Agreement when UWF has such knowledge. The determination of whether funds are available to support the Program shall be made in the sole discretion of UWF.

G. Termination of this Agreement in accordance with this section shall be effective as of the date specified in the Parties' written agreement of termination. Otherwise, termination of this Agreement will be valid only if a notice of termination is delivered to the other Party to this Agreement by the Party electing the termination and will be effective when the notice of termination is delivered to the other Party or, if later, as of the date specified in the notice of termination.

H. Effect of Termination. If this Agreement is terminated as provided in this section, neither IHMC nor UWF will have any further duty, right, liability, or obligation under this Agreement, except as to those duties, rights, liabilities, or obligations that by their terms are to expressly survive the termination of the Agreement. Notwithstanding the foregoing, a Party will not be relieved from liability for a breach of warranty, obligation, or representation under this Agreement that occurred before the effective date of termination. In the case of termination, the Parties will work together to ensure a smooth transition for the Program.

I. IHMC and UWF agree to work with any students affected by termination of the Agreement to ensure suitable completion of the student's program of study and graduation.

IX. Notices.

Notices to either party will be given to the contacts identified below:

TO: UWF

Office of the Provost
Bldg. 10 / Room 210
11000 University Parkway
Pensacola, FL 32514
(850) 474-2035
academicaffairs@uwf.edu

With a copy to:
Office of General Counsel
University of West Florida
Building 10
11000 University Parkway
Pensacola, FL 32514
gcfrontdesk@uwf.edu

TO: IHMC

Office of the Chief Executive Officer
Florida Institute for Human and Machine Cognition
40 S. Alcaniz Street
Pensacola, FL 32502
(850) 202-4400
kford@ihmc.us

With a copy to:
Office of General Counsel
Florida Institute for Human and Machine Cognition
40 S. Alcaniz Street
Pensacola, FL 32502
(850) 202-4435
jsheppard@ihmc.us

or at any other mailing address as a Party subsequently designates by notice to the other Party that is given and effective in accordance with the provisions of this section. A validly given notice, request, demand, consent, or approval will be effective on the earlier of its receipt, if delivered personally or by commercial courier with a confirmation of receipt, or the fifth day after it is postmarked by the United States Postal Service, if delivered by first class, postage prepaid United States mail. Each Party promptly shall notify the other Party of any change in its mailing address.

X. Relationship of Parties.

A. Separate Legal Entities. IHMC and UWF are separate legal entities and shall maintain their separate legal structures and their independent authority and responsibilities for their respective missions, programs, personnel, facilities and other resources. The Board of Trustees for UWF and the Board of Directors for IHMC will retain full control over the operations of each Party in accordance with applicable Florida law. The relationship of IHMC and UWF pursuant to this Agreement is that of independent contractors and nothing in this Agreement shall be construed to create a partnership, joint venture, association, employment, or agency relationship between IHMC and UWF. Neither Party shall have the right to terminate or discipline the agents or employees of the other Party. Each Party shall be entirely responsible for its acts and for the acts of its agents, employees and representatives as provided by law.

B. Responsibility for Personnel. Each Party is responsible for the payment of the expenses, compensation, and fringe benefits of its agents, employees, and independent contractors and for the payment and reporting of all taxes, withholdings, and other contributions imposed or required under Medicare, Social Security, income tax, workers' compensation, and unemployment, compensation laws with respect to its agents, employees, and independent contractors.

C. Lack of Authority to Bind other Party. Neither UWF nor any agent, employee, or independent contractor of UWF has any authority to assume or create any contractual liability or obligation of any kind in the name or on behalf of IHMC, and neither IHMC nor any agent, employee, or independent contractor of IHMC has any authority to assume or create any contractual liability or obligation of any kind in the name or on behalf of UWF.

D. UWF Employment Authority. UWF shall have exclusive authority and responsibility to hire, discipline and terminate all its agents, employees and independent contractors, and to determine and provide their UWF salary, fringe benefits, duty assignments, professional liability protections, and other terms and conditions of their employment, appointment or engagement by UWF.

E. IHMC Employment Authority. IHMC shall have exclusive authority and responsibility to hire, discipline and terminate all its agents, employees and independent contractors, and to determine and provide their IHMC salary, fringe benefits, duty assignments, professional liability protections, and other terms and conditions of their employment, appointment or engagement by IHMC.

XI. General.

A. Nothing in this Agreement, whether express or implied, is intended or should be construed to confer or grant to any person, except IHMC and UWF, and their respective permitted assignees and successors in interest, any claim, right, remedy, or privilege in connection with this Agreement or any provision of it. This Agreement inures to the benefit of, and is binding on each Party's permitted assignees and successors in interest.

B. This Agreement is not assignable by either Party, nor may duties hereunder be delegated or subcontracted, in whole or in part, by either Party, without the advance written approval of the other Party, and any attempted assignment or delegation by a Party without the advance written approval of the other Party will be invalid and unenforceable against the other Party.

C. Dispute Resolution. The Parties shall strive to use good faith negotiations to resolve any controversy, dispute or disagreement arising out of or relating to this Agreement or the breach of this Agreement. If the Parties are not able to resolve any dispute by negotiation, either Party may request that the dispute go before a mediator, mutually acceptable to the Parties, to resolve the dispute. The cost of the mediation, including the fees and expenses of the mediator, will be shared equally by the parties, with each party paying its own attorneys' fees.

D. Whenever possible, each provision of this Agreement should be construed and interpreted so that it is valid and enforceable under applicable law. If a court determines that a provision of this Agreement is invalid or unenforceable under applicable law, however, that provision will be deemed separable from the remaining provisions of this Agreement and will not affect the validity, interpretation, or legal effect of the other provisions of this Agreement or the application of that provision to other circumstances in which it is valid and enforceable.

E. A Program branding and marketing strategy and process will be mutually developed and coordinated between both parties.

F. Use of Logos and Trademarks. IHMC and UWF each covenants that it shall not use the name or any logo or trademark of the other Party, including the name, logo or trademark of any unit or department of the other Party, in any advertising, promotion, literature, or other medium or manner, without the prior written consent of the other Party, which shall be granted or denied within thirty (30) days after the date of the request; provided, however, if no action is taken within such time, the request shall be deemed denied.

G. All payments or reimbursement of expenses for travel, lodging, or meal expenses made by UWF must comply with section 112.061 of the Florida Statutes.

H. In the course of providing services during the term of this Agreement, IHMC may have access to student education records that are subject to the Family Educational Rights and Privacy Act (FERPA), 20 U.S.C. 1232g, et seq. and the regulations promulgated there under. Such information is considered confidential and must therefore be protected.

To the extent that IHMC has access to "education records" under this Agreement, it is deemed a "school official," as each of these terms are defined under FERPA. IHMC agrees that it shall not use education records for any purpose other than in the performance of this Agreement. Except as required by law, IHMC shall not disclose or share education records with any third party.

I. PUBLIC RECORDS PROVISIONS.

i. Both parties to this Agreement acknowledge that each is subject to Florida's Public Records law, Chapter 119, Florida Statutes, which requires it to provide access to its records, subject to certain limitations. Both parties agrees to allow public access to all records, documents, papers, letters or other material subject to the provision of the Florida Public Records law and made or received in conjunction with this Agreement. Refusal by either party to allow such public access will be grounds for immediate cancellation of this Agreement.

ii. Specifically, both parties agrees to:

a. Keep and maintain public records that ordinarily and necessarily would be required in order to perform the services under this Agreement;

b. Provide the public with access to such public records and at a cost that does not exceed that provided in chapter 119, Fla. Stat., or as otherwise provided by law;

c. Ensure that public records that are exempt or that are confidential and exempt from public record requirements are not disclosed except as authorized by law; and

d. Meet all requirements for retaining public records and transfer to the other party upon request and at no cost, all public records in its possession upon termination of this Agreement and destroy any duplicate public records that are exempt or confidential and exempt. All records stored electronically must be provided to the other party in a format that is compatible with the information technology systems of the other party.

iii. Both parties agree to work together and coordinate public records requests and responses when both parties are named in the request.

University of West Florida

By: _____
Dr. George Ellenberg
Provost and Senior Vice President
5-9-18

Florida Institute for Human & Machine Cognition

By: _____
Dr. Kenneth Ford
Chief Executive Officer

By: _____
DocuSigned by:
Jaromy Kuhl
EE88ADE94CD24A8...
Dr. Jaromy Kuhl, Interim Dean
Hal Marcus College of Science and Engineering

APPROVED AS TO
FORM AND LEGALITY
_____
OFFICE OF THE GENERAL COUNSEL

Attachment 1

Program Description

The University of West Florida (UWF) seeks to offer a Doctor of Philosophy (Ph.D.) degree program in Intelligent Systems and Robotics in CIP Code 11.0102. The degree program will be housed in the Department of Intelligent Systems and Robotics within the Hal Marcus College of Science and Engineering. The proposed degree program in CIP Code 11.0102 will be the first of its kind in the state of Florida. The proposed program comprised of 72 semester credit hours (SCH) beyond the bachelor's degree will be an affiliation between UWF and the Florida Institute for Human and Machine Cognition (IHMC). IHMC, located at 40 South Alcaniz Street, Pensacola, Florida is a not-for-profit research institute established by the Florida Legislature in 2004 (Florida Statute 1004.447).

The university has designed the Intelligent Systems and Robotics Ph.D. degree program to train the next generation of educators and researchers to develop technology combining human and machine elements. The goal is to have well-educated citizens who will work in diverse fields, strengthen UWF's research and scholarly activities, and create regional economic impacts.

Beyond coursework, the program's cornerstone will be hands-on, leading-edge research in robotics and artificial intelligence and will leverage the proximity and talent of UWF faculty and IHMC Researchers. Graduates from the degree program will work in a variety of high-tech industries such as advanced manufacturing, healthcare, defense, and transportation.

UWF is uniquely poised to execute and deliver this Ph.D. degree program, the first of its kind in Florida. Because of the close working relationship and physical proximity with IHMC, students and faculty will be able to leverage the infrastructure and expertise of this world-class institution.

Educating students in the subject of artificial intelligence and robotics aligns with the Florida Board of Governors' 2025 Strategic Plan to have "well-educated citizens who are working in diverse fields, from science and engineering to medicine and bioscience to computer science, the arts and so much more."

Appendix F

University of West Florida Graduate Admissions and Graduation Requirements

Graduate Admissions and Graduation Requirements

General Information
The Graduate School administers the application, admission, and readmission process for all degree-seeking and non-degree seeking graduate students. It also assists prospective graduate students in obtaining information about UWF.

General Policies
The University of West Florida encourages applications for admission from qualified students regardless of gender, culture, religion, ethnic background, age, marital status, or disability. Students with documented visual impairments, hearing impairments, motor impairments, or specific learning disabilities may petition for substitution of admission requirements provided such substitution does not significantly alter the nature of the program for which admission is being sought. For more information about the University's admission requirement substitution policy contact the Graduate School.
Admission of students to the University of West Florida is within the jurisdiction of the University, but subject to the minimum standards adopted by the UWF Board of Trustees and the Florida Board of Governors.

Conditions of Admission
The Graduate School will notify the applicants of the admission decision. Admission to the University is often contingent upon the subsequent receipt of satisfactory and official college or university transcripts and verification of baccalaureate degrees. Failure to submit such documents may result in the cancellation of admission. Refer to Provisional for more information.

Ownership of Submitted Documents
All credentials and documents submitted become the property of the University of West Florida. The originals or copies of the originals will not be returned to the applicant or forwarded to another institution, agency, or person.

Fraudulent Records
If it is found that an applicant has made a false or fraudulent statement or a deliberate omission on the application for admission, the residency statement, or any other accompanying documents or statements, the applicant may be denied admission. If the student is already enrolled when the fraud is discovered, the case will be adjudicated using the procedures specified for violations of the UWF Student Conduct System as contained in the *Student Handbook and Planner* which is available online at http://uwf.edu/studenthandbook/.

Applicant Conduct
The University shall evaluate an applicant's previous conduct to determine whether offering the applicant admission is in the best interest of the University. Applicants with a record of previous misconduct at an educational institution or criminal conduct will be evaluated during the admission process in accordance with UWF Regulation 3.003.

Request for Admission for a Later Semester
Applicants are admitted to the University only for the semester for which they apply. Students who do not enroll in the semester for which they have been admitted and want consideration for a different semester must reapply for admission and pay another application processing fee. Applicants will be considered for admission under the policies in effect at that time. Admission

is not automatic. If an applicant has attended, or is currently attending, another collegiate institution since the submission of the previous application, the applicant must indicate the institution on the new application and provide an official transcript of all work attempted.

Admission Documents Required
Applicants for graduate admission must provide the Graduate School with the following documents:

Application for Admission
Applicants must apply for graduate level admission online. All graduate applications are available online at http://uwf.edu/graduate/graduate-admissions/apply-now. The application for admission and a non-refundable, non-deferrable $30 processing fee payable to the University of West Florida should be submitted six to nine months prior to the semester for which admission is requested. It is the policy of the University not to defer or waive the application for admission and the application processing fee. The application processing fee must be in U.S. currency and drawn from a U.S. bank. There is an option to pay via credit card when the web application is submitted.

College Transcripts
Applicants must submit one official transcript from each college and university attended to the Graduate School. Applicants who received their undergraduate degree from UWF do not need to provide UWF transcripts. Transcripts are considered official when they are sent from a college or university directly to the Graduate School and bear an official seal and signature. Transcripts bearing the statement "Issued to Student," faxed transcripts, or transcripts submitted by the applicant are not considered official. Original documents or signed, officially certified photocopies of original documents may be submitted by the applicant only when institutions outside the U.S. will not send academic records to other institutions. The verifying signature should preferably be that of an officer of the institution attended. All academic records that are not in English must be accompanied by certified English translations.

Test Scores
Official test results from a nationally standardized graduate admission test are required for all applicants unless otherwise specified by the graduate program to which you are applying. Applicants should contact the graduate department for which he/she applied to inquire as to which test is acceptable for that program or if it may be waived. The University of West Florida accepts the Graduate Record Examination (GRE), the Miller Analogies Test (MAT), and the Graduate Management Admissions Test (GMAT). For the majority of departments, it is recommended that the graduate admission test be taken no later than April for the fall semester, August for the spring semester, or January for the summer semester. Applicants should contact the specific department for departmental deadlines for admission tests. Applicants to the Ed.D. program should take the GRE or MAT one year prior to desired admission. The test scores are considered official only when they are sent directly to the Graduate School from the testing agency. Examinee copies are not considered official. The GRE, GMAT, and MAT are offered several times a year at numerous testing centers in the U.S. and abroad. Advanced registration is required. Registration forms, as well as detailed information on the availability and character of the examinations, may be obtained from the UWF Testing Center.

Departmental Requirements
Some departments have additional admission requirements such as auditions, portfolios, goal statements, letters of recommendation, departmental applications, writing samples, personal

interviews, and diagnostic testing. Applicants should contact the department directly regarding any departmental admission requirements.

Deadlines for Applications and Supporting Documents

The final deadlines for applications and supporting documents for graduate applicants are:

Fall	June 1
Spring	October 1
Summer	March 1

Because some departments have earlier deadlines, applicants should contact the specific academic departments for departmental deadlines. It is in an applicant's best interest to apply early. Files completed after the published deadlines may not be processed in time for the applicant to be considered for enrollment in the desired semester.

Admission Policies

Admission to a UWF graduate program is a selective process that is governed by University requirements and department requirements that may exceed University-level requirements. Admission decisions are based on a holistic review of credentials in which multiple criteria are used to judge the appropriateness of an applicant to pursue graduate study. Each department selects factors it considers will help predict probable success in the graduate program and may include, but are not limited to, the quality of the applicant's undergraduate or graduate preparation as determined by the undergraduate or graduate institution attended; undergraduate or graduate grade point average and performance in specific courses; scores on standardized admission tests; the motivation and attitude of the applicant as determined by a personal statement, letters of reference, and/or a personal interview or other means; and writing ability. Preference for admission to any semester is given to students whose credentials indicate the greatest promise for academic success. Because of factors related to a department's enrollment capacity, the fact that a student meets minimum requirements does not guarantee admission to a specific program. Admission requirements shall not include preferences in the admissions process for applicants because of race, national origin, or gender.

Requirements for Regular Admission to a Master's Program

Each applicant shall be required to meet minimum University requirements:

- An earned bachelor's degree from an institution that is fully accredited by a regional or national accrediting agency recognized by the United States Department of Education or a comparable degree from an international institution with a minimum cumulative grade point average (GPA) of 3.0 on a 4-point scale, or a 3.0 (GPA) on a 4-point scale on the last 60 hours of coursework in the baccalaureate degree.
- Be in good standing at all previous institutions of higher learning. Students who, for academic or disciplinary reasons, are not eligible to register in the college or university last attended will not be admitted for graduate study.
- A score on a nationally standardized graduate admissions test, such as the General Test of the Graduate Record Examination (GRE), the Miller Analogies Test (MAT), the Graduate Management Admission Test (GMAT), or an equivalent that is acceptable for the program to which the student is applying. Applicants should contact the graduate department for which he/she applied to inquire as to which test is acceptable for that program or if it may be waived. Test scores must be no more than five years old.
- Approval by the department offering the degree to which the applicant is applying.

Departments may establish standards that exceed these University requirements or require additional application materials. Departments may accept an earned graduate degree from a U.S. institution that is fully accredited by a regional or national accrediting agency recognized by the United States Department of Education or a comparable degree from an international institution in lieu of the bachelor's degree and required standardized admission test.

Requirements for Regular Admission to a Doctoral Program

Each applicant shall be required to meet minimum University requirements:

- An earned master's degree from an institution that is fully accredited by a regional or national accrediting agency recognized by the United States Department of Education or a comparable degree from an international institution with a minimum cumulative grade point average (GPA) of 3.5 on a 4-point scale.
- Be in good standing at all previous institutions of higher learning. Students who, for academic or disciplinary reasons, are not eligible to register in the college or university last attended will not be admitted for graduate study.
- A score on a nationally standardized graduate admissions test, such as the General Test of the Graduate Record Examination (GRE), the Miller Analogies Test (MAT), or an equivalent that is acceptable for the specialization to which the student is applying. Applicants should contact the graduate department for which he/she applied to inquire as to which test is acceptable for that program or if it may be waived. Test scores must be no more than five years old.
- Other requirements as specified by each specialization for the degree.
- Approval by the department offering the specialization to which the applicant is applying.

Provisional Admission

With approval from the department, students who do not have all application materials available at the time of admission may be granted provisional admission by the Graduate School. Provisional admission is appropriate for circumstances such as when the baccalaureate degree has been awarded but the undergraduate institution has not yet posted the degree, when graduate admissions has not received the applicant's official standardized test score, or when information required by the department is incomplete. Students who are granted provisional admission must submit all application materials during the first semester of graduate study or risk removal by the Graduate School of their status to pursue graduate study.

Conditional Admission

Students who do not meet the minimum requirements for regular admission may be admitted by a department on a conditional basis. In order to be considered for conditional admission, students must submit all required admission materials. Also, students who have graduated from a recognized, although non-accredited, institution may be admitted on a conditional basis at the department's discretion. Students admitted on a conditional basis may be permitted to register for up to 12 semester hours, identified by the department as appropriate to the degree. In addition, the student must:

1. Earn at least a grade of "B" on each of those courses during the semester(s) where the student is admitted on a conditional basis
   or
2. Earn a semester grade point average above a 3.0, earning no less than a C+ on any given course, during the semester(s) where the student is admitted on a conditional basis.

Failure to accomplish the above may result in the removal of his/her status to pursue graduate study. Admission on a conditional basis should not be routine.

Appeal of Admission Denial

Denial of Admission to Graduate Programs

Applicants who have been denied admission or readmission to a graduate program at the University may appeal the denial by filing a written letter of appeal with the Director of the Graduate School, by sending it to gradadmissions@uwf.edu or The University of West Florida, Graduate School, Building 11 Room 207, 11000 University Parkway, Pensacola, Florida 32514. The letter of appeal must address the reasons why the applicant believes the decision is in error. It must be received by the Graduate School within 30 days of the date of the denial letter, or by the first day of classes of the semester for which admission was requested, whichever is shorter. Once received, the appeal letter will be forwarded to the appropriate College Dean. The College Dean will convene a faculty committee to review the denial within 20 days of the date of the appeal letter. The committee will consider the materials submitted by the applicant including the letter of appeal. The committee's decision will be forwarded to the applicant by the Graduate School within five business days of the date of the receipt of the committee's decision. This appeal decision is final.

Applicants who are denied admission or readmission to the University for judicial and/or conduct reasons should refer to UWF/REG. 3.003.

General Readmission

Readmission to Master's and Specialist Programs

Graduate students not in attendance during three or more consecutive academic semesters (including summer semester), but less than five years, must complete the "Application for Readmission" and provide any required documentation. The application must be filed according to readmission deadlines stated in the Academic Calendar for the semester to which the student is reapplying. The "Application for Readmission" does NOT include an application processing fee.

Readmitted students will have their official catalog year automatically updated to the catalog year in effect at the time of re-enrollment. Readmitted students also have the option of changing their catalog year to the catalog year in effect at the time of graduation.

Degree-seeking students file the readmission application in the Graduate School. Official transcripts from each college or university attended since previous enrollment at UWF must be submitted to the Graduate School prior to readmission. If a student is currently enrolled at another institution, the final transcript must be submitted when the term has ended. Readmission is not automatic and is at the discretion of the Graduate School and graduate department.

Graduate students who last attended their graduate program five years ago or more must reapply to their program using the graduate application for admission.

Readmission to Doctoral Program

Doctoral candidates who do not attend three consecutive semesters must formally reapply to the University and to the program. Readmission to the doctoral program is at the discretion of the Ed.D. Admissions Committee.

International Graduate Admission

Applicants to the University are considered international if they are not U.S. Citizens, dual citizens, or permanent residents. In addition to the policies and procedures stated for the different categories of admission, the following information pertains to international applicants.

International Student Office (ISO)

The International Student Office provides immigration assistance to all international students, scholars, and employees at the University of West Florida and is available to assist students with

problems ranging from immigration to cultural and personal matters. Students should feel free to ask questions and seek assistance from this office at any time. Among the services offered are:

- Advising on immigration rules, regulations, responsibilities, and deadlines processing immigration requests and forms such as travel documents, employment authorizations, dependent documents, and social security card applications/approvals
- Optional Practical Training (OPT) and Curricular Practical Training (CPT) Workshops
- Communication with the international student community of any changes in immigration rules and regulations
- Connecting students with appropriate university offices or federal and state agencies
- Serving as a liaison with other university units on behalf of international students

The Office of International Education and Programs is located in Building 71 and may be reached at 850-474-2479. Please see additional information for international students and available services at uwf.edu/internationaloffice.

Academic Records

International applicants must submit original documents or signed, officially certified photocopies of original documents, as well as certified translations of all documents that are not in English. International applicants must also have their foreign credentials evaluated by one of the four evaluation services listed below. The evaluation should contain a course-by-course description and a grade point average from each institution attended. Applicants have the responsibility to contact the evaluation agency directly and have the evaluation agency send the official evaluation report to UWF. The official evaluation report must be received by the application deadline for the semester the applicant plans to attend.

English Proficiency Test

If the international applicant's native language is not English or the applicant is from a country in which the primary language is not English, he or she must take one of the following tests before consideration of admission. English proficiency test scores are considered official only when they are sent directly to the Graduate School from the testing agency. Not all exams are available outside the U.S. and most are offered on a fixed schedule. Contact the testing agencies directly for scheduling information.

- Test of English as a Foreign Language (TOEFL)
- International English Language Test System (IELTS)
- Michigan English Language Assessment Battery (MELAB)

Minimum scores required by the University are listed below. However, individual departments may require higher scores.
Paper-based TOEFL (pBT): 55 Listening/Comprehension Sub Score: 53
Internet-based TOEFL (iBT): 79/80 Listening Sub Score: 19
IELTS: 6.5 Listening/Comprehension Sub Score: 7
MELAB: 78
International students expecting to receive appointments as teaching assistants also are required by Florida law to pass a test of spoken English and must obtain and report a minimum TOEFL iBT Listening sub score of 23 to the Graduate School.
International non-degree seeking applicants, including applicants attending UWF under an international exchange agreement, must meet the English proficiency requirement.

Exemptions from proof of English proficiency

- UWF Intensive English Program (IEP) students who successfully complete the advanced level with an average of B+ (88) and score 78 or higher on the IEP exit test (MELICET) are eligible

for admission to the University of West Florida if they meet all other requirements of the University.

- International students with a bachelor's degree from a U.S. institution or who have successfully completed a full year of full-time academic course work at a regionally accredited institution in the U.S. preceding the semester for which admission is sought. Intensive English course work does not qualify.

Certification of Finances

Certification of finances must be completed and returned to the International Student Office before the student visa, "Certificate of Eligibility" (Form I-20), is issued. The University is required by U.S. Citizenship and Immigration authorities to check the financial resources of each student prior to issuing Form I-20. Therefore, it is important for the applicant to know the costs of attending the University and have the necessary funds for the entire period of enrollment. Funds for one year of study and living expenses must be documented and approved by the University before an I-20 is issued.

The "Confidential Financial Statement" form must be completed, signed by the student, and verified by the student's or sponsor's bank or financial institution with a statement of deposit. Before completing the "Confidential Financial Statement," the applicant should review the estimate of institutional costs and living expenses under Tuition and Fees. The total amount of funds available to the student must be listed for each year of planned attendance and must equal or exceed the total estimate of institutional costs and living expenses. This form must be accurate and documented to avoid unnecessary delay in processing. The "Confidential Financial Statement" and supporting documents from the student's or sponsor's bank or financial institution should be submitted to the International Student Office by email at intered@uwf.edu.

Health Form/Health Insurance

Applicants must submit a "Mandatory Immunization Health History Form" completed by the applicant. Refer to the Immunization Requirements for more information.

International students are required to show certified proof of adequate medical insurance coverage for illness or accidental injury for an entire academic year before they will be permitted to register or to continue enrollment. An adequate medical insurance policy must meet a number of requirements as listed on the "Health Insurance Compliance Form", including that the insurance proceeds are payable in U.S. currency. Insurance may be obtained at the University before registration.

Notice of Admission

If a student's application for admission to UWF is approved, an official letter of admission will be sent by the Graduate School. Admission is for a specific semester only. If the student is unable to enroll for the semester indicated on the letter of admission, the Graduate School should be informed immediately. Under no circumstances should an applicant make departure plans for Pensacola until official approval has been given by the Graduate School and the student has received the Form I-20 from the International Student Office (see section on passports and visas). Students who come to the campus without first receiving an official notice of acceptance do so at their own risk. The student's presence on the campus will not influence the decision on an application for admission.

International Exchange

International students interested in participating in the UWF exchange program must be nominated by their home institution. Once confirmation of a student's eligibility has been received by the home institution, the acceptance process can begin through the International

Student Office. For a list of participating exchange partner institutions and application procedures, please see the International Student Office's J-1 Exchange Student Admission webpage.

Passports and Visas

Students meeting all admission requirements of the University will be mailed a "Certificate of Eligibility" by the International Student Office. Students possessing a valid Form I-20 will be considered for a F-1) by presenting it and the following documents to the nearest U.S. Embassy or Consulate:

- A valid passport,
- Evidence of adequate financial support,
- Evidence of proficiency in the English language, and
- Any other additional documentation required by the U.S. Embassy or Consulate.
- The student visa is stamped on a page in the passport.

Transfer of Funds

Prospective students should familiarize themselves with the current regulations of their own governments, as many restrict the purchase of U.S. dollars. Students should arrive with ample funds in U.S. dollars or in a credit card which is authorized to be used in the U.S. International wire transfer service to UWF is also available.

Graduation and General Degree Requirements

http://catalog.uwf.edu/graduate/academicpolicies/graduation/#mastersdegreerequirements

Master's Degree Requirements

Requirements for a master's degree from UWF are listed below. The colleges and departments may have requirements which exceed these minimums. Please consult the individual departments and the individual program descriptions in this *Catalog* for details. Minimum requirements are the following:

- Students must be admitted and enroll at UWF for a minimum of one semester as degree-seeking in the degree program for which a degree is awarded;
- Completion of minimum 30 semester hours in an approved program;
- Completion of minimum 15 semester hours of coursework at the 6000 level or above;
- Completion of minimum 24 semester hours of credit at UWF. The department offering the program may require additional residency;
- Graduate GPA of a minimum of 3.0, refer to GPA Requirement for more information;
- Complete degree requirements within six years from the date the UWF degree is awarded, refer to the Time to Degree requirement for more information;
- A degree will not be awarded for a student on academic probation or suspension;
- A maximum of 6 semester hours of credit may be applied toward a master's degree for successful completion of a thesis;
- Master's students must enroll as degree-seeking for a minimum of one semester at UWF within the last five years of the date the degree is to be awarded. Students who need to be readmitted will be required to meet the degree requirements of the current *Catalog*.

Requirements for Second UWF Master's Degree

Requirements listed below are applicable for students who already hold a master's degree from UWF or who are pursuing two masters' degrees simultaneously. Students who have earned a master's degree from another institution must meet the requirements listed under Master's Degree Requirements.

- Master's students may be candidates for two master's degrees at UWF. Candidacy in two separate master's programs may be held in overlapping time periods. Candidates must meet the conditions of graduate status stipulated by both departments;
- Since a master's degree represents a level of attainment, some (or all) courses included in one graduate program may be used by another department to satisfy the formal requirements for a second graduate degree. A minimum of 18 semester hours must be taken for the second graduate degree which were not a part of the first degree;
- A degree will not be awarded for a student on academic probation or suspension;
- Master's students must be admitted and enroll at UWF for a minimum of one semester as degree-seeking in the degree program for which a degree is awarded;
- Master's students must enroll as degree-seeking for a minimum of one semester at UWF within the last five years of the date the degree is to be awarded. Students who need to be readmitted will be required to meet the degree requirements of the current *Catalog*.
- A second master's degree may not be earned in the same program area.

Application for Graduation

Students fulfilling requirements for a UWF master's or specialist degree must submit an "Application for Graduation" online by the application deadline stated in the Academic Calendar. Doctoral students apply for graduation the semester prior to the dissertation defense and must apply through the graduate department in the Ed.D. Program Office. Graduation application forms are available on the Office of the Registrar website. Retroactive graduation to a prior semester will not be approved.

Commencement

Commencement ceremonies at UWF are held twice a year, fall and spring, for students graduating with a Baccalaureate, Master's, Specialist, or Doctorate degree. Doctoral students must be approved by the Graduate School prior to participating in the commencement ceremony. Those master's students who plan to graduate in the summer should apply for summer graduation only. Prospective summer graduates have the option to participate in either the preceding spring or following fall ceremony. Doctoral students intending to graduate in the summer may not participate in the spring ceremony unless the dissertation has been fully approved and participation is approved by the Dean of the Graduate School. "Applications for Graduation" should be submitted by the date stated in the Academic Calendar. Students will receive information about graduation through their student e-mail accounts. Commencement information is also available on the web at uwf.edu/commencement. UWF does not have a graduation honors program for master's, specialist, and doctoral students.

Degree Audit System

Degree Works will identify and track all graduation requirements for each degree at the University. Students may check their individual progress toward degree completion by reviewing their degree audit, which is available in MyUWF. The degree audit is used for the final graduation check and a completed audit is required before a degree is awarded.

Posthumous Graduate Degree

To be considered for a posthumous degree, graduate students shall have successfully completed at least eighty percent of the chosen UWF degree program, have been in good standing at UWF, and have met UWF degree residency requirements. In exceptional circumstances the Dean of the Graduate School may make exceptions to these requirements. The student's academic department must initiate the request for a posthumous degree through the College Dean, Dean of the Graduate School, and the Provost's Office.

Substitution of Graduation Requirements for Students with Disabilities

Students with documented visual impairments, hearing impairments, motor impairments, or specific learning disabilities may petition for substitution of degree requirements provided such substitutions do not significantly alter the nature of the program in which the student is enrolled. For more information about the University's degree requirement substitution policy, contact the college dean of the program.

Appendix G

Curriculum Vitarum

Oscar Y. Chuy Jr.
Assistant Professor Department of Engineering
Hal Marcus College of Science and Engineering
Bldg 4/ Rm. 132 11000 University Pkwy.
Pensacola, Florida 32514
Phone: (850)-474-3317
E-mail: ochuy@uwf.edu

Research Interest

Human Robot Physical Interaction and Cooperation, Motion Planning and Control, Control of Robotic Assistive Devices, and Control of Autonomous Vehicles.

Professional Preparation

Postdoctoral Research Associate (2007-2010) Department of Mechanical Engineering Florida State University Tallahassee, FL USA

Ph.D., Bioengineering and Robotics (2006) Tohoku University, Sendai Japan Supervisor: Prof. Kazuhiro Kosuge

M.S., Electrical Engineering (Major: Instrumentation and Controls) (2001) University of the Philippines, Dilliman, Quezon City, Philippines

B.S., Electrical Engineering (1996) Mindanao State University - Iligan Institute of Technology, Philippines

B.S., Electronics and Communication Engineering (1994) Mindanao State University - Iligan Institute of Technology, Philippines

Professional Experience

Assistant Professor (2015-Present) Department of Engineering Hal Marcus College of Science and Engineering University of West Florida Pensacola, FL USA
Research Faculty I (2013-2015) Department of Mechanical Engineering FAMU-FSU College of Engineering Florida State University Tallahassee, FL USA

Assistant Scholar/Scientist (2010-2013) Department of Mechanical Engineering FAMU-FSU College of Engineering Florida State University Tallahassee, FL USA

Research Associate (2006-2007) System Robotics Laboratory Department of Bioengineering and Robotics Tohoku University, Sendai Japan

Graduate Research Assistant (2002-2006) System Robotics Laboratory Department of Bioengineering and Robotics Tohoku University, Sendai Japan

Graduate Research Assistant (1998-2000) Department of Electrical and Electronics Engineering University of the Philippines, Philippines

Instructor (1995-1997 and 2000-2002) Department of Electronics and Electrical Engineering Mindanao State University - Iligan Institute of Technology, Philippines

Contracts and Grants

Chuy, Oscar (PI), Development of a Robotic Mobility Aid, UWF (Internal Grant), May 2017-April 2018, ($24,600)

Collins, Emmanuel (PI) & Chuy, Oscar (Co-PI). NRI: Control and Planning for Slip Mitigation in Manned and Unmanned Electric Ground Vehicles. Submitted to National Science Foundation.

Collins, Emmanuel (PI) & Chuy, Oscar (Senior Personnel). Momentum Based Motion Planning for Manipulators with Heavy Loads, NSF, CMMI-1130286, September 1 , 2011 - August 31, 2014.

Collins, Emmanuel (PI) & Chuy, Oscar (Senior Personnel). Modeling and Motion Planning for Skid Steered Vehicles, NSF, CMMI-0927040, August 15, 2009 - July 31, 2012.

Collins, Emmanuel (Co-PI) & Chuy, Oscar (Senior Personnel). Motion Planning and Control of Electric Powered Wheelchair, (subcontract from University of Pittsburgh and Carnegie Mellon University, A National Science Foundation Engineering Research Center for Quality of Life Technologies), August 15, 2009 - July 31, 2014.

Patent

Collins, E. and Chuy, O., Slip mitigation control for electric ground vehicles, Patent Application US 15/131,689.

Research Project

Stability of Human Robot Physical Interaction, 2016 – Present

Human CoG State Estimation (Collaboration with Smart Design Lab, Tohoku University, Japan), 2017 – Present

Fast Motion Planning Using Experience (Collaboration with Florida State University), 2015 – Present

Momentum Based Motion Planning for Manipulators with Heavy Loads, NSF CMMI-1130286, (9/2011-9/2014).

Modeling and Motion Planning for Skid Steered Vehicles, NSF, CMMI-0927040, (8/2009 – 7/ 2012)

Electric Powered Wheelchair Self- Balancing Mode, (subcontract from University of Pittsburgh and Carnegie Mellon University, A National Science Foundation Engineering Research Center for Quality of Life Technologies), 8/2013-7/2014.

Slip Control for Electric Powered Wheelchair, (subcontract from University of Pittsburgh and Carnegie Mellon University, A National Science Foundation Engineering Research Center for

Quality of Life Technologies), 8/2012-7/2013.

Real-time Control of Electric Power Wheelchair, (subcontract from University of Pittsburgh and Carnegie Mellon University, A National Science Foundation Engineering Research Center for Quality of Life Technologies), 8/2011-7/2012.

Motion Planning using Dynamic Model for a Manipulator on an Electric Powered Wheelchair, (subcontract from University of Pittsburgh and Carnegie Mellon University, A National Science Foundation Engineering Research Center for Quality of Life Technologies), 8/2009-7/2011.

Dynamic and Power Modeling of Skid Steered Vehicle, Department of Mechanical Engineering, Florida State University, 4/2007- 8/2009.

Control of Robotic Walking Support Systems, Tohoku University, 4/2003-3/2007.

Teaching

Department of Engineering, Hal Marcus College of Science and Engineering, Universiry of West Florida:
Autonomous Systems (Mobile Robotics) EEL4990 Elements of Robotics EEL4663 Discrete Time Signals and Systems EEL3135 Linear Control Systems EEL4657 Electronics Laboratory EEL4308L Linear Control Systems Laboratory EEL4657L

Department of Mechanical Engineering, FAMU-FSU College of Engineering:
Mechatronics I (EML3811), Fall 2010 – Spring 2015 Introduction to Mobile Robotics (EML5831, graduate) Introduction to Mobile Robotics (EML4830, undergraduate)

Mindanao State University-Iligan Institute of Technology, Philippines
Introduction to Electronics: Circuits and Devices Feedback Control System

Supervision of Student Research and Projects

Adam Moore, Stabilization of Attendant Wheelchair Based on User's Pose, Summer Undergraduate Research Program (SURP), Hal Marcus College of Science and Engineering, University of West Florida, 2017.

Jonathan Herrero, Control Evaluation of Attendant Wheelchair, Summer Undergraduate Research Program (SURP), Hal Marcus College of Science and Engineering, University of West Florida, 2017.

Lash, S., Role of Arm Configuration to the Stability of Human-Robot Physical Interaction, Summer Undergraduate Research Program (SURP), Hal Marcus College of Science and Engineering, University of West Florida, 2016.

Petsigner, E., Electric Powered Wheelchair Control Addressing User and Terrain Interaction, Summer Undergraduate Research Program (SURP), College of Science and Engineering, University of West Florida, 2016.

M. Peters, A. Vignolo, and J. Bromen, Design of an Autonomous Quadrotor, Senior Design, Jan 2015 – Dec 2016, Dept. of Engineering, Hal Marcus College of Science and Engineering,

University of West Florida.

M. Cherry and M. Pekarek, Design of an Android Jeopardy Game Using Google Chromecast and Bluetooth Controllers, Senior Design, Jan 2015 – Dec 2016, Dept. of Engineering, Hal Marcus College of Science and Engineering, University of West Florida.

B. Avellon, M. Humes and, S. Taylor, Design of an Autonomous Robot, Senior Design, Aug. 2015 –Apr 2016, Dept. of Engineering, Hal Marcus College of Science and Engineering, University of West Florida.

J. Davis, K. Dang, and K. Tan, Unmanned Ground Vehicle Competition, Senior Design, Aug. 2015 –Apr 2016, Dept. of Engineering, Hal Marcus College of Science and Engineering, University of West Florida.

Reyes, R., Inertial Parameters Identification of a 2 DOF Manipulator, Undergraduate Honors Thesis, FSU, 2014.

Krichman, B., Development of a Wheel Force/Torque Sensor for Autonomous Ground Vehicle, National Science Foundation Research Experience for Undergraduate (NSF-REU), FSU, May–Aug 2014.

Brown, J., Dynamic Modeling and Control of a Quadrotor, NSF-REU, FSU, May–Aug 2013.

Bucken, D., Development and Control of a 2 DF Manipulator, NSF, CMMI-1130286, Jan–Dec 2012.

Miller, K., Modeling and Simulation of Skid Steed Vehicle on Rough Terrain, NSF-REU, FSU, May–Jul 2012.

Lenoff, J., Development and Control of a Robotic Walker, FSU, May 2011–Apr 2012.

Team 1, Eglin/AFRL: Indoor Quadrotor Control, Dept. of Mechanical Engineering, FAMU-FSU College of Engineering, Senior Design, Aug 2013 –Apr 2014.

Team 10, Autonomous All-Terrain Vehicle, Dept. of Mechanical Engineering, FAMU-FSU College of Engineering, Senior Design, Aug 2013 –Apr 2014.

Team 10, Modeling and Instrumentation of an Autonomous Ground Vehicle, Dept. of Mechanical Engineering, FAMU-FSU College of Engineering, Senior Design, Aug 2012 –Apr 2013.

Team 17, Design and Control of Outdoor Robotic Walker, Dept. of Mechanical Engineering, FAMU-FSU College of Engineering, Senior Design, Aug 2011 –Apr 2012.

Refereed Journal Articles

Chuy, O. Y., Collins, E., Sharma, A., & Kopinsky, R., Using Dynamics to Consider Torque Constraints in Manipulators Planning with Heavy Loads, ASME Journal of Dynamic Systems, Measurement and Control, Vol. 139, No. 5, May 2017. doi: 10.1115/1.4035168

Chuy, O. Y., Collins, E., Sharma, A., & Kopinsky, R. Robot Trajectory Planning and Control for Input Constrained Systems: Application to Manipulators Lifting Heavy Loads. IEEE Transaction on Control Systems Technology. (Under Review)

Ordonez, C., Chuy, O. Y., Liu, X., & Collins, E. (2011). A Laser Based Rut Detection and Following System for Autonomous Ground Vehicles. Journal of Field Robotics, 28, p. 158-179.

Yu, W., Chuy, O. Y., Collins, E., & Hollis, P. (2010). Analysis and Experimental Verification for Dynamic Modeling of a Skid-Steered Wheeled Vehicle. IEEE Transactions on Robotics, p. 340-353.

Chuy, O. Y., Hirata, Y., Wang, Z., & Kosuge, K. (2007). A Control Approach Based on Passive Behavior to Enhance User Interaction. IEEE Transactions on Robotics, p 899-908.

Chuy, O. Y., Hirata, Y., & Kosuge, K. (2006). A New Control Approach for a Robotics Walking Support System in Adapting User Characteristics. IEEE Transactions on Systems Man and Cybernetics, p. 725-733.

Invited Book Chapters

Dunlap, D., Caldwell, C., Collins, E., & Chuy, O. Y. (2011). Motion Planning for Mobile Robots Via Sampling-Based Model Perspective Optimization - Mobile Robots. In Recent Advances in Mobile Robotics (pp. 1-23). InTech.

Yu, W., Collins, E., & Chuy, O. Y. (2011). Dynamic Modeling and Power Modeling of Robotic Skid-Steered Wheeled Vehicles - Mobile Robots - Current Trends. In Mobile Robots - Current Trends. InTech.

Refereed Book Chapters

Chuy, O. Y., Collins, E., Dunlap, D., & Sharma, A. (2013). Sampling-Based Direct Trajectory Generation Using the Minimum Time Cost Function. In Experimental Robotics (pp. 651-666). Springer.

Refereed Proceedings

Chuy, O. Y. & Jonathan Hererro, Stability Analysis of an Attendant Controlled Wheelchair with Desired Dyanmics, 2017 IEEE International Conference on Intelligent Robots and Systems. (Submitted for Review)

Chuy, O. Y., Collins, E., Ordonez, C., Candiotti, J., Wang, H., & Cooper, R. (2014). Slip Mitigation Control for an Electric Powered Wheelchair. In 2014 IEEE International Conference on Robotics and Automation, (pp. 333-338). Hong Kong. Francis, G., Collins, E., Chuy, O. Y., & Sharma, A. (2013). Sampling-Based Trajectory Generation for Autonomous Spacecraft Rendezvous and Docking. In AIAA Guidance, Navigation, and Control (GNC) Conference. AIAA.

Ordonez, C., Gupta, N., Chuy, O. Y., & Collins, E. (2013). Momentum Based Traversal of Mobility Challenges for Autonomous Ground Vehicles. In 2013 IEEE International Conference on Robotics and Automation, (pp. 752-759). Karlsruhe, Germany.

Chuy, O. Y., Collins, E., Dunlap, D., & Sharma, A. (2012). Sampling-Based Direct Trajectory Generation Using the Minimum Time Cost Function. In 13th International Symposium on Experimental Robotics. Quebec, Canada, 2012.

Ordonez, C., Gupta, N., Chuy, O. Y., & Collins, E. (2012). Modeling of Skid-Steered Wheeled Robotic Vehicles on Sloped Terrains. In Proceedings of the ASME Dynamic Systems and Control Conference,(pp. 91-99). Fort Lauderdale, FL, 2012.

Ordonez, C., Chuy, O. Y., Collins, E., & Liu, X. (2009). Rut detection and following for autonomous ground vehicles. In In Proceedings of Robotics: Science and Systems. Seattle, WA.

Chuy, O. Y., Collins, E., Yu, W., & Ordonez, C. (2009). Power Modeling of a Skid Steered Wheeled Robotic Ground Vehicle. In 2009 IEEE International Conference on Robotics and Automation, (pp. 4118 – 4123), Kobe, Japan.

Chuy, O. Y., Kumar, V., Holt, F., Collins, E., & Alvi, F. (2009). Microjet-based Separation Control Using a Virtual Sensor for Degree of Separation. In Florida Center for Advanced AeroPropulsion (FCAAP) Annual Technical Symposium. Orlando, FL.

Ordonez, C., Chuy, O. Y., Collins, E., & Liu, X. (2009). Rut Tracking and Steering Control for An Autonomous Rut Following. In Proceedings of the 2009 IEEE International Conference on Systems, Man, and Cybernetics, (pp. 2775-2781), San Antonio, TX, USA.

Yu, W., Chuy, O. Y., Collins, E., & Hollis, P. (2009). Dynamic Modeling of a Skid-Steered Wheeled Vehicle with Experimental Verification. In 2009 IEEE/RSJ International Conference on Intelligent Robots and System,(pp. 4212-4219). St. Louis, MO.

Zhang, K., Collins, E., Shi, D., Liu, X., & Chuy, O. Y. (2008). A Stochastic Clustering Auction for Centralized and Distributed Task Allocation in Multi-Agent Teams. In Distributed Autonomous Robotic Systems (pp. 345-354). Tsukuba, Ibaraki, Japan.

Chuy, O. Y., Hirata, Y., & Kosuge, K. (2007). Active Type Robotic Mobility Aid Control Based on Passive Behavior. In 2007 IEEE/RSJ International Conference on Intelligent Robots and System (pp. 165-170). San Diego, CA.

Chuy, O. Y., Hirata, Y., & Kosuge, K. (2007). Environmental Feedback for Robotic Walking Support System Control. In 2007 IEEE International Conference on Robotics and Automation, (pp. 3633-3638). Rome, Italy.

Chuy, O. Y., Hirata, Y., Wang, Z., & Kosuge, K. (2006). Approach in Assisting a Sit-to-Stand Movement Using a Robotic Walking Support System. In 2006 IEEE/RSJ International Conference on Intelligent Robots and System (pp. 4343-4348). Beijing, China.

Chuy, O. Y., Hirata, Y., & Kosuge, K. (2005). An Online Approach in Adapting User Characteristic for Robotic Walker Control. In IEEE 9th International Conference on Rehabilitation Robotics (pp. 139- 142). Chicago, USA.

Chuy, O. Y., Hirata, Y., & Kosuge, K. (2005). Augmented Variable Center of Rotation in Controlling a Robotic Walker to Adapt User Characteristics. In 2005 IEEE/RSJ International

Conference on Intelligent Robots and System (pp. 1779–1784). Edmonton, Canada. Chuy, O. Y., Hirata, Y., Wang, Z., & Kosuge, K. (2005). Motion Control Algorithms for a New Intelligent Robotic Walker in Emulating Ambulatory Device Function. In IEEE International Conference on Mechatronics and Automation (pp. 1509 - 1514). Canada.

Hirata, Y., Chuy, O. Y., Hara, A., & Kosuge, K. (2005). Human-adaptive Motion Control of Active and Passive type Walking Support System. In 2005 IEEE Workshop on Advanced Robotics and its Social Impacts (pp. 139-144). Japan.

Chuy, O. Y., Hirata, Y., & Kosuge, K. (2004). Control of Walking Support System Based on Variable Center of Rotation. In 2004 IEEE/RSJ International Conference on Intelligent Robots and System (pp. 2289-2294). Sendai, Japan.

Non-Refereed Proceedings

Chuy, O. Y., Al-Selwadi A., & Herrero J. (2017). Development and Control of a Robotic Attendant Wheelchair. Florida Conference on Recent Advances in Robotics. Boca Raton, Florida, May 11-12, 2007.

Lui, Y., Orodnez, C., Gupta, N., Chuy, O., Mard, C., & Collins, E. (2015). Jumping Behavior for Wheeled Robotic Vehicles, Florida Conference on Recent Advances in Robotics. Melbourne, Florida. May 2015.

International Conference Presentation

Chuy, O. Y., Collins, E., Ordonez, C., Candiotti, J., Wang, H., & Cooper, R. (presented 2014, May). Slip Mitigation Control for an Electric Powered Wheelchair. Paper presented at 2014 IEEE International Conference on Robotics and Automation, IEEE. (International)

Francis, G., Collins, E., Chuy, O. Y., & Sharma, A. (presented 2013, August). Sampling-Based Trajectory Generation for Autonomous Spacecraft Rendezvous and Docking. Paper presented at AIAA Guidance, Navigation, and Control (GNC) Conference, AIAA. (International)

Ordonez, C., Gupta, N., Chuy, O. Y., & Collins, E. (presented 2013, May). Momentum Based Traversal of Mobility Challenges for Autonomous Ground Vehicles. Paper presented at 2013 IEEE International Conference on Robotics and Automation, IEEE. (International)

Chuy, O. Y., Collins, E., Dunlap, D., & Sharma, A. (presented 2012, June). Sampling-Based Direct Trajectory Generation Using the Minimum Time Cost Function. Paper presented at 13th International Symposium on Experimental Robotics, International Foundation of Robotics Research, Quebec, Canada. (International)

Ordonez, C., Gupta, N., Chuy, O. Y., & Collins, E. (presented 2012). Modeling of Skid-Steered Wheeled Robotic Vehicles on Sloped Terrains. Paper presented at Proceedings of the ASME Dynamic Systems and Control Conference, ASME, Fort Lauderdale, FL. (International)

Chuy, O. Y., Collins, E., Yu, W., & Ordonez, C. (presented 2009). Power Modeling of a Skid Steered Wheeled Robotics Ground Vehicle. Paper presented at 2009 IEEE International Conference on Robotics and Automation, IEEE, Kobe Japan. (International)

Ordonez, C., Chuy, O. Y., Collins, E., & Liu, X. (presented 2009). Rut Detection and Following for Autonomous Ground Vehicles. Paper presented at In Proceedings of Robotics: Science and Systems, Science and Systems, Seattle, WA. (International)

Ordonez, C., Chuy, O. Y., Collins, E., & Liu, X. (presented 2009). Rut Tracking and Steering Control for An Autonomous Rut Following. Paper presented at 2009 IEEE International Conference on Systems, Man, and Cybernetics, Systems, Man, and Cybernetics, San Antonio, TX. (International)

Yu, W., Chuy, O. Y., Collins, E., & Hollis, P. (presented 2009). Dynamic Modeling of a SkidSteered Wheeled Vehicle with Experimental Verification. Paper presented at IEEE/RSJ International Conference on Intelligent Robots and System, IEEE/ RSJ, St. Louis, MO. (International)

Chuy, O. Y., Hirata, Y., & Kosuge, K. (presented 2007). Active Type Robotic Mobility Aid Control Based on Passive Behavior. Paper presented at 2007 IEEE International Conference on Robotics and Automation, IEEE, San Diego, CA. (International)

Chuy, O. Y., Hirata, Y., & Kosuge, K. (presented 2007). Environment Feedback for Robotic Walking Support System Control. Paper presented at 2007 IEEE International Conference on Robotics and Automation, IEEE, Rome, Italy. (International)

Chuy, O. Y., Hirata, Y., Wang, Z., & Kosuge, K. (presented 2006). Approach in Assisting a Sitto-Stand Movement Using a Robotic Walking Support System. Paper presented at 2006 IEEE/RSJ International Conference on Intelligent Robots and System, IEEE/RSJ, Beijing, China. (International)

Chuy, O. Y., Hirata, Y., Wang, Z., & Kosuge, K. (presented 2005). Motion Control Algorithms for a New Intelligent Robotic Walker in Emulating Ambulatory Device Function. Paper presented at IEEE International Conference on Mechatronics and Automation, IEEE, Canada. (International)

Chuy, O. Y., Hirata, Y., & Kosuge, K. (presented 2005). Augmented Variable Center of Rotation in Controlling a Robotic Walker to Adapt User Characteristics. Paper presented at 2005 IEEE/RSJ International Conference on Intelligent Robots and System, IEEE/RSJ, Edmonton, Canada. (International)

Chuy, O. Y., Hirata, Y., & Kosuge, K. (presented 2005). Online Approach in Adapting User Characteristic for Robotic Walker Control. Paper presented at IEEE 9th International Conference on Rehabilitation Robotics, ICORR/ IEEE, Chicago. (International)

Hirata, Y., Chuy, O. Y., Hara, A., & Kosuge, K. (presented 2005). Human-adaptive Motion Control of Active and Passive type Walking Support System. Paper presented at IEEE Workshop on Advanced Robotics and its Social Impacts, IEEE, Japan. (International)

Chuy, O. Y., Hirata, Y., & Kosuge, K. (presented 2004). Control of Walking Support System Based on Variable Center of Rotation. Paper presented at 2004 IEEE/RSJ International Conference on Intelligent Robots and System, IEEE/RSJ, Sendai, Japan. (International)

Society Memberships

Institute of Electrical and Electronics Engineers (IEEE) Robotics and Automation Society, Member (2004- Present)

Service and Outreach

Reviewer: IEEE Robotics and Automation Letters (April 2017) Journal of Advanced Robotics IEEE Robotics and Automation Magazine (2007) IEEE Int. Conf. on Robotics and Automation (ICRA) IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)

Session Chair: IEEE Int. Conf. on Robotics and Automation, 2009 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems, 2010

Program Committee (International Conference): 7th IEEE International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management 2014 2012 IEEE International Conference on Robotics and Biomimetics

E-media chair(International Conference): 2016 IEEE/SICE International Symposium on System Integration 2011 IEEE International Conference on Robotics and Biomimetics

Service to other Universities: Project Leader, Development of Mobile Robot Research Platform, De La Salle University, Philippines (2010).

Service to Community: Mentor, For Inspiration in Recognition of Science and Technology (FIRST) completion, Panhandle Pirates (2009–2010). Mentor, Robotics Program, R. Frank NIMS Middle School, Tallahassee, Florida (2008–2010).

Technical Skills

• Realtime Operating System: QNX, Vxworks, and Linux (RTAI) NuttX for Pixhawk autopilot system (currently studying) • Realtime Control/Programming: C/C++, Matlab RT, and Labview RT • Device Driver Developmen Experience: QNX and Linux (RTAI)
• Research Platfrom Development: Ability to develop and control robotic platform from mechanical design, electronic instrumentation, and control pragramming. • Electronic design: analog and digital

MOHAMED A. KHABOU

Professor and Chair
Engineering Department
University of West Florida
11000 University Pkwy, Pensacola, FL 32514
(850) 857-6031 mkhabou@uwf.edu

EDUCATION

- Ph.D., Electrical Engineering, University of Missouri-Columbia, 1999
  Dissertation Title: Improving Shared-Weight Neural Network Generalization Using Regularization Theory and Entropy Maximization
- MSEE, Electrical Engineering, University of Missouri-Columbia, 1993
- BSEE, Electrical Engineering, University of Missouri-Columbia, 1990

PROFESSIONAL EXPERIENCE

- Chair, Electrical and Computer Engineering Dept., University of West Florida (January 2014-Present)
- STEM Fellow, Center for University Teaching, Learning and Assessment (2013-2014)
- Associate Professor, Electrical and Computer Engineering Dept., University of West Florida (2009-Present)
- Assistant Professor, Electrical and Computer Engineering Dept., University of West Florida (2002-2009)
- Visiting Assistant Professor, Physics Computer Science and Engineering Dept., Christopher Newport University. (1999-2002)
- Research Assistant, Computer Engineering and Computer Science (CECS) Dept., University of Missouri-Columbia (1991-1999)
- Teaching Assistant, Math Dept., University of Missouri-Columbia (1993-1999)
- Teaching Assistant, CECS Dept., University of Missouri-Columbia (1995-1996)

TEACHING EXPERIENCE

- At University of West Florida

1. EGN 1002 Introduction to Engineering
2. EEL 3135 Discrete Time Signals and Systems
3. EEL 3211 Electrical Energy Engineering
4. EGN 3203 Engineering Software Tools
5. EGM 4313 Intermediate Engineering Analysis
6. EEL 3303L Circuits I Lab
7. EEL 3701 Digital Logic & Computer Systems (Lecture + Lab)
8. EEL 4712 Digital Design (Lecture + Lab)
9. EEL 4713 Digital Computer Architecture (Lecture + Lab)
10. EEL 4744 Microprocessor Applications (Lecture + Lab)
11. EEL 4759 Digital Image Processing
12. EEL 4822 Pattern Recognition
13. EEL 4834 Programming For Engineers
14. EEL 4914C Electrical Engineering Design
15. EEL 4949 Co-Op Work Experience

- At Christopher Newport University

16. CPEN 414 Computer Architecture
17. CPSC 205 Introduction to Computer Science
18. CPSC 230 Introduction to Computers and Programming in C++
19. CPSC 330 Computer Organization
20. CPSC 642 Pattern Recognition
21. ENGR 213 Discrete Mathematics

RESEARCH EXPERIENCE

- Using Smart Device Technology to Improve Quality of Life for Older Adults (2015-Present)

22. Sponsor: Health Alliance Professorship
23. Cooperating with Dr. Reichherzer from the Computer Science Department and Dr. Rodney Guttmann the Director of the Center on Aging to combine off-the-shelf devices with novel computer algorithms to build a SMILE (Smart Independent Living for Elders) home in which older adults and their families can monitor and improve their daily lives.

- Processing and Classification of Actigraphy Signals (2012-2013)

24. Cooperated/consulted with Actigraph Company on the design of features and classifiers to automatically process actigraphy signals.

- Effect of Distance Learning on Student Learning Outcomes (2008-Present)

25. Cooperate with Electrical and Computer Engineering Department colleagues and Dr. Claudia Stanny from the Center for University Teaching, Learning, and Assessment (CUTLA) on studying the effect of distance learning on the student performance in class and instructor evaluation.

- Eigenvalues and Shapes (2007-2010)

26. Sponsor: Sultan Qaboos University Postgraduate Studies and Research
27. Cooperate with Dr Lotfi Hermi of University of Arizona and Dr Mohamed B. H. Rhouma of Sultan Qaboos University on the use of Laplacian-based features in pattern recognition

- System for Indexing and Retrieving Historical Documents (2006-Present)

28. Sponsor: UWF Summer Research Award and collaboration with researchers at Ecole Nationale d'Ingénieurs de Sfax (ENIS), Tunisia
29. Design and test a system to process, index, and retrieve images of historic documents and artifacts

- Human Face Detection Using Morphological Neural Nets (2005-2006)

30. Sponsor: UWF 2005 Faculty Scholarly and Creative Activity Award
31. Design and test of a reliable human face detector using a morphological shared-weight neural network.

- Automatic Detection of Human Faces in Visual Scenes (2003)

32. Sponsor: UWF Summer Research Grant
33. Design and test a neural network-based system to detect human faces in visual scenes

- Remote Acquisition Storage System (2000)

34. Sponsor: NASA-Langley Research Center (LaRC)
35. Designed and tested autonomous microphones to detect and transmit sound waves of military airplanes flying over residential areas. The project was part of an effort to redesign the shape of airplane wings to reduce noise levels.

- Mine Detection and Neutralization (1997-1999)

36. Sponsor: Army Research Office
37. Helped in the design and testing of a landmine detection system that uses ground penetrating radar and neural networks to detect buried metal and plastic landmines. The

system was able to detect 98% of the landmines. The system was selected among 6 competing designs proposed by top universities including MIT

- Application of Fuzzy Logic to Automatic Target Recognition (1996-19998)

38. Sponsor: Office of Naval Research

39. Helped in the design and testing of an automatic detection system that detects tanks in laser radar images. The system used a combination of neural networks and fuzzy logic to detect more than 97% of the tanks.

- Image Algebra-Based Local Feature Extraction and Detection of Occluded Vehicles (1995-1997)

40. Sponsor: Eglin AFB

41. Helped in the design and testing of an automatic detection system that detects tanks and armored personnel carriers in synthetic aperture radar images. The system used a combination of neural networks and fuzzy logic to detect more than 90% of the targets.

- Pattern Recognition via Fuzzy Morphological Networks (1993-1994)

42. Sponsor: MU Research Board

43. Helped in the design of a new type of neural networks called shared-weight morphological neural networks. They proved to be superior to other networks in detecting particular patterns and shapes.

- Handwriting Recognition (1991-1993)

44. Sponsor: ERIM

45. Designed a system to recognize handwritten zip codes on mail pieces. The system was able to correctly recognize more than 96% of the handwritten numerals.

PUBLICATIONS

Book Chapters

[1] M. Ben Haj Rhouma, M.A. Khabou, and L. Hermi, "Shape Recognition Based on Eigenvalues of the Laplacian," chapter in Advances in Imaging and Electron Physics vol. 167, pp 183-252, P. W. Hawks (Ed): Elsevier (2011)

[2] W. Maghrebi, A. Borchani, M. A. Khabou, and A. M. Alimi, "A System for Historic Document Image Indexing and Retrieval Based on XML Database Conforming to MPEG7 Standard," chapter in LNCS vol. 5046, pp 114-125, W. Liu, J. Lladós, and J.-M. Olgier (Eds.): Springer-Verlag Berlin Heidelberg (2008)

[3] W. Maghrebi, L. Baccour, M.A. Khabou, and A.M. Alimi, "An Indexing and Retrieval System of Historic Art Images Based on Fuzzy Shape Similarity," chapter in MICAI 2007: Advances in Artificial Intelligence, pp. 623–633, A. Gelbukh and A.F. Kuri Morales (Eds.): Springer-Verlag Berlin Heidelberg (2007)

[4] P. D. Gader, B. N. Nelson, A. K. Hocaoglu, S. Auephanwiriyakul, and M. A. Khabou, "Neural Vs. Heuristic Development of Choquet Fuzzy Integral Fusion Algorithms for Land Mine Detection," chapter in Neuro-fuzzy Pattern Recognition, H. Bunke, A. Kandel (Eds): World Scientific Publishing Co., (2000)

Refereed Journal Papers

[1] W. Maghrebi, M.A. Khabou, and A.M. Alimi, "FMIRS: A Fuzzy indexing and retrieval system of mosaic-image database," Electronic Letters on Computer Vision and Image Analysis, Vol. 13, No. 3, pp. 81-96, (2014)

[2] W. Maghrebi, M. A. Khabou, A. B. Ammar, and A. M. Alimi, "An Intelligent Multi-object Retrieval System for Historical Mosaics," Int'l Journal of Advanced Computer Science and Applications," Vol. 4, No. 4, pp. 103-110, (2013)

[3] T. M. Hamdani, M. A. Khabou, A. M. Alimi, and F. Karray, "An Intelligent Decision-Making System Based on Multiple Classifiers Updated using Confidence Rates and Stress Parameters", Control and Intelligent Systems, Vol. 39, No. 4, pp. 213-223, (2011)
[4] T. M. Hamdani, A. M. Alimi, and M. A. Khabou, "An Iterative Method for Deciding SVM and Single Layer Neural Network Structures," Neural Processing Letters, Vol. 33, pp. 171-186, (2011)
[5] B. Shaer, M.A. Khabou, and A. Fuchs, "Effect of Student Location on Assessment of Instruction and Grade Assignment," Distance Learning, Vol. 6, No. 4, pp. 21-29, (2009)
[6] M. A. Khabou, L. Hermi, and M. B. H. Rhouma, "Shape Recognition Using Eigenvalues of the Dirichlet Laplacian," Pattern Recognition, Vol. 40, pp. 141–153, (2007)
[7] P. D. Gader, M. A. Khabou, and A. Koldobsky, "Morphological Regularization Networks," Pattern Recognition, Special Issue on Mathematical Morphology and Its Application, Vol. 33, No. 6, pp. 935-944, (2000)
[8] M. A. Khabou, P. D. Gader, and J. M. Keller, "LADAR Target Detection Using Morphological Shared-Weight Neural Networks," Machine Vision and Applications, Vol. 11, No. 6, pp. 300-305, (2000)
[9] M. A. Khabou and P. D. Gader, "Automatic Target Detection Using Entropy-Optimized Shared-Weight Neural Networks," IEEE Trans. Neural Networks, Vol. 11, No. 1, pp. 186-194, (2000)
[10] M. A. Khabou, P. D. Gader, and H. Shi, "Entropy Optimized Morphological Shared-Weight Neural Networks," Optical Engineering, Vol. 38, No. 2, pp. 263-273, (1999)
[11] P. D. Gader and M. A. Khabou, "Automatic Feature Generation for Handwritten Digit Recognition," IEEE Trans. Pattern Analysis Machine Intelligence, Vol. 18, No. 12, pp. 1256-1262, (1996)

Refereed Conference Papers

[1] M. A. Khabou and M. B. H. Rhouma, "Ratios of Eigenvalues for the Dirichlet Laplacian and Hu's Moments," Proc. Int'l Conference on Image Processing, Computer Vision, and Pattern Recognition, Las Vegas, NV, (2014)
[2] B. Shaer and M. A. Khabou, "The Development of Interactive Distance-Learning Laboratory for Teaching Digital Design in Electrical and Computer Engineering," Proc. Int'l Conference on Frontiers in Education: Computer Science and Computer Engineering, Las Vegas, NV, (2014)
[3] W. Maghrebi, M.A. Khabou, and A.M. Alimi, "A Fuzzy Metadata to Index and Retrieve Images of Roman Mosaics," Int'l Conference on Fuzzy Computation Theory and Applications, Vilamoura, Portugal (2013)
[4] M. A. Khabou and M. V. Parlato, "Classification and Feature Analysis of Actigraphy Signals," IEEE Southeast Conference, Jacksonville, FL (2013)
[5] M. A. Khabou and M. V. Parlato, "Feature Selection for Actigraphy Signal Processing and Recognition," Int'l Conference on Ambulatory Monitoring of Physical Activity and Movement, Amherst, MA, (2013)
[6] W. Maghrebi, M.A. Khabou, and A.M. Alimi, "Extraction of knowledge from Tunisian historical mosaics using fuzzy logic and semantic concepts similarity measure to create a fuzzy metadata," Proc. Int'l Conference on Image Processing, Computer Vision, and Pattern Recognition, pp. 489-495, Las Vegas, NV, (2012)
[7] T.M. Hamdani, M.A. Khabou, and A.M. Alimi, "Conflict Negotiation Process with Stress Parameters Control for New Classifier Decision Fusion Scheme," Proc. Int'l

Conference on Image Processing, Computer Vision, and Pattern Recognition, Las Vegas, NV, (2010)

[8] M.B.H. Rhouma, L. Hermi, and M.A. Khabou, "Laplacian and Bilaplacian Based Features for Shape Classification," Proc. Int'l Conference on Image Processing, Computer Vision, and Pattern Recognition, pp. 615-619, Las Vegas, NV, (2009)

[9] W. Maghrebi, M.A. Khabou, and A.M. Alimi, "Extraction of Fuzzy Spatial Relationships for Multi Objects Indexing of Historic Mosaic Images," Proc. Int'l Conference on Image Processing, Computer Vision, and Pattern Recognition, pp. 326-330, Las Vegas, NV, (2009)

[10] M. A. Khabou, M. B. H. Rhouma, and L. Hermi, "Performance Comparison of Laplacian-Based Features," Proc. Int'l Conference on Image Processing, Computer Vision, and Pattern Recognition, Las Vegas, NV, (2008)

[11] E. M. El-Sheikh, B. A. Swain, and M A. Khabou, "A Comparison of Neural Network Architectures for Handwritten Digit Recognition," Proc. Int'l Conference on Artificial Intelligence, Las Vegas, NV, (2008)

[12] T. Ayadi, T. M. Hamdani, A. M. Alimi, and M. A. Khabou, "2IBGSOM: Interior and Irregular Boundaries Growing Self-Organizing Maps," Int'l Conference on Machine Learning and Applications, Cincinnati, OH, (2007)

[13] M. A. Khabou, M. B. H. Rhouma, and L. Hermi, "Feature Generation Using the Laplacian Operator with Neumann Boundary Condition," Proc. IEEE Southeast Conference, pp. 766-771, Richmond, VA, (2007)

[14] M. A. Khabou and L. F. Solari, "A Morphological Neural Network-Based System for Face Detection and Recognition," IEEE Southeast Conference, Memphis, (2006)

[15] W. Maghrebi, M. A. Khabou, and A. M. Alimi, "A System for Indexing and Retrieving Historical Arabic Documents Based on Fourier Descriptors," International Conference on Artificial and Computational Intelligence for Control, Automation and Decision in Engineering and Industrial Systems, Tozeur, Tunisia, (2005)

[16] M. A. Khabou and S. G. Kleiner, "Face Detection: Combining Classifiers to Improve Performance," International Conference on Computing, Communication and Control Technologies, Austin, TX, (2004)

[17] M. A. Khabou, "Application of Morphological Shared-Weight Neural Networks to Landmine Detection," International Conference on Artificial and Computational Intelligence for Control, Automation and Decision in Engineering and Industrial Systems, Monastir, Tunisia, (2000)

[18] M. A. Khabou, P. D. Gader, and J. M. Keller, "Morphological Shared-Weight Neural Networks: A General Tool for Automatic Target Recognition Beyond the Visible Spectrum," Proceedings of the IEEE Workshop on Computer Vision Beyond the Visible Spectrum: Methods and Applications (part of the Conference on Computer Vision and Pattern Recognition), pp. 101-110, Ft. Collins, Colorado, (1999)

[19] N. Theera-Umpon, M. A. Khabou, P. D. Gader, J. M. Keller, H. Shi and H. Li, "Detection and Classification of MSTAR Objects Via Morphological Shared-Weight Neural Networks," Proceedings SPIE, Vol. 3370, pp. 530-540, (1998)

[20] M. A. Khabou and P. D. Gader, "Erosion and Dilation as Solutions to Regularization Problem," Proceedings SPIE, Vol. 3026, pp. 106-111, (1997)

[21] P. D. Gader, Y. Won and M. A. Khabou, "Image Algebra Network for Pattern Recognition," SPIE Proceedings, Vol. 2300, pp. 157-168, (1994)

[22] P. D. Gader and M. A. Khabou, "Automated Feature Generation for Handwritten Digit Recognition by Neural Networks," Third International Workshop on Frontiers in Handwriting Recognition, (1993)

Poster Papers

[1] K. R. Latourelle, N. M. Latourelle, and D. E. Radcliffe, "Design of and Electronic Apiary Unit", University of West Florida Student Scholars Symposium (2015)

[2] W. Posey, B. Sherrell, and C. Cohron, "Design of an Integrated Circuit Storage and Retrieval System", University of West Florida Student Scholars Symposium (2015)

[3] B. Rhodes, M. Shipps, H. Hardy and J. Kocher, "Design of a smart Cooler System", University of West Florida Student Scholars Symposium (2015)

[4] J. Spitznagel, L. Vunkannon, A. Scanlon, G. Dossantos, and M. K. Khabou, "Design of an Electronic Home Control System", University of West Florida Student Scholars Symposium (2014)--Project won Electrical and Computer Engineering Department Award

[5] C. Mason, P. Rappold, and R. Hope, "Design of an Unmanned Proximity Tracking Device", Student Scholars Symposium, University of West Florida, (2013)

[6] J. Davis, M. Starr, B. Walker, A. Yaresko, A. Fuchs, and M. Khabou, "iRobot Create: Traffic Simulations," Student Scholars Symposium, University of West Florida, (2011)

[7] A. Yaresko, A. Keyhani, and M. Khabou, "Autonomous Research Surface Vessel," Student Scholars Symposium, University of West Florida, (2011)

[8] B. Walker, M. Starr, and M. Khabou, "Hardware/Software Interfacing of an Indoor Navigation System: Auto-pilot Reconnaissance Quad-Copter," Student Scholars Symposium, University of West Florida, (2011)

[9] W. Maghrebi, M.A. Khabou, A. Ben Ammar, and A.M. Alimi, "A Fuzzy Indexing and Retrieval System of Historic Mosaics," Workshop on Intelligent Machines: Theory & Applications, Mahdia, Tunisia (2010)

[10] W. Seaman and M.A. Khabou, "Design of a Remote Automation Controller with the CAN 2.0B Standard," Scholars of Engineering, Applied Sciences and Technology Annual Research Symposium (SEASTARS), University of West Florida, (2010)—Paper won the Electrical and Computer Engineering Department Award.

[11] N.A. Chan and M.A. Khabou, "Alarm-Triggered Web-connected Video Surveillance System," Scholars of Engineering, Applied Sciences and Technology Annual Research Symposium (SEASTARS), University of West Florida, (2009)—Paper won the Electrical and Computer Engineering Department Award.

[12] B. Swain, E. El-Sheikh, and M. A. Khabou, "Recognize This! A Neural Network-based Recognizer of Handwritten Digits," Scholars of Engineering, Applied Sciences and Technology Annual Research Symposium (SEASTARS), University of West Florida, (2008)—Paper won the Computer Science Award" sponsored by Prompt Technologies.

Technical Reports

[1] M. A. Khabou, "Automatic Detection of Human in Visual Scenes", Technical Report, UWF Summer Research Grant, (2003)

[2] J. Hereford, R. Selim, and M. A. Khabou, "Remote Acquisition Storage System," Technical Report, NASA-Langley Research Center, (2001)

[3] P. D. Gader, J. M. Keller, H. Shi, and M. A. Khabou, "Extension of Image Algebra-Based Local Feature Extraction and Detection of Occluded Vehicles," Technical Report, Eglin AFB, (1997)

[4] P. D. Gader, J. M. Keller, and M. A. Khabou, "Image Algebra-Based Local Feature Extraction and Detection of Occluded Vehicles," Technical Report, Eglin AFB, (1996)

Mentored Projects

[1] K. R. Latourelle, N. M. Latourelle, and D. E. Radcliffe, "Design of and Electronic Apiary Unit", (2015)
[2] William Posey, Branden Sherrell, and Colby Cohron, "Design of an Integrated Circuit Storage and Retrieval System", (2015)
[3] Bryan Rhodes, Mark Shipps, Hunter Hardy and Jimmy Kocher, "Design of a smart Cooler System", (2015)
[4] C. T. Harwell, J. R. Harwell, and N. Gann, "Design of an autonomous Field Painter", (2014)
[5] Sean Miller, Kelly Godwin, and Jonathan Hosey, "Design of a self-Automated Programmable Foil Dispenser", (2014)
[6] Daniel Irizarry and Brian Dickens, "Design of Autonomous Beacon Finding with Obstacle Avoidance in Conjunction with 3D Mapping", (2014)
[7] John Spitznagel, Laura Vunkannon, Alexander Scanlon, and Geverson Dossantos, "Design of an Electronic Home Control System", (2014)
[8] M. D. Robinson Jr., J. S. Simpson, and C. J. Ritchie, "Design of a Brail Tablet Reader", (2013)
[9] Michael Vasek, Bradley Klimek, Laura Strickland, and Marienel Finkley, "Design of an Electromagnetic Lock with Fingerprint Identification", (2013)
[10] Michael Parlato and William Mackie, "Design of a Machine Learning System for Sign Language Recognition", (2013)
[11] Christopher Mason, Peter Rappold, and Ryan Hope, "Design of an Unmanned Proximity Tracking Device", (2013)
[12] David Swick and Tyler Bowman, "Design of a Solar Tracker Utilizing an Embedded Monitoring System", (2013)
[13] Michael Carbaugh, Steven Lyons, and David Duncan, "Design of an Automated Spectrum Equalizer for Audio Signals", (2012)
[14] Alberto Sigala, Daniel Tuller, and Miles Hammac, "Camera Stabilization System", (2012)
[15] Linzy Franks, Noah Larsen, and Alex Martinez, "Design and Implementation of Affordable Sight Technology for the Blind", (2012) (*Team applied for US patent based on their project*)
[16] Curtis Scott and John Law, "Design of a Stability Controlled Bicopter", (2012)
[17] Anton Yaresko and Alexander Keyhani, "Design of Autonomous Research Surface Vessel", (2011)
[18] Bradly Faulk, Jack Gilgore, and Jose Poggiolo, "MOBILCOM: Design of a Morse-Binary-Light Communication System", (2011)
[19] Michel Starr and Brandon Walker, "Design and Application of an Autonomous Quad-copter for Indoor Search Missions," (2011)
[20] Khoa Chu, John Negrido, and Joshua Davis, "Parking Space Availability System Using Wirteless Camera and Image Processing Embedded System," (2011)
[21] Samir Ibrahim, Leary Tomlin Jr., and David Oshana, "Internet Controlled Refrigeration Systems (ICRS)," (2011) (*Team applied for US patent based on their project*)
[22] David White, "DC-DC Modular Smart Power Board", (2010)
[23] Josh Davis, Michel Starr, Brandon Walker, and Anton Yaresko, "iRobot Create: Traffic Simulations", (co-mentored with Dr. Andreas Fuchs), (2010)
[24] Thomas Cantin and Aubrey Coleman, "Design of a Self-Navigating Robot", (2010)

[25] William Seaman, "Design of a Web-based Remote Automation System with the CAN 2.0B Standard", (2009)
[26] Stephen Keith, "PCB Power Supply", (2009)
[27] Nicholas Chan, "Alarm Triggered Video Surveillance System", (2008)
[28] Jarrod Brown, David Bryan, Kyle Simpson, and Scott Walker, "Autonomous GPS Robot", (2008)
[29] David Moeller and Pamela Prater, "Image Processing and Gimbal", (2008)
[30] Bryan Payne and Michael Welch, "Power Audio Amplifier", (2008)
[31] Raymond Anderson, Rachel Knodel, and Manuel Rosario, "The GRUNT Team", (2008)
[32] Alexander Evans, "Motor Control for Autonomous Underwater Vehicle", (2008)
[33] Trevor Gehman, "Automatic Loader for External CD/DVD Burner", (2008)
[34] Mark Goley, Charles Bardgett, Matthew Dupont, and Robert Worrell, "The AVRaL Robot Team", (2008)
[35] Jesse Rosal and Joshua Walker, "Automated Drink Mixer Machine", (2007)
[36] Eli Wilson, "Designing an MP3 Music Player", (2007)
[37] Anthony Burkett, "The Sudoko Solver", (2007)
[38] James Hereford, "Design of a Programmable Appliance Timer", (2006)
[39] Christopher Doss and Shelby Romine, "Submarine Navigational System", (2006)
[40] Adam Chow, "Card Dealing Robot", (2006)
[41] Laura Solari, "Algorithm for Face Detection and Recognition", (2005)
[42] Thomas Owens, "Voice Frequency Analyzer", (2005)
[43] Nate Matzer, "Multi-source Vision System for Unmanned Underwater Vehicles", (2005)
[44] Lobesky Johnson and David Musgrove, "MJ2005: The Autonomous Vehicle", (2005)
[45] Mathew Howell, "The PostalPro: Automated email Notification Device", (2005)
[46] Kris Stringer, "Tracking System", (2004)
[47] Christian Hughes and Lurie Walton, "Control Unit for Residential Heat Pump Upgrades", (2003)
[48] Timber Wolfe, "GPS-Controlled Robot", (2003)
[49] Jason Mamaloukas and Scott Parrott, "Voice Recognition TV Remote Control", (2002)

AWARDS

- *Faculty Excellence in Teaching Award*, University of West Florida, 2013
- *Electrical and Computer Engineering Award*, Student Scholars Symposium, University of West Florida, 2014
- *Teacher of the Year Award*, IEEE Student chapter, University of West Florida, 2004-2005
- *Computer Science Paper Award*, SEASTARS Conference, University of West Florida, 2008
- *Electrical and Computer Engineering Paper Award*, SEASTARS Conference, University of West Florida, 2009
- *Electrical and Computer Engineering Paper Award*, SEASTARS Conference, University of West Florida, 2010
- *Five Year Service Certificate*, University of West Florida, 2008
- *Full National Merit Scholarship*, USAID/Tunisian Government, 1986-1993

PROFESSIONAL MEMBERSHIPS AND ACTIVITIES

- *Vice Chair,* IEEE North West Florida region (2004)
- *Senior Member,* IEEE
- *Member,* HKN Honors Society
- *Faculty Advisor,* IEEE student chapter, University of West Florida
- *Faculty Advisor,* Florida Engineering Society student chapter, University of West Florida
- *Advisory Committee*, Int'l Conference on Advanced Technologies for Signal and Image Processing (2014)
- *Program Committee*, Int'l Conference on Neural Computation Theory and Applications (2013)
- *Organizing Committee Member,* IEEE International Conference on Fuzzy Systems (2004)
- *Organizing Committee Member,* International Conference on Intelligent Technologies (2003)
- *Organizing Committee Member*, International Conference on Artificial and Computational Intelligence for Control, Automation and Decision in Engineering and Industrial Systems (ACIDCA2000)
- *Session Chair,* Intelligent Pattern Analysis III, the International Conference on Machine Intelligence (ICMI2005)
- *Reviewer for:*

46. Neural Computing and Applications
47. Information Sciences Journal
48. IEEE Transactions on Fuzzy Systems
49. IEEE Transactions on Geoscience and Remote Sensing
50. Journal of Optics Communications
51. Journal of Electronic Imaging
52. Journal of Fuzzy Sets and Systems
53. Journal of Optical Engineering
54. IEEE International Conference on Neural Networks
55. IEEE International Conference on Fuzzy Systems
56. IEEE Southeast Conference
57. SPIE Conference on Image Algebra and Morphological Image Processing
58. International Conference on Artificial and Computational Intelligence for Control, Automation and Decision in Engineering and Industrial Systems
59. International Conference on Machine Intelligence
60. International Conference on Education and Information Systems, Technologies and Applications
61. International Conference on Intelligent Technologies
62. International Conference on Neural Computation Theory and Applications
63. International Conference on Pattern Recognition Applications and Methods

COMMITTEE MEMBERSHIPS

- *Member*, Strategic Academic Visioning and Empowerment (SAVE) team
- *Chair, Internal Stakeholders Subcommittee, SAVE*
- *Member, STEM Steering Committee*
- *Member, STRIDE Committee*
- *Chair/Member, Faculty Search Committees*
- *Member, Department Curriculum Committee*
- *Member, ABET Accreditation Committee*

- *Chair, Outcome Assessments and Retention Committee*
- *Chair, Bylaws Revision Committee*
- *Coordinator, with the Computer Science Department*
- *Member, FWB Expansion Committee*
- *Member, College of Arts and Science Council (Fall 2003)*

Curriculum Vitae

Name:

John W. Coffey
Professor, Department of Computer Science

Office Address:

Computer Science Department
The University of West Florida
Building 4, Room 434
Pensacola, FL, 32514

Telephone Number: 850-474-3183
E-mail Address: jcoffey@uwf.edu
Web Site http://www.uwf.edu/~jcoffey

Educational Background:

The University of West Florida.
- Ed.D. Curriculum and Instruction, Computer Science Option, August, 2000.
- M.S. Computer Science/Software Engineering, April, 1992.
- B.S. Systems Science, December, 1989.

The College of William and Mary.
- B.S. Psychology, June, 1971.

Employment History at the University of West Florida

The Department of Computer Science

- Professor (2010 - present)
- Associate Professor (2005 - 2009)
- Assistant Professor (2001 - 2004)
- Lecturer (1992-2000)

Teaching Assignments

1. **Programming Languages** - a core course in the CS option. A survey of procedural, object-oriented, functional and logic-based programming languages. Chomsky hierarchy of formal languages, stack and heap memory management issues, parameter passing modes, etc.
2. **Advanced Programming Languages** - a 6000-level graduate course. Topics include program translation, intermediate representations and code generation, code optimization, concurrency issues for programming language design, and abstract grammars, translational, operational, denotational and axiomatic semantics.
3. **Science of Computing** - an introductory core course for CIS and CS options. Developed the original CCR for the course and the original instructional materials in conjunction with the Instructional Media Center.
4. **Data Structures** - core course for CIS and CS options and for two of the five IIT options. Basic data structures including arrays, vectors, linked lists, trees, graphs,

searching and sorting algorithms, hashing and heaps. Significant emphasis is placed on programming.

5. **Java Programming** - prerequisite course for CIS, CS, and IIT options. Basic programming in Java. Utilizes an "objects early" approach.
6. **Introduction to CIS** - a required course for CIS, CS, and IIT options and for ECE students. An intermediate course in C++ programming.
7. **Exploring the Internet** - an online course that utilizes the Internet to teach about usingthe Internet. Over a 2 year period, administered delivery of the course to 1800 students.
8. **UNIX and C** - an upper level elective that required C programming, basic UNIX opearting system use, scripting and system calls.
9. **Pascal Programming** - a beginning course in the Pascal programming language. Previously a required prerequisite for the CIS and CS options.
10. **Software Engineering** - a core course in the CIS and CS options. This course focuses on issues pertaining to the analysis, design and implementation of large software systems requiring co-ordination among team members.
11. **Web-Enabled Applications.** An upper-level elective in XML, Document Object Models, Ajax, client versus server-side scripting. Additional topics include CSS, XSLT, SAX parsing, and php.
12. **Intermediate Programming** - a required course for CS, CIS and other majors. A continuation of Introduction to Java featuring ArrayLists and arrays, Interfaces, file I/O, exceptions.
13. **Service Oriented Architecture Seminar:** A seminar in Web services and SOA. The course dealt with topics including BPEL, Ajax/Dojo, Database, service interoperability, service semantics and others.
14. **Advanced Computer Programming** - An advanced Java programming course for the CIS option: Data Structures, Threads, Generics, XML, Client-Server.
15. **Data Structures and Algorithms II** – for Computer Science, CS option majors. Includes height-balanced trees, recurrences, counting principles, heaps and priority queues, greedy algorithms, probabilistic algorithms, and dynamic programming.
16. **Distributed Software Architecture II –** Web applications including client and server-side processing, XML, XSLT, XML Schema, Document Object Model, Javascript, php, AJAX, MySQL, SOAP, WSDL, BPEL and service-oriented architecture.
17. **Network-Centric Software Applications –** offered concurrently with Distributed Software Architecture II.
18. **C++ Programming:** an introductory course in C++ taken by a variety of majors.
19. **Graduate Project:** Capstone project for CS/SE Master's students
20. **Undergraduate Capstone Project** – capstone experience for CS/CIS/SE/IT
21. **CS and SE Seminar** – graduate research class
22. **CS Foundations: Algorithms and Data Structures** - A fast-paced course introducing foundational knowledge in computer science for graduate students.

The Institute for Human and Machine Cognition

Major projects:

- **NUCES Project.** Researcher, Programmer and Knowledge Engineer. Created knowledge bases, designed and programmed (25,000 loc in C) a Multimedia graphical interface for a large scale expert system. Created

Multimedia Model Editor and Model Player, the precursor to CMapTools. Database supervisor.

- **Project Quorum** - Programmer on large scale joint project with IBM Latin America. Automated file transfer between OS-2 machines by writing Rexx and C programs to UUencode and upload the files to mainframes, send files across SNA networks, UUdecode and download files on the other end.
- **Knowledge Preservation at NASA Lewis Research Center** - Elicited knowledge regarding Launch Vehicle System Integration from senior NASA engineers and represented that knowledge in multimedia knowledge models. Demonstrated three different arrangements of the knowledge to target various audiences and uses.
- **Multimedia Knowledge-Based Systems** - Name withheld at request of sponsoring agency. Demonstrated knowledge modeling of experts in a knowledge domain using CMapTools. Worked in Washington D.C.
- **Models & Prototypes for Improving the Effectiveness of Distance Learning & Computer-Mediated Learning.** Chief of Naval Aviation and Training (CNET).
  Phase 1 - Researcher, Knowledge Engineer. Created a demonstration performance support system for electronics technicians.
  Phase 2 - Researcher, Designer, Programmer. Created a pedagogical adjunct to ìCMapTools.î Extended this large object-oriented computer program in JavaTM.
- **Navy Meteorological and Oceanographic Facility** - METOC. Assisted in performing Cognitive Work Analysis of the installation, and in the creation of new ways to represent meteorological data.

Consultancy Work:

- NASA Glenn Research Center, Cleveland, OH.
- Electric Power Research Institute
- Dolan DNA Learning Center, Cold Spring Harbor, NY
- The University of North Florida, Florida Institute of Education, Jacksonville, FL
- Boeing, Houston, TX
- The United States Navy, Dahlgren, VA.
- Southern Company, Birmingham, AL.
- Gulf Power, Pensacola, FL.
- Commander's Predictive Environment, US Navy

Research/Creative Activities

Refereed Journal Publications

Coffey, J.W. (2017). No Warranty Express or Implied: Why do We Have so many Problems with the Computer Systems that Pervade our Lives? Journal of Systemics, Cybernetics and Informatics, ISSN: 1690-4524 (to appear).

Coffey, J.W. (2017). A Framework for a Multi-Faceted, Educational, Knowledge-Based Recommender System. Journal of Systemics, Cybernetics and Informatics, ISSN: 1690-4524 (to appear).

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International Journal of Software Engineering and Knowledge Engineering, 26(1), pp 41–62.

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White, L. J., Reichherzer, T., Coffey, J., Wilde, N. and Simmons, S. (2011). Maintenance of service oriented architecture composite applications: static and dynamic support. Journal of Software Maintenance and Evolution: Research and Practice. doi: 10.1002/smr.568

Prayaga, L., Coffey, J.W., and Rasmussen, K. (2010). Teaching game programming across age groups. International Journal of Gaming and Computer-Mediated Simulations. 3(1). pp. 28-43.

Coffey, J.W. (2010). Web Conferencing Software in University-Level, E-Learning-Based, Technical Courses. Journal of Educational Technology Systems. 38(3). pp. 367-381.

Coffey, J. W., (2008). Digital Natives, Online Learning, and the Production of Capable Computer Science Graduates: The Case for Virtual Synchronous Learning Activities, The International Journal of Technology, Knowledge, and Society, 4(4) pp. 59-64.

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El-Sheikh, E. M., Coffey, J.W., & White, L. J. (2008). Exploring the Use of Virtual Synchronous Sessions in an Online Foundational Programming Course. Proceedings of the 2008 International Conference on Frontiers in Education: Computer Science and Computer Engineering. July 17-19, 2008. Las Vegas, NV. pp.
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Coffey, J.W. (1994). A Computationally Efficient Rule Evaluation Method from Compiled Knowledge Bases. Proceedings of the Seventh Florida AI Research Symposium (FLAIRS '94), Pensacola Beach, FL, May, 1994.

Ford, K.M., Cañas, A.J., & Coffey, J.W. (1993). Participatory Explanation. Proceedings of the Sixth Florida AI Research Symposium (FLAIRS '93), Ft. Lauderdale, FL, April, 1993.

Ford, K.M., Cañas, A.J., Coffey, J.W., Andrews, E.J., & Schad, N. (1991). Interpreting Functional Images with NUCES: Nuclear Cardiology Expert System. Proceedings of the Fifth Florida AI Research Symposium (FLAIRS '92), Ft. Lauderdale, FL, April, 1992.

Ford, K.M., Cañas, A.J., Coffey J.W., & Andrews, E.J. (1991). NUCES: Nuclear Cardiology Expert System: A Preliminary Report. Fourth International Conference on Industrial & Engineering Applications of Artificial Intelligence and Expert Systems, Kauai, Hawaii.

Invited Book Chapters

Reichherzer, T., Coffey, J. W., Gonen, B., Gillett, I. (2015). Knowledge Modeling in the Health Care Domain: Capturing Semantics to Bridge the Gap between Complex Data Models and Object Models, In Desfray, P., Filipe, J., Hammoudi, S., Pires, L. F. (Eds), *Model-Driven Engineering and Software Development*. Springer Verlag, pp. 328-338.

Moon, B., Hoffman, R.R., Eskridge, T., & Coffey, J.W. (2011). Skills in Applied Concept mapping. In Moon, B., Hoffman, R.R., and Canas, A.J. (Eds.), Applied Concept mapping: Capturing, Analyzing, and Organizing Knowledge. Florence, KY: Taylor and Francis Group. pp 23-46

Coffey, J.W., Hoffman, R. R., & Novak, J. D. (2010). Applications of Concept Maps to Web design and Web Work. In R. W. Proctor & K.-P. L. Vu (Eds.), Handbook of Human Factors in Web Design, 2nd Edition. Mahwah, NJ: Erlbaum.

Coffey, J.W. (2004). LEO: A Concept Map-Based Course Visualization Tool for Instructors and Students. Lecture Notes in Computer Science (LNCS 3426), Olaf-Tergan, S. and Keller, T. (Eds.), Berlin: Springer Verlag.

Hoffman, R. R., Coffey, J.W., Novak, J. D., & Cañas, A. J. (2005). Applications of Concept Maps to Web design and Web Work. In R. W. Proctor & K.-P. L. Vu (Eds.), Handbook of Human Factors in Web Design (pp. 157-175). Mahwah, NJ: Erlbaum.

Refereed Book Chapters

Coffey, J. W. Logic and Proof in Computer Science: Categories and Limits of Proof Techniques. Philosophic Perceptions of Logic and Order. J. Horne (ed). IGI Global: Hershey, PA. 2017.

Coffey, J. W., Baskin, A. and Snider, D. (2016) Knowledge Elicitation and Conceptual Modeling to Foster Security and Trust in SOA System Evolution. In El-Sheikh, E., Zimmerman, A., and Jain, L. (Eds), Emerging Trends in the Evolution of Service-Oriented and Enterprise Architectures. Springer. (to appear)

Baskin, A., Reinke, R., and Coffey, J. W. The Fractal Nature of SOA Federations: A Real World Example . In El-Sheikh, E., Zimmerman, A., and Jain, L. (Eds), Emerging Trends in the Evolution of Service-Oriented and Enterprise Architectures. Springer. (to appear).

Coffey, J.W. (2006). Integrating Visual Representations of Knowledge with Learning Management Systems: Design Principles for Advanced Computer-Based Distance Learning Support. In Mendes, M., & Vilar, F. (Eds.), Advances in Computer-Supported Learning. Hershey, PA: Idea Group Publishing. pp. 21-44.

Wilde, N., Bagui, S., Coffey, J., El-Sheikh, E., Reichherzer, T., White, L., Goehring, G., Terry, C., & Baskin, A. (2013). Interoperable Systems and Software Evolution: Issues

and Approaches, Digital Enterprise Design and Management 2013, Advances in Intelligent Systems and Computing, Springer-Verlag, Berlin, Heidelberg, pp. 45-56.

Posters

Just, J., & Coffey, J. W. (2008) A Study of Possible Attack Strategies on the RSA Public-Key Cryptosystem. SEASTARS 2008. School of Science and Engineering, University of West Florida, Penascola, FL April 14, 2008.

Coffey, J.W. (2005). A Poster presented at FLAIRS'05, The Eighteenth Florida AI Research Symposium (FLAIRS '05), Clearwater Beach, Florida, May 15-17, 2005.

Hoffman, R.R., Coffey, J.W., & Carnot, M.J. (2000 Nov). Is there a "fast track" into the black box?: The cognitive models procedure. Poster presented at the 41st annual meeting of the Psychometrics Society, New Orleans, LA.

Hoffman, R. R., Coffey, J.W., & Carnot, M. J. (2001, February). "The Cognitive Styles of Expert Weather Forecasters." Paper presented in the symposium on Human Factors Psychology at the annual meeting of the South Eastern Psychological Association, Atlanta, GA.

Hoffman, R. R., & Coffey, J. W. (2000). "The cognitive styles of expert weather forecasters." Poster presented at the convention of the American Psychological Society, Miami, FL.

Cañas, A.J., Ford, K.M., & Coffey, J.W. (1994). Concept Maps as a Hypermedia Navigational Tool. A session presented at FLAIRS-94, the Florida AI Research Symposium, Pensacola Beach, FL, May 6, 1994.

Presentations

Coffey, J.W. No Warranty Express or Implied: Why do We Have so many Problems with the Computer Systems that Pervade our Lives. A Keynote talk presented at IMCIC'17, The 8th International Multi-Conference on Complexity, Informatics and Systemics. March 24-27, 2017, Orlando, FL.

Coffey, J. W. Ameliorating Sources of Human Error in CyberSecurity: Technological and Human-Centered Approaches. A talk presented at IMCIC'17, Symposium on Information and CyberSecurity.

Coffey, J. W. A Study of the Use of a Reflective Activity to Improve Students' Software Design Capabilities. SIGCSE '17: A talk presented at the 2017 ACM SIGCSE Technical Symposium on Computer Science Education.

Coffey, J. W. (2016). A Framework for a Multi-Faceted, Educational, Knowledge-Based Recommender System. A presentation delivered at the Seventh International Conference on Complexity, Informatics and Cybernetics.

Coffey, J. W. (2015). Concept Mapping and Knowledge Modeling: A Multi-Disciplinary Educational, Informational, and Communication Technology. A Keynote talk at the 6th International Multi-Conference on Complexity, Informatics and Cybernetics, IMCIC 2015, Orlando, FL. March 10-13, 2015.

Coffey, J. W. (2015). A Tool to Automate Generation of Wireshark Dissectors for a Proprietary Communication Protocol. A talk presented at IMCIC'15, Orlando, FL. March 10, 2015.

Coffey, J. W. (2015). Relationship between design and programming skills in an advanced computer programming class. A talk presented at CCSC Mid-South, Hendrix College.

Coffey, J.W. (2014). Concept Mapping for the Efficient Generation and Communication of Security Assurance Cases. IMCIC'14, Orlando, FL. March 4-7, 2014.

Coffey, J.W. (2014). A Method to Evaluate Differences between Student UML Class Diagrams. CCSC MidSouth, March 5 2014, LeMoyne-Owen College, Memphis, TN.
Coffey, J.W. (2013). Integrating theoretical and empirical computer science in a data structures course. The 44th ACM technical symposium on Computer Science Education. Denver, CO. March 7, 2013.
Coffey, J.W. (2012). A Comparison of Functional and Imperative Programming Techniques for Mathematical Software Development. A Presentation at MEI'12, Orlando, FL. July 16, 2012.
Coffey, J.W. (2011). Search-Based Support for Web Services Evolution: Identifying the Right Abstractions. A Presentation at WSE 2011 13th IEEE International Symposium on Web Systems Evolution, Williamsburg, VA. Sept 30, 2011.
Coffey, J.W. (2011). Knowledge Modeling with CmapTools. Science Café. Pensacola, Fl July 18, 2011.
Coffey, J.W. (2010). Creating a Technically-Oriented Course in Web Services and SOA: Successes, Failures, and Lessons Learned. Presented at FECS'10. July, 2010, Las Vegas, NV.
Just, J., & Coffey, J. W. (2008) A Study of Possible Attack Strategies on the RSA Public-Key Cryptosystem. SEASTARS 2008. School of Science and Engineering, University of West Florida, Penascola, FL., April 14, 2008.
Coffey, J. W. (2007). Knowledge Modeling for Decision Support in a Medical Application. Cogon Systems, December 11, 2007.
Coffey, J. W. (2007). First Experiences with Elluminate. Presented at The Elluminate, Users Conference, The University of West Florida.
Coffey, J.W. (2007). CmapTools: A Concept Map-based, Knowledge Modeling Toolkit. Digital and Learning Technology Programs, John C. Pace Library, University of West Florida. 4/6/2007.
Coffey, J.W. (2007). Knowledge Modeling with CmapTools: Technologies and Methods Presentation to the Director, Review and Assessment Program, NASA Safety and Assurance Office, NASA Headquarters, Washington DC August 8, 2006.
Hoffman, R.R., & Coffey, J.W. (2007). "Knowledge Modeling with Concept Maps at Gulf Power, Preliminary Results." presentation to the General Manager for Power Delivery and staff, Gulf Power Company, Pensacola, FL 12/11/2006.
Coffey, J.W. (2006). Getting the Big Picture: Visual Advance Organizers in Computer Science Course Presentation, Ed-Media 2006, World Conference on Educational Multimedia, Hypermedia, and Telecommunications, June 28, Orlando, FL.
Coffey, J.W. (2005) (Virtual Presentation) European Association of Research on Learning and Instruction, Nicosia, Cyprus. August, 2005.
Novak, J.D., & Coffey, J.W. (2005). Educational Uses of CmapTools. Dolan DNA Learning Center, C2G Advisory Panel Meeting, Cold Spring Harbor, New York. March 10-11, 2005.
Coffey, J.W. (2005). LEO, AMEE and CMapTools: A Next-Generation Learning Environment. Presentation to a representative of one of the nation's Intelligence agencies. IHMC, Pensacola, FL, December 7, 2005.
Coffey, J.W. (2004). A Case Study in Knowledge Elicitation for Institutional Memory Preservation using Concept Mapping. Presented at the First International Conference on Concept Mapping, CMC 2004. Pamplona, SP. September 14. 2004.
Coffey, J.W., Sanchez, D.P., Roche, J., & Woosley, A. (2004). TVAN Knowledge Retention Program Using Concept Mapping Tools. Presentation to the Chief Nuclear Officer and others, Tennessee Valley Authority, Chattanooga, TN. August 18, 2004.
Coffey, J.W., (2004). Concept Map-based Knowledge Modeling. A Presentation at the

8th World MultiConference on Systemics, Cybernetics and Informatics. (SCI2004), Orlando, FL, July 18-21, 2004,

Coffey, J.W. (2004). LEO: A Concept Map-based Course Visualization Tool for Instructors and Students. A Presentation at the International Workshop on Visual Artifacts for the Organization of Information and Knowledge, Tubingen, Germany, May 13-14, 2004.

Coffey, J.W., & Koonce, R. (2004). MODeLeR: Multimedia Object Design Learning Resource. Proceedings of SIGCSE'04, The ACM Special Interest Group on Computer Science Education. March 3-7, 2004, Norfolk, VA.

Hoffman, R.R., Coffey, J.W., (2004). Varieties of knowledge elicitation experiences: A knowledge engineer's perspective. Presentation in the Seminar on Expertise (N. Charness, Instructor), Department of Psychology, Florida State University, Tallahassee, FL. March 2004.

Coffey, J.W., & Carnot, M.J. (2003). Graphical depictions for knowledge generation and sharing. Proceedings of IKS2003, IASTED International Conference on Information and Knowledge Sharing. Scottsdale, AZ, Nov 17-19.

Coffey, J.W. (2003). Knowledge Modeling with IHMC's CmapTools. Presentation to representatives of Southern Company, Birmingham, AL., and Gulf Power, Pensacola, FL.

Coffey, J.W., Cañas, A.J., Novak, J.D., Hoffman, R.R., Carnot, M.J., & Jost. A. (2003). Facilitating the Creation of Graphical Knowledge Representations for Brainstorming and Decision Support. Proceedings of the 7th World MultiConference on Systemics, Cybernetics and Informatics. (SCI2003), July 27-30, 2003, Orlando, FL.

Coffey, J.W., & Chernacov, G. (2003). Knowledge Modeling with IHMC's CmapTools. A Presentation to the Plant manager and training director of Brown's Ferry Nuclear Power Plant, Decatur, AL. June, 25.

Coffey, J.W. (2003). LEO: A Learning Environment Organizer for the Presentation of Knowledge Models as Courses, EPRI Workshops, IHMC, Pensacola, FL, May 7-9.

Hoffman, R.R., Coffey, J.W., Novak, J.D., & Carnot, M.J. (2003). Human Centered Computing: Human Factors in Creating Decision Aids for Battlespace Weather. Presented at the Conference on Battlespace Atmospheric and Cloud Impacts on Military Operations (BACIMO). Sponsored by the Naval Research Laboratory. September 9, 2003, Monterey CA.

Coffey, J.W. (2002, November). LEO: A Learning Environment Organizer for the Presentation of Knowledge Models as Courses, EPRI Workshops, IHMC, Pensacola, FL .

Coffey, J.W. (2002). AMEE: Annotated, Multi-modal Electronic Evaluation for Dynamic Student Modeling. A Presentation at E-Learn 2002, World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education, Montreal, Canada October 19-23, 2002.

Coffey, J.W. (2002). A Concept Map-Based Knowledge Modeling Approach to Expert Knowledge Sharing. A Presentation at IKS2002, IASTED International Conference on Information and Knowledge Sharing. St. Johns Virgin Islands, Nov 6 - 8.

Coffey, J.W. (2002). An Ontology-Guided Approach to Content Adaptation in LEO: A learning environment organizer. A Presentation at the Second International Conference on Adaptive Hypermedia and Adaptive Web-based Systems, Malaga, Spain, May, 27 - 29.

Coffey, J.W. (2002). LEO: A Learning Environment Organizer for the Presentation of Knowledge Models as Courses, CNET Workshops, IHMC, Pensacola, FL

Coffey, J. W. (2002). A knowledge-based instructional assistant to accompany LEO: A learning environment organizer. A Presentation at the Fifteenth Florida AI Research Symposium (FLAIRS '02), Pensacola Beach, FL.

Coffey, J.W. (2002). Eliciting, Preserving, and Sharing Expert Knowledge, CNET Workshops, IHMC, Pensacola, FL.

Hoffman, R.R., & Coffey, J.W. (2001) STORM-LK, Details withheld at request of sponsoring agency, Pensacola, FL.

Coffey, J.W. (2001). An Advance Organizer Approach to Distance Learning Course Presentation. A Presentation at the Fifteenth International Conference on Technology and Education. May 2 - 5, 2001. Tallahassee, FL.

Hoffman, R.R., & Coffey, J.W. (2001) STORM-LK, A Presentation at the Navy Professional Development Center, Gulfport, MS.

Hoffman, R.R., Coffey, J.W., Ford, K.M., & Carnot, M.J. (2001). STORM-LK: A Human-Centered Knowledge Model For Weather Forecasting. Presentation at the Second Workshop on Interactive Meteorology and Oceanography, held at the Naval Pacific Meteorology and Oceanography Center (NPMOC), North Island Naval Air Station, California, on August 29 - 31.

Hoffman, R.R., & Coffey, J.W. (2000) STORM-LK, A Presentation to the National Technology Alliance, Washington, D.C.

Coffey, J.W. (2000). A Learning Environment Organizer for Asynchronous Distance Learning Systems. A Presentation at the Twelth IASTED International Conference on Parallel and Distributed Computing and Systems (PDCS 2000). November 6-9, 2000. Las Vegas, Nevada.

Coffey, J.W. (1999). Knowledge-based Systems, Seminar for Outstanding Science Students, University of West Florida, February 25.

Canas, A.J., & Coffey, J.W. (1998). El-Tech Performance support with embedded training for electronics Technicians. Presentation to the Chief of Naval Education and Training, NAS Pensacola, FL.

Coffey, J.W. (1998). Details withheld at request of sponsoring agency, Washington D.C.

Coffey, J.W. (1998). Multimedia Performance Support Systems, Seaside, FL.

Coffey, J.W. (1995). Differences between a method of representing knowledge and a patent for Nexpert Object. Presentation at the Office of Patents and Trademarks, Arlington, VA.

Coffey, J. W. (1995). Issues in Hypermedia and Participatory Explanation. A Presentation at the Eighth Florida AI Research Symposium (FLAIRS '95), Melbourne, FL, 1995.

Ford, K.M. & Coffey, J.W. (1993 - 1995). NUCES, Nuclear Cardiology Expert System. Presented to:

- Lousiana State University – The Chancellor of the University and Faculty of the Department of Computer Science, Baton Rouge, LA.
- Florida State Police, Tallahassee, FL.
- The State of Florida Board of Regents, Orlando, FL.
- Sopha Medical, Incorporated, Columbia, MD.
- The Board of Trustees, The University of West Florida, Pensacola FL.

Coffey, J.W. (1994). A Computationally Efficient Rule Evaluation Method from Compiled Knowledge Bases. A Presentation at the Seventh Florida AI Research Symposium (FLAIRS '94), Pensacola Beach, FL, May, 1994.

Coffey, J.W., (1994). Artificial Intelligence, Science Seminar for Superior Students, University of West Florida, February 17.

Coffey, J.W., (1994). Modern Computing Environments and Computational Intelligence, Pensacola Rotary Club, July 19.

Ford, K.M., & Coffey, J.W. (1993). Participatory Explanation. A Presentation at the Sixth Florida AI Research Symposium (FLAIRS '93), Ft. Lauderdale, FL, April.

Coffey, J.W., (1993). Interpreting Functional Images with NUCES: Nuclear Cardiology Expert System. The Gulf Coast (Pensacola) chapter of DPMA, September 14.

Coffey, J.W., (1993). Issues and Practice in Artificial Intelligence (And Other Fun Topics), Pensacola Junior College, November 4.

Panels

Digital Concept Maps as Tools for Organizing and Managing Knowledge and Information Resources. (2006). Moderator: Dr. Tanja Keller, Knowledge Media Research Center, University of Tubingen, Germany, Panelists: Dr. Geoff Briggs, CMEX, NASA Ames Research Center, Dr. Mauri Ahlberg, University of Helsinki, Dr. Pat Hayes, Institute for Human and Machine Cognition. CMC 2006, September 7, San Jose, Costa Rica.

Panel on Knowledge Elicitation. (2006). Moderator: Dr. Robert R. Hoffman, Institute for Human and Machine Cognition, Panelists: Dr. Josianne Basque, Tele-Universite, Canada, Mr. Ed Dotson, NS Navy, Dr. Tristan Johnson, Florida State University, Dr. Patrick Moore, University of West Florida. CMC 2006, September 7, San Jose, Costa Rica.

Training Knowledge Engineers (2004). Moderator: Dr. Robert R. Hoffman, Institute for Human and Machine Cognition, Panelists: Mr. Brian Moon, Klein Associates, Ms J.C. Dumestre, US Navy, Dr. F. Garcia Gonzalez, Universidad Autonoma de Puebla, Mexico. CMC 2004, September 16, Pamplona, Spain.

Workshops - Participated in the preparations and delivery of the following:

Palo Alto Research Center (PARC) Subcontract - two-day workshop in which we demonstrated joint knowledge elicitation with Dr. Joseph Novak to researchers from PARC. Elicited knowledge from intelligence analysts on a knowledge domain of interest.

NASA Blue Sky Workshop - Facilitated multi-day group knowledge generation sessions via Concept Mapping for researchers from IHMC and NASAS Ames Research Center

No Guts, No Glory: Forging A Theory of Complex Cognitive Systems. Served as Knowledge Engineer/Facilitator, ALRADA Select Working Meeting, Boulder, CO, February 27 - March 1, 2003.

Introduction to Concept Mapping using the *CmapTools* Software CMC2004 Workshop. Created and presented the workshop.

CAS Technical Planning Retreat - Planning for the College of Arts and Sciences School of Science and Engineering (SSE) organizational unit.

CmapTools training Multi-day training workshops presented to:

- **The Electrical Power Research Institute (EPRI)** - Human Resources personnel trained in the use of CmapTools for the preservation of tacit and undocumented knowledge. 17 trainees.
- **Chief of Naval Education and Training (CNET)** – Four workshops in which 80 employees of NETPDTC were trained in the use of CmapTools for Human Performance documentation purposes.
- **Naval Education and Training Command (NETC)** The CFFC group of the reorganized command.
- **PATS** – "Enhancing Educational Experiences with Concept Maps and CmapTools" workshop delivered to 12 teachers from the PATS Center, Pensacola, FL.
- **TVA/BFN** - Served as the lead for a two-day workshop held for participants in a pilot study within Tennessee Valley Authority (TVA). Coordinated by EPRI.

- One of the nation's intelligence agencies. Details withheld at the request of the sponsoring agency.
- **The University of North Florida, Florida Institute of Education (FIE).** Organized and delivered two workshops on using CmapTools to build knowledge models of Intermediate Algebra.
- **Gulf Power and Southern Company.** Follow-on workshop to the knowledge elicitation work performed with two experts.

Task Force Excel, Norfolk, VA. Three-day workshop to elicit knowledge pertinent to professional career advancement for SignalMen, Boatswain's Mate and Quartermaster.

Missions to Mars multi-day workshop with representatives of NASA Ames Research Center. Elicited knowledge on alternative exploratory missions to Mars including:

- humans remain on earth
- humans to orbit (including Libration point)
- humans to the surface of Mars

Capturing Experts' Knowledge Using Concept Maps. (2006). Moderators: Robert R. Hoffman and John W. Coffey. CMC 2006, the Second International Conference on Concept Mapping. September 7, San Jose, Costa Rica.

Commander's Predictive Environment, First workshop: January 16-17, 2006.
Commander's Predictive Environment, Second workshop: April 14-15, 2007.

Patent

Ford, K.M., Cañas, A.J. & Coffey, J. (1996). Concept map-based multimedia computer system for facilitating user understanding of a domain of knowledge. U.S. Patent #5,506,937.

Memberships in Professional Organizations

- Association of Computing Machinery.
- American Association of Artificial Intelligence
- UWF chapter of Association of Information Technology Professionals.
- Chapter (Faculty) Advisor, UWF chapter of AITP. (1992-present)
- Chairman, Speaker Committee, AITP. (1990-1992)
- President, UWF chapter of AITP. (1990-1991)

Professional Development

- Professional Development Leave, University of West Florida, to complete Doctoral Dissertation, academic year 1999-2000.
- Teaching Portfolio Workshop 2001.
- LEAD: Leadership Enhancement and Development Program. Class of 2002.
- Teaching Partners, 2008-2010.
- Sabbatical, Spring, 2017.

Projects and Grants

Externally Funded

- Principal Investigator - Knowledge Acquisition at NASA LeRC. $66,500.00
- Principal Investigator - Eliciting Knowledge and Reasoning of Southern Company Experts. $18,800.00.

- Co-Principal Investigator - A Knowledge Engineering, Team-Based Approach to Introducing Security Assurance Cases $25,000.00
- Co-Principal Investigator – Knowledge Modeling for Supporting Program Comprehension Blue Cross, Blue Shield Associates. $50,000.00
- Co-Principal Investigator - Medical Educational Research Foundation (MERF). $23,000.00
- Served as Critical Personnel on many grants through IHMC including the following (these grants totaled millions of dollars):
    - Quorum: Collaboration without Boundaries - IBM World Trade Corporation
    - Models & Prototypes for Improving the Effectiveness of Distance Learning & Computer-Mediated Learning - Chief of Naval Training
    - Multimedia Knowledge-Based Systems - sponsoring agency name withheld by request of the agency
    - Navy Meteorological and Oceanographic Facility - METOC.

Internally Funded

- Wrote and defended annual proposals to the Student Government Association (SGA) for support for the Student Chapter of AITP. $54,218.00
- University of West Florida Faculty Summer Research Grant (2006) $6,250.00
- University of West Florida Research Assistantship Grant (2006) $1,500.00

Dissertation and Thesis Work

Coffey, J.W. (2000). LEO: A Learning Environment Organizer to Accompany Constructivist Knowledge Models. Doctoral Dissertation, The University of West Florida, Pensacola, FL. *Advisor:* Dr. Alberto J. Cañas.

Coffey, J.W. (1992) Nuclear Cardiology Expert system: Development of a Prototype. Master's Thesis, University of West Florida. *Advisor:* Dr. Kenneth M. Ford.

Security Clearance

Secret Level. Interim clearance, April, 1997, Final clearance, October, 1997.

Knowledge Modeling Projects

- **Nuclear Cardiology Expert Systems (NUCES).** The original project for which the IHMC was created and funded. Elicited knowledge about the interpretation of radionuclide images of the left ventricle. Built knowledge-based consultation component to accompany the knowledge model.
- **Launch Vehicles Systems Integration (LVSI)** Performed at NASA Glenn Research Center. Created three separate multimedia elements that were integrated to create one knowledge model on launch vehicles systems integration
- **El-Tech** – Knowledge model and consultation system for Navy electronics technicians
- **STORM-LK** – Large-scale knowledge model of local weather forecasting knowledge that is necessary to be a forecaster in Pensacola, FL.
- **KMD** – The EPRI – Southern Company Knowledge Modeling Demonstration Project. Birmingham, AL.
- **Drought -** a project with the National Weather Service eliciting and modeling knowledge on conditions giving rise to droughts in the Southeastern United States.
- **Department of Defense** - information withheld at request of clients.
- **Leadership** – information withheld at request of clients.

- **EPRI/TVA Pilot Project** - Knowledge Modeling for Institutional Memory Preservation pertaining to air effluent analysis and turbine maintenance/overhaul.
- **Social Network Analysis** - knowledge modeling pertaining to uses of Social Network Analysis. Department of Defense.
- **Boeing, Houston.** Demonstration Knowledge modeling for Institutional Memory Preservation pertaining to:
  - Space Shuttle Ascent Guidance
  - Space Station On-orbit Thermo-structural Analysis.

Institutional Service

Service to the Profession

- Editorial Board – Journal of Educational Technology Systems
- Reviewer:
  - Computers and Education
  - International Journal of Expert Systems
  - International Journal of Human-Computer Studies.
  - IEEE Expert
  - Advances in Computer-Supported Learning (Book)
  - Educational Research Review
  - Journal of Technology, Knowledge, and Society. Associate Editor for volume 8.
  - Journal of Technology, Knowledge, and Society. Associate Editor for volume 4.
  - External reviewer for MEng degree, Alireza Kashian , School of EEE, Nanyang Technological University, Singapore
- Program Committee: Intelligent User Interfaces, IUI 2008 - 2008 International Conference on Intelligent User Interfaces. Canary Islands, Spain, January 13-16, 2008.
- Program Committee CMC:
  - CMC 2004 - The First Int'l Concept Mapping Conference, Pamplona, Spain.
  - CMC 2006 - The Second Int'l Concept Mapping Conference, San Jose, Costa Rica.
  - CMC 2008 - The Third Int'l Concept Mapping Conference, Estonia and Finland.
  - CMC 2010 –The Fourth Int'l Concept Mapping Conference, Santiago, Chile.
  - CMC 2012 –The Fifth Int'l Concept Mapping Conference, Malta.
  - CMC 2014 –The Sixth Int'l Concept Mapping Conference, Sao Paulo, Brazil.
  - CMC 2016 - The Seventh Int'l Concept Mapping Conference, Estonia.
- Advisory Committee for Computer Science and Information Technology, Pensacola State College, 1994-present.
- Twenty Five Gallon Blood Donor, Northwest Florida Regional Blood Center
- Judge, Florida Panhandle Regional Science and Engineering Fair (many years).

To the University

- University Faculty Personnel Committee. Chair, 2016 – 2017.
- Member Office of Undergraduate Research Committee.
- Chair, Information Technology Planning and Advisory Committee (ITPAC) – the successor to UPC-IT (2009-present).
- University Web Advisory Committee (WAC)
- Student Technology Fee Committee member (ITEP and Systemic)
- ITPAC Subcommittee to develop a prioritization plan for strategic IT projects.

- University Planning Council for Information Technology (UPC-IT), University of West Florida (2001-2008). Participated in the formulation of the UWF IT Mission Statement and Strategic Plan.
- Co-chair, UPC-IT (2004-2008)
- UPC-IT Subcommittee for Classroom Technology
- UPC-IT Subcommittee for formulation of a framework for Student Access to Technology Fees (SATF).
- Chair, UPC-IT Subcommittee to study the feasibility of adopting Open Source Software
- UPC-IT Strategic Plan Subcommittee.
- UPC-IT Minimum Hardware Standards Subcommittee
- UWF Web Presence Committee
- Search Committee, Assistant Professor, Digital Media, Department of Art.
- Search Committee for Coordinator, Career Development Services (2001).
- Phon-a-thon volunteer for new students, 1996, 2001, 2003, 2008, 2013.
- Division of Engineering Technology External Review
- Focus Group on the University Portal
- Faculty Search Committee, Institute for Human and Machine Cognition, 1994.
- Tutor, Minority Retention Center, UWF. (1988).
- Tutor, Literacy Volunteers of America, Escambia County. (1991-1992)
- LEAD program - Students' Perspectives: The Educational Experience at UWF

To the College

- Co-chair, Intelligent Systems and Robotics PhD Planning Committee (2016-present)
- Teacher Incentive Program Committee Judge, 1998
- LAS Planning for Science and Technology building (2006-2007).

To the Computer Science Department

- Chair, Department Tenure and Promotion Committee (2017).
- Member, Tenure and Promotion Committee (2005-present)
- Chair, Nystul Search Committee 2016-2017.
- Scholarship Committee (2000-2001).
- Scholarship Committee Chair (2001 - present).
- Faculty advisor to the UWF chapter of DPMA/AITP. (1993 - Present)
- Computer Science Core Curriculum Committee, 1998-1999.
- Computer Science Department Ad Hoc Curriculum Design Group (2001-2002)
- Computer Science Department representative for Saturday Open House and Undergraduate Orientations (in many years, 1996-present).
- Academic Advisor, Department of Computer Science (1993 to 1999).
- Faculty advisor to the UWF chapter of DPMA/AITP. (1993 - Present)
- ASC Open house (Fort Walton Beach, August 2006)
- Faculty Search Committee for two Lecturers (2005)
- Chair, Five-year self-study, Department of Computer Science
- Community outreach: visited area high schools to promote programs in computing.
- CS Department committee to revise CIS curriculum, IT currriculum (2006-07-08).
- Mentoring Committee, Drs. Lakshmi Prayaga, Laura White, Dallas Snider, Ezhil Kaliamannan

Dissertation Committee Member

- John Bolyard

Computer Science Department Honors Project Advisor
- Travis Zimmerman
- Keegan Anderson

Master's Thesis Advisor
- Gilbert Ryan Petris
- Eric Golden

Thesis Commitees
- Steven Satterfield – Defended May, 2012
- Bradley Swain – defended August, 2009
- Carlos Perez – defended Fall, 2009
- LaTreva Pounds - defended 8/2001
- Michelle Buckalew - defended 1/2001
- Tony Croy - prospectus completed
- Sherri Sentelle - defended 1/2002
- Ian Schneller - defended 4/2002

Graduate Project Advisor
- Eric Golden
- Rick Peterson
- Ryan Defour
- Scott Frame
- Laura Dulin
- Jiri Just
- Michael Webb
- Johnnie Odom
- Darcy Lewis
- Tim Giertz

Electrical and Computer Engineering Department Honors Committee Member
- Laura Solari
- Jeffrey Gibson

Directed Individual Studies - Supervised the following students:
- Andre King
- Thomas Roberson
- Halston Pate
- Eric Golden
- Mithal Ashraf
- Robert Peters
- Roger Hawthorne
- Travis Zimmerman
- Gary Register
- Chris Ayers
- Chad Carff
- Bart McDonough
- Brian Watson

- Michael Webb
- James Holstead
- Paul Groth
- James Dodd
- Bruce Edgar
- Timeyo Banda
- Eric Larin
- Curtis Williams
- Alice Banks

Awards and Honors

- Lifetime member, Upsilon Pi Epsilon
- As Chapter Advisor to UWF chapter of AITP (Association of Information Technology Professionals:
  Outstanding Student Chapter of the Year for AITP Region 7 (SouthEastern United States) 1998-1999 and 2000-2001.
  Student Chapter Outstanding Performance Award (SCOPA) 1993, 1994, 1998, 1999, 2000.
  Coordinated many trips to regional and National competitions.
- Professional Development Leave, University of West Florida, to complete Doctoral Dissertation, academic year 1999-2000.
- Distinguished Teaching Award, UWF (1997).
- Golden Apple Award as Teacher of the Year, UWF. (1997)
- Teacher Incentive Program Award, (1997).
- Outstanding Student Organization Advisor, UWF, (1993 - 1994)
- Outstanding Student, Division of Computer Science, UWF. (1989)
- Honor Society of Phi Kappa Phi. (1989).
- Lifetime member, Phi Kappa Phi. (1991).
- Who's Who Among Students at American Colleges and Universities. (1991)
- Summa Cum Laude graduate of UWF.
- President's List, UWF. (every semester of Undergraduate studies)
- Certificate of Accomplishment for Outstanding Academic Performance, BellSouth Services, Summer, 1998, Winter, 1989.
- Graduate Scholarships: Division of Computer Science, UWF; Pensacola Chapter of DPMA.
- Dean's List, The College of William and Mary.

Eman M. El-Sheikh – Curriculum Vitae

Center for Cybersecurity and
Department of Computer Science
University of West Florida
11000 University Parkway
Pensacola, FL 32514
Tel: 850-474-3074
Fax: 850-474-3156
E-mail: eelsheikh@uwf.edu

Education

Ph.D., Computer Science 2002	Michigan State University Area: Artificial Intelligence Advisor: Jon Sticklen Title: An Architecture for the Generation of Intelligent Tutoring Systems from Reusable Components and Knowledge-Based Systems.	East Lansing, MI
M.Sc., Computer Science 1995	Michigan State University	East Lansing, MI
B.Sc., Computer Science 1992	American University in Cairo Summa Cum Laude (Highest Honors)	Cairo, Egypt

Employment

Director 2/2016 – present	Center for Cybersecurity University of West Florida	Pensacola, FL
Professor 8/2014 – present	Department of Computer Science University of West Florida	Pensacola, FL
Interim Director 7/2015 – 2/2016	Center for Cybersecurity University of West Florida	Pensacola, FL
Associate Dean 8/2015 – 8/2016 8/2014 – 7/2015 1/2010 – 7/2014	University of West Florida College of Science and Engineering College of Science, Engineering and Health College of Arts and Sciences	Pensacola, FL
Associate Professor 8/2009 – 7/2014	Department of Computer Science University of West Florida	Pensacola, FL
Interim Associate Dean 8/2009 – 12/2009	College of Arts and Sciences University of West Florida	Pensacola, FL
Assistant Professor 8/2001 – 7/2009	Department of Computer Science University of West Florida	Pensacola, FL
Teaching Assistant 9/2000 – 5/2001	Computer Science & Engineering Department Michigan State University	East Lansing, MI

Instructor 6/1999 – 7/1999	Computer Science & Engineering Department Michigan State University	East Lansing, MI
Research Assistant 5/1995 – 9/2000	Intelligent Systems Lab Computer Science & Engineering Department Michigan State University	East Lansing, MI
Teaching Assistant 9/1993 – 5/1995	Computer Science & Engineering Department Michigan State University	East Lansing, MI
Software Engineer 1/1993 – 6/1993	Automatic Systems Corporation	Abu Dhabi, UAE
Programmer 4/1992 – 1/1993	IBM	Cairo, Egypt

Awards and Appointments

Member, Innovation Coast Board of Directors
November 2016 – present Innovation Coast, Pensacola, Florida.

Principal Investigator and Project Director
August 2012 – present NSF Faculty ADVANCE Program, University of West Florida.

Visiting Research Scientist
Spring 2011– present Florida Institute for Human and Machine Cognition, Pensacola, Florida.

Achievement Award
Awarded for service to advancing cybersecurity education at SAM 2016: 15th International Conference on Security and Management, Las Vegas, NV, July 25 – 28, 2016.

Mentor
2015 Association of American Colleges and Universities (AAC&U) Project Kaleidoscope (PKAL) PKAL Summer Leadership Institute, Claggett, MD, July 20 – 26, 2015.

Friend of Diversity Award, Awarded to ADVANCE Program by the Office of Equity,
April 2015 Diversity and International Affairs, University of West Florida.

President's Award for Leadership in Diversity
April 2014 University of West Florida.

Administrative Fellow
Fall 2008 – Summer 2009 College Arts and Sciences Dean's Office, University of West Florida.

I worked with the Dean on college goals and developed and managed Teaching Partners, a program to promote the development and exchange of best teaching practices, and facilitate peer reviews of teaching. My responsibilities also included overseeing the college's **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, Faculty Activity Reports, and various assessment initiatives.

Instructional Strategies and Assessment Fellow
Spring 2007 – Summer 2009 The Center for University Teaching, Learning, and Assessment,

University of West Florida.

I planned and facilitated events for the development of faculty skills in teaching, learning, and assessment, including five mini-conferences, several workshops and roundtable discussions. I worked with faculty to develop useful and sustainable instructional and assessment practices.

Paper and Poster Awards

Computer Science Award, 2016 Student Scholars Symposium: Timm, M. and El-Sheikh, E. Animal ID: An Algorithmic Approach to Identifying Individual Animals in Images. University of West Florida, Pensacola, FL, April 21, 2016.

Computer Science Award, 2015 Student Scholars Symposium: Mitchell, C., AI Research Group, and El-Sheikh, E. The Hemingway Effect: A Comparison of Artificial Intelligence and Machine Learning Methods. University of West Florida, Pensacola, FL, April 23, 2015.

Computer Science Award, 2014 Student Scholars Symposium: Rowberry, B., AI Research Group, and El-Sheikh, E. Race to the Finish: A Comparison of AI Search, Navigation, and Pathfinding Algorithms. University of West Florida, Pensacola, FL, April 24, 2014.

TechSoft Computer Science Award, 2013 Student Scholars Symposium: Stephen, D., Haynes, A., and El-Sheikh, E. Wernicke: Natural Language Processing for Home Automation. University of West Florida, Pensacola, FL, April 25, 2013.

Artificial Intelligence Award, 2011 Student Scholars Symposium: Connor, J. and El-Sheikh, E. Let's Make Music: Generating Music Using Artificial Intelligence. University of West Florida, Pensacola, FL, April 21, 2011.

Computer Science Award, 2011 Student Scholars Symposium: Ramirez, Z. and El-Sheikh, E. An AI Framework for Maze Navigation in Robotic Environments. University of West Florida, Pensacola, FL, April 21, 2011.

Gaming/Simulation Award, 2011 Student Scholars Symposium: Broxton, T. and El-Sheikh, E. Implementing Swarm Intelligence for Solving Complex Problems. University of West Florida, Pensacola, FL, April 21, 2011.

Gaming/Simulation Award, 2011 Student Scholars Symposium: McConaghy, P., Graves, J., Brown, P., Brewster, T., and El-Sheikh, E. Argos Glest: Ambitious AI Automating Annihilation (Intelligent Game Play Using AI). University of West Florida, Pensacola, FL, April 21, 2011.

Provost's Award, SEASTARS 2010: McCarthy, J. and El-Sheikh, E. A Cooperative Intelligent Agent Architecture for Enterprise Search. The 7th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 15, 2010.

Best Graduate Award, 2010 SEASTARS: Corliss, J. and El-Sheikh, E. Intelligent Network Traffic Flow Analysis: the "Brains" of the System. The 7th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 15, 2010.

Best Simulation Award, 2010 SEASTARS: Calvo, C. L. and El-Sheikh, E. Analysis of the A* Search Algorithm: Using AI to Improve Search Effectiveness. The 7th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 15, 2010.

Best Computer Science Award, 2010 SEASTARS: Cantero, F. M. and El-Sheikh, E. Can your Robot Move? Navigation and Obstacle Avoidance. The 7th Annual **Scholars of Engineering,**

Applied Sciences & Technology Annual Research Symposium, University of West Florida, Pensacola, FL, April 15, 2010.

Best Computer Science Award, 2009 SEASTARS: Carff, J., El-Sheikh, E. M., Johnson, M., and Pratt, J. E. A Human-Robot Team Navigation System for Complex Environments. The 6th **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 16, 2009.

Best Computer Science Award, 2008 SEASTARS: Swain, B., El-Sheikh, E., and Khabou, M. Recognize This! A Neural Network-Based Recognizer of Handwritten Digits. The 5th **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 14, 2008.

Upsilon Pi Epsilon Induction
2008 International Honor Society for the Computing Disciplines

Best Paper Award
2008 Paper was selected among top 10% of papers at EISTA 2008: **6th International Conference on Education and Information Systems, Technologies and Applications**, Orlando, FL, June 29 – July 2, 2008.

El-Sheikh, E. (2008). Engaging Students in an Online Programming Course: Lessons Learned.

Best Paper Award
2007 Paper was selected as best paper in session at EISTA 2007: **The 5th International Conference on Education and Information Systems, Technologies and Applications**, Orlando, FL, July 12 – 15, 2007.

El-Sheikh, E., White, L., and Coffey, J. (2007). Reflections in Uncharted Waters: Teaching Foundational Programming Online.

New Faculty Fellow
2003 The IEEE 2003 Frontiers in Education (FIE) Conference, Boulder, CO, November 5-8, 2003.

I was selected as a 2003 IEEE Faculty Fellow. Fellows are selected using a rigorous peer-reviewed application process to promote and acknowledge their involvement in the development of innovative practices for Computer Science and Engineering education.

Distinguished Teacher
2003 Nominated for the Distinguished Teacher Award at the University of West Florida, Spring 2003.

Thoman Fellow
1999 I was selected as a Thoman Fellow at Michigan State University for 1999 – 2000. The Thoman Fellow is awarded to outstanding and motivated international scholars completing their doctoral studies, who show achievement and promise in scholarship and leadership. I participated in seminars, outreach programs, community service, global awareness events, and volunteer work.

Best Paper Award
1999

Paper was selected as a best paper at 12th International Conference on Industrial and Engineering Applications of Artificial Intelligence and Expert Systems, Cairo, Egypt.

El-Sheikh, E., and Sticklen, J. (1999). Leveraging a Task-specific Approach for Intelligent Tutoring System Generation: Comparing the Generic Tasks and KADS Frameworks.

Research and Scholarly Activities

Books

Daimi, K., Francia, G., Ertual, L., Encinas, L., and El-Sheikh, E. (2017). Computer and Network Security Essentials, Springer International Publishing, ISBN 978-3-319-58423-2, 2017.

El-Sheikh, E., Zimmermann, A., and Jain, L. (2016). Emerging Trends in the Evolution of Service-Oriented and Enterprise Architectures, Springer International Publishing ISBN 978-3-319-40562-9, DOI 10.1007/978-3-319-40564-3.

Refereed Journal Publications and Book Chapters

Warren, C., Reed, A., El-Sheikh, E., and Le-Khac, N.A. (2017). Privacy Preserving Internet Browsers – Forensic Analysis. Computer and Network Security Essentials (Daimi, K., Francia, G., Ertual, L., Encinas, L., and El-Sheikh, E., Eds.). Springer International Publishing, ISBN 978-3-319-58423-2, 2017.

Wilde, N., Gonen, B., El-Sheikh, E., and Zimmermann, A. (2016). Approaches to the Evolution of SOA Systems. Trends in the Evolution of Service-Oriented and Enterprise Architectures (E. El-Sheikh, A. Zimmermann and L. Jain, Eds.). Springer International Publishing ISBN 978-3-319-40562-9, DOI 10.1007/978-3-319-40564-3.

Zimmermann, A., Schmidt, R., Sandkuhl, K., El-Sheikh, E., Jugel, D., Schweda, C., Möhring, M., Wißotzki, M., Lantow, B. (2016). Leveraging Analytics for Digital Transformation of Enterprise Services and Architectures. Trends in the Evolution of Service-Oriented and Enterprise Architectures (E. El-Sheikh, A. Zimmermann and L. Jain, Eds.). Springer International Publishing ISBN 978-3-319-40562-9, DOI 10.1007/978-3-319-40564-3.

Gonen, B., Fang, X., El-Sheikh, E., Bagui, S., Wilde, N., and Zimmermann, A. (2014). Ontological Support for the Evolution of Future Services Oriented Architectures. Transactions on Machine Learning and Artificial Intelligence, vol. 2, no. 6, pp. 77 – 90, 2014.

Maestre, A., El-Sheikh, E., Williamson, D., and Ward, A. (2014). A Machine Learning Tool for Weighted Regressions in Time, Discharge, and Season. International Journal of Advanced Computer Science and Applications, vol. 5, no. 3, pp. 99 – 106, 2014.

El-Sheikh, E., Reichherzer, T., White, L., Wilde, N., Coffey, J., Bagui, S., Goehring, G., and Baskin, A. (2013). Towards Enhanced Program Comprehension for Service Oriented Architecture (SOA) Systems, Journal of Software Engineering and Applications, vol. 6, pp. 435 – 445, 2013.

Wilde, N., Bagui, S., Coffey, J., El-Sheikh, E., Reichherzer, T., White, L., Goehring, G., Terry, C., Baskin, A. (2013). "Interoperable Systems and Software Evolution: Issues and Approaches," *Digital Enterprise Design and Management 2013, Advances in Intelligent Systems and Computing*, volume 205, 2013, chapter 10, pp. 45-56, Springer Berlin Heidelberg, doi={10.1007/978-3-642-37317-6_5}.

Goehring, G., Reichherzer, T., El-Sheikh, E., Snider, D., Wilde, N., Bagui, S., Coffey, J., and

White, L. (2013). A Knowledge-Based System Approach for Extracting Abstractions from Service Oriented Architecture Artifacts. International Journal of Advanced Research in Artificial Intelligence, vol. 2, no.3, pp. 44 – 52, 2013.

El-Sheikh, E. and Prayaga, L. (2011). Development and Use of AI and Game Applications in Undergraduate Computer Science Courses. Journal of Computing Sciences in Colleges, vol. 27, no. 2, pp. 114-122, December 2011.

Fernandez, J.R. and El-Sheikh, E.M. (2011). CluSandra: A Framework and Algorithm for Data Stream Cluster Analysis. International Journal of Advanced Computer Science and Applications, vol. 2, no. 11, pp. 87-99, 2011.

Perez, C.A., El-Sheikh, E.M. and Glymour, C. (2010). Discovering Effective Connectivity among Brain Regions from Functional MRI Data. International Journal of Computers in Healthcare, vol. 1, no. 1, pp. 86 - 102. Inderscience Publishers.

Stanny, C., El-Sheikh, E., Ellenberg, G., & Halonen, J. S. (2010). First Things First: Attending to Assessment Issues. Dunn, D. S., McCarthy, M. A., Baker, S., & Halonen, J. S. Using Quality Benchmarks for Assessing and Developing Undergraduate Programs. San Francisco, CA: Jossey-Bass, pp. 46 – 70.

El-Sheikh, E. M., Mbizo, J., Stanny, C. J., Stewart, G. L., Sutton, M. A., White, L. J., and Williams, M. H[1]. (2010). Engaging Faculty in the Assessment Process at the University of West Florida. P. L. Maki, Ed., Coming to Terms with Student Outcomes Assessment. Sterling, VA: Stylus Publishing, pp. 178 - 190.

Halonen, J. S. and El-Sheikh, E. M. (2010). How Chairs Help Departments Become Great. Academic Leader, June 2010 issue. Madison, WI: Magna Publications

El-Sheikh, E. and Sticklen, J. (2009). Reusing Task-Specific Knowledge-Based Systems to Generate Intelligent Tutoring Systems. International Journal of Advanced Intelligence Paradigms, vol. 1, no. 3, pp. 251 – 274. Inderscience Publishers.

Prayaga, L., Prayaga, C., Simmons, S., and El-Sheikh, E. (2009). Visual Interactive Artificial Neural Network (VIANN) Tutor. Bulletin of Applied Computing and Information Technology (BACIT), vol. 7, no. 1.

El-Sheikh, E. (2009). Techniques for Engaging Students in an Online Programming Course. Journal of Systemics, Cybernetics, and Informatics, vol. 7, no. 1, pp. 1 - 12. IIIC Press.

El-Sheikh, E., Coffey, J., and White, L. (2008). Exploring Technologies, Materials, and Methods for an Online Foundational Programming Course. International Journal of Informatics in Education, vol. 7, no. 2, pp. 259-276.

El-Sheikh, E. (2005). An Adaptive Learning Environment for Improving Learning Experiences in Introductory Computer Programming Courses. The International Journal of Learning, vol. 12, no. 9, pp. 83-90.

El-Sheikh, E. and Sticklen, J. (2002). Generating Intelligent Tutoring Systems from Reusable Components and Knowledge-Based Systems. Lecture Notes in Computer Science, S. Cerri, G. Gouarderes, and F. Paraguacu (Eds.), Springer-Verlag, vol. 2363, pp. 199-207.

El-Sheikh, E. (2000). Generation of Intelligent Tutoring Systems from Existing Expert Systems, In: The 1999 SIGART/AAAI Doctoral Consortium, J. Wiebe (Ed.), Intelligence, vol. 11, no. 2, pp. 43-48.

[1] Authors are listed in alphabetical order. All authors contributed equally to manuscript.

El-Sheikh, E., and Sticklen, J. (1998). A Framework for Developing Intelligent Tutoring Systems Incorporating Reusability. Lecture Notes in Artificial Intelligence, J. Mira, A. del Pobil, and M. Ali, (Eds.), Springer-Verlag, vol. 1415, pp. 558-567.

Refereed Conference Proceedings Publications

Timm, M. and El-Sheikh, E. (2017). An Evaluation of Machine Learning Algorithms for Prediction of Shelter Animal Outcomes. Proceedings of the 32nd International Conference on Computers And Their Applications (CATA 2017). March 20 – 22, 2017, Honolulu, HI.

Useche, O. and El-Sheikh, E. (2016). An Intelligent Web-Based System for Measuring Students' Attention Levels. Proceedings of ICAI 2016: The 18th International Conference on Artificial Intelligence, July 25 – 28, 2016, Las Vegas, NV, CSREA Press.

Baggs, J.P., Renner, M. and El-Sheikh, E. (2016). A Faster Alternative to Traditional A* Search: Dynamically Weighted BDBOP. Proceedings of ICAI 2016: The 18th International Conference on Artificial Intelligence, July 25 – 28, 2016, Las Vegas, NV, CSREA Press.

Useche, O. and El-Sheikh, E. (2015). An Intelligent System Framework for Measuring Attention Levels of Students in Online Course Environments. Proceedings of ICAI 2015: The 17th International Conference on Artificial Intelligence, July 27 – 30, 2015, Las Vegas, NV, CSREA Press.

Gonen, B., Fang, X., El-Sheikh, E., Bagui, S., Wilde, N., Zimmermann, A., and Petrov, I. (2014). Maintaining SOA Systems of the Future: How Can Ontological Modeling Help? Proceedings of KEOD 2014: The International Conference on Knowledge Engineering and Ontology Development, October 21 – 24, 2014, Rome, Italy.

Zimmermann, A., Gonen, B., Schmidt, R., El-Sheikh, E., Bagui, S., and Wilde. N. (2014). Adaptable Enterprise Architectures for Software Evolution of SmartLife Ecosystem. Proceedings of IEEE EDOC – SoEA4EE 2014: The Sixth Workshop on Service oriented Enterprise Architecture for Enterprise Engineering, Sep. 1-5, 2014, Ulm, Germany.

Maestre, A. and El-Sheikh, E. (2014). A Comparison of Machine Learning Techniques for the Generation of River and Stream Water Quality Estimates. Proceedings of ICAI 2014: The 2014 International Conference on Artificial Intelligence, July 21 – 24, 2014, Las Vegas, NV, CSREA Press.

Zimmermann, A., Pretz, M., Zimmermann, G., Firesmith, D., Petrov, I., and El-Sheikh, E. (2013). Towards Service-oriented Enterprise Architectures for Big Data Applications in the Cloud. The Fifth International Workshop on Service Oriented Enterprise Architecture for Enterprise Engineering, September 9, Vancouver, BC.

El-Sheikh, E., Bagui, S., Firesmith, D., Petrov, I., Wilde, N., Zimmermann, A. (2013). Towards Semantic-Supported SmartLife System Architectures for Big Data Services in the Cloud. Proceedings of The Fifth International Conference on Advanced Service Computing, May 27 – June 1, Valencia, Spain, **IARIA XPS Press**.

McGraw, B. and El-Sheikh, E. (2013). Integrating Reinforcement Learning with Communication for Multi-Agent Systems. Proceedings of the 28th International Conference on Computers And Their Applications (CATA 2013). March 4 – 6, 2013, Honolulu, HI, pp. 123 – 128.

Satterfield, S., Reichherzer, T., Coffey, J., and El-Sheikh, E. (2012). Application of Structural Case-based Reasoning to Activity Recognition in Smart Home Environments. Proceedings of The 11th *International Conference on Machine Learning and Applications.* December 12-15, 2012, Boca Raton, FL.

Jackson, R. and El-Sheikh, E. (2012). A Case Study Building a Web-Based Dietitian Expert System. Proceedings of ICAI'12: The 2012 International Conference on Artificial Intelligence, July 16 – 19, 2012, Las Vegas, NV, vol. 1, pp. 445 – 451, CSREA Press.

White, L., Wilde, N., Reichherzer, T., El-Sheikh, E., Goehring, G., Baskin, A., Hartmann, B., and Manea, M. (2012). Understanding Interoperable Systems: Challenges for the Maintenance of SOA Applications. Proceedings of 45th Hawaii International Conference on System Sciences (HICSS), pp. 2199-2206, January 2012.

Reichherzer, T., El-Sheikh, E., Wilde, N., White, L., Coffey, J., Simmons, S. (2011). Towards Intelligent Search Support for Web Services Evolution: Identifying the Right Abstractions. Proceedings of 2011 13th IEEE International Symposium on Web Systems Evolution (WSE), pp.53-58, Sep. 30, 2011.

McCarthy, J. M. and El-Sheikh, E. M. (2011). Image Generation and Analysis for the Android Platform: Exploring Computer Vision in Mobile Development Environments. Proceedings of IPCVI'11: The 2011 International Conference on Image Processing, Computer Vision, and Pattern Recognition**,** Las Vegas, NV, July 18 – 21, 2011, CSREA Press.

El-Sheikh, E. M., Perez, C. A., and Glymour, C. (2010). Using Causal Modeling for Determining Connectivity among Brain Regions. Proceedings of ICAI'10: The 2010 International Conference on Artificial Intelligence**,** Las Vegas, NV, July 12 – 15, 2010, CSREA Press, pp. 653 - 659.

McCarthy, J. M. and El-Sheikh, E. M. (2010). A Cooperative-Agent Architecture for Managing Large Document Collections in Corporate Intranets. Proceedings of ICAI'10: The 2010 International Conference on Artificial Intelligence**,** Las Vegas, NV, July 12 – 15, 2010, CSREA Press, pp. 438 - 443.

Corliss, J. and El-Sheikh, E. M. (2010). An Intelligent System for Network Traffic Flow Analysis. Proceedings of ICAI'10: The 2010 International Conference on Artificial Intelligence**,** Las Vegas, NV, July 12 – 15, 2010, CSREA Press, pp. 716 - 722.

Carff, J., Johnson, M., El-Sheikh, E. M., and Pratt, J. E. (2009). Human-Robot Team Navigation in Visually Complex Environments. Proceedings of IROS 2009: The 2009 IEEE/RSJ International Conference on Intelligent RObots and Systems, St. Louis, MO, Oct. 11 – 15, 2009.

El-Sheikh, E. and Swain, B. (2009). A Geospatial Natural Language-Based Path Understanding System. Proceedings of ICAI'09: The 2009 International Conference on Artificial Intelligence**,** Las Vegas, NV, July 13 – 16, 2009, CSREA Press, pp. 161 - 167.

Wells, D. L., El-Sheikh, E. M., Sutton, M. A., Di Santo, V., and Bennett, W. A. (2009). Automated Image Processing of X-Radiographics of Digestion in Stingrays. Proceedings of ICAI'09: The 2009 International Conference on Artificial Intelligence**,** Las Vegas, NV, July 13 – 16, 2009, CSREA Press, pp. 715 - 719.

White, L., Coffey, J., and El-Sheikh, E. (2009). A Longitudinal Study of the Effectiveness of Teaching Introductory Programming Courses Online. Proceedings of ED-MEDIA 2009: World Conference on Educational Multimedia, Hypermedia & Telecommunications. Honolulu, Hawaii, June 22-26, 2009, AACE Press.

Perez, C. and El-Sheikh, E. (2009). Learning and Representing Causal Relationships with Bayesian Networks. Proceedings of CATA-2009: The 24th International Conference on Computers and Their Applications, New Orleans, LA, April 8-10, 2009, ISCA Press, pp. 252 - 257.

El-Sheikh, E., Swain, B., and Khabou, M. (2008). A Comparison of Neural Network Architectures for Handwritten Digit Recognition. Proceedings of ICAI'08: The 2008 International Conference on Artificial Intelligence**,** Las Vegas, NV, July 14 – 17, 2008, CSREA Press, pp. 28-32.

El-Sheikh, E., Coffey, J., and White, L. (2008). Exploring the Use of Virtual Synchronous Sessions in an Online Foundational Programming Course. Proceedings of FECS'08: The 2008 International Conference on Frontiers in Education: Computer Science and Computer Engineering, Las Vegas, NV, July 14 – 17, 2008, CSREA Press, pp. 395-401.

El-Sheikh, E., and Becker, J. (2008). G-Bots: Intelligent Agents in a Complex Simulated Environment. Proceedings of WMSCI 2008: **The 12th World Multi-Conference on** Systemics, **Cybernetics and Informatics,** Orlando, FL, June 29 – July 2, 2008, IIIS Press, pp. 109-113.

El-Sheikh, E. (2008). Engaging Students in an Online Programming Course: Lessons Learned. Proceedings of EISTA 2008: **The 6th International Conference on Education and Information Systems, Technologies, and Applications**, Orlando, FL, June 29 – July 2, 2008, IIIS Press, pp. 37-41.

El-Sheikh, E., White, L., and Coffey, J. (2007). Reflections in Uncharted Waters: Teaching Foundational Programming Online. Proceedings of EISTA 2007: **The 5th International Conference on Education and Information Systems, Technologies and Applications**, Orlando, FL, July 12 – 15, 2007, IIIS Press, pp. 310-314.

El-Sheikh, E. and Stanny, C. (2007). Creating Institutional Structures to Promote, Reward, and Sustain Faculty Work on Assessment and Scholarship of Teaching and Learning. Proceedings of the 2007 Association of American Colleges and Universities (AAC&U) Conference, Savannah, GA, Nov. 1 – 3, 2007.

Coffey, J., El-Sheikh, E., and Redding, C. (2007). Barriers to Open-Source Software Migration: A Case Study from Higher Education. Proceedings of WMSCI 2007: **The 11th World Multi-Conference on Systemics, Cybernetics and Informatics**, Orlando, FL, July 8 – 11, 2007, IIIS Press, pp. 155-158.

Stanny, C. and El-Sheikh, E. (2007). Integrating Assessment and Faculty Development in a Teaching Center: Issues and Conflicts. Proceedings of the 2007 International Assessment and Retention Conference (IARC), St. Louis, MO, June 7 – 10, 2007.

Horsley, J., Wooten, M., and El-Sheikh, E. (2006). Shoechicken: An Intelligent System for Recommending RSS/Atom Content. Proceedings of the 21st International Conference on Computers And Their Applications (CATA), Seattle, WA, March 23 – 25, 2006, ISCA Press, pp. 206-210.

El-Sheikh, E. and Greene, M. (2005). A Program Visualization Tool for Learning Introductory Java Programming. Proceedings of FECS'05: The 2005 International Conference on Frontiers in Education: Computer Science and Computer Engineering, Las Vegas, NV, June 20 – 23, 2005, CSREA Press, pp. 48-54.

El-Sheikh, E., Taylor, L., Digman, M., and Carff, C. (2005). Using Interactive Learning Environments in the Introductory Computer Science Curriculum. FECS'05: The 2005 International Conference on Frontiers in Education: Computer Science and Computer Engineering, Las Vegas, NV, June 20 – 23, 2005, CSREA Press, pp.95-101.

Harrell, D., Bataineh, M., El-Sheikh, E., and Spolski, J. (2004). The Development of a Pre-College Engineering Curriculum for High School Students: Design and Implementation. Proceedings of FIE-2004: The 2004 Frontiers in Education Conference. October 20 – 23, Savannah, GA, IEEE Press, pp. F4D:1-5.

El-Sheikh, E. (2003). A Conceptual Problem-Based Learning Environment for Teaching Introductory Programming. Proceedings of FIE-2003: The 2003 Frontiers in Education Conference, November 5 – 8, Boulder, CO, IEEE Press, pp. T4C:28.

El-Sheikh, E. and Sticklen, J. (2003). Using Hierarchical Classification-Based Expert Systems to Support Tutoring. Proceedings of IC-AI'03: The 2003 International Conference on Artificial Intelligence. June 23 – 26, Las Vegas, NV. CSREA Press, pp. 636-642.

El-Sheikh, E. and Sticklen, J. (2002). A Task-Specific Architecture for the Generation of Intelligent Tutoring Systems. Proceedings of FLAIRS-2002: The 15th International Florida Artificial Intelligence Research Society Conference. May 14 – 16, Pensacola Beach, Florida. AAAI Press, pp. 294-298.

El-Sheikh, E. (1999). Development of a Methodology and Software Shell for the Automatic Generation of Intelligent Tutoring Systems from Existing Generic Task-based Expert Systems. AAAI-99: Sixteenth National Conference on Artificial Intelligence, SIGART/AAAI-99 Doctoral Consortium. Orlando, Florida, AAAI Press, pp. 945.

El-Sheikh, E., and Sticklen, J. (1999). Leveraging a Task-specific Approach for Intelligent Tutoring System Generation: Comparing the Generic Tasks and KADS Frameworks. IEA-AIE 1999: 12th International Conference on Industrial and Engineering Applications of Artificial Intelligence and Expert Systems, Cairo, Egypt, Springer-Verlag Press, pp. 809-819.

El-Sheikh, E. and Sticklen, J. (1998). Using a Functional Approach to Model Learning Environments. ECAI'98: European Conference on Artificial Intelligence Model Based Reasoning for Intelligent Education Environments Workshop, Brighton, UK, ECAI Press, pp. 30-40.

El-Sheikh, E., Bakowska, F., Penney, C., Liu, R., and Sticklen, J. (1997). Utilizing the WWW for Industrial Training. WebNet 97: World Conference of the WWW, Internet, and Intranet, Toronto, Canada, AACE Press, pp. 14.

El-Sheikh, E., Penney, C., Bakowska, F., Liu, R., Kamel, A., and Sticklen, J. (1997). Intelligent Tutoring for Polymer Composite Molding. 1997 Symposium on Low-Cost, High-Speed Polymer Composites Processing, Michigan State University, East Lansing, MI.

El-Sheikh, E., Penney, C., Liu, R., Kamel, A., McCullough, R. L., and Sticklen, J. (1997). Leveraging Computer Technology to Support Training in Liquid Molding Technologies for Polymer Composite Materials. NSF Engineering Education Innovators' Conference, Technology Reinvestment Project in Manufacturing Education and Training, Washington, DC.

El-Sheikh, E., Kamel, A., and Sticklen, J. (1996). An ITS Shell Leveraging the Generic Task Approach to Problem Solving. ITS'96: Third International Conference on Intelligent Tutoring Systems Workshop on Architectures and Methods for Designing Cost-Effective and Reusable ITSs, Montreal, Canada.

El-Sheikh, E., Sticklen, J., Kamel, A., and Schroeder, K. (1996). Neper Wheat: Integrating Expert Systems and Crop Modeling Technology. 6th International Conference on Computers in Agriculture, American Society of Agricultural Engineers, Cancun, Mexico.

Conference Presentations and Posters

Timm, M. and El-Sheikh, E. (2017). An Evaluation of Machine Learning Algorithms for Prediction of Shelter Animal Outcomes. The 32nd International Conference on Computers And Their Applications (CATA 2017). March 20 – 22, 2017, Honolulu, HI.

Useche, O. and El-Sheikh, E. (2016). An Intelligent Web-Based System for Measuring Students' Attention Levels. ICAI 2016: The 18th International Conference on Artificial Intelligence, July 25 – 28, 2016, Las Vegas, NV.

Baggs, J.P., Renner, M. and El-Sheikh, E. (2016). A Faster Alternative to Traditional A* Search: Dynamically Weighted BDBOP. ICAI 2016: The 18th International Conference on Artificial Intelligence, July 25 – 28, 2016, Las Vegas, NV.

Schneider, S. K., Bryan, L. K., Chung, H., El-Sheikh, E., Hays-Thomas, R., Thompson, C., Vaughan, P., & Walch, S. E. (May, 2016). *Development and revision of a reliable and valid faculty culture survey to measure advancement of women in the STEM disciplines.* 28th annual meeting of the Association for Psychological Science, May 2016, Chicago, IL.

Schneider, S. K., Bryan, L. K., Chung, H., El-Sheikh, E., Hays-Thomas, R., Thompson, C., Vaughan, P., & Walch, S. E. (May, 2016). *Development of a survey to measure faculty culture supportive of women scientists in ADVANCE Institutions.* 2016 NSF ADVANCE/GSE Program Workshop Broadening Participation: Research, Interventions, Impact, May 2016, Baltimore, MD.

Baggs, J. P., Renner, M. and El-Sheikh, E. (2016). Enhancing Path Finding in 3D Environments using Navigation Meshes and Hybrid Search Algorithms. 2016 Student Scholars Symposium, University of West Florida, Pensacola, FL, April 21, 2016.

Dhimal, P., Sanford, K. and El-Sheikh, E. (2016). Stock Predictor Using Machine Learning. 2016 Student Scholars Symposium, University of West Florida, Pensacola, FL, April 21, 2016.

Self, C., AI Research Group and El-Sheikh, E. (2016). Argonaut Tour-Bot: A Tour Robot for University of West Florida's Science and Engineering Building. 2016 Student Scholars Symposium, University of West Florida, Pensacola, FL, April 21, 2016.

Timm, M. and El-Sheikh, E. (2016). Animal ID: An Algorithmic Approach to Identifying Individual Animals in Images. 2016 Student Scholars Symposium, University of West Florida, Pensacola, FL, April 21, 2016.

Timm, M., White, T. and El-Sheikh, E. (2016). TourBot: Ultimate Robot Tour Guide of Building 4. 2016 Student Scholars Symposium, University of West Florida, Pensacola, FL, April 21, 2016.

Schneider, S. K., Bryan, L. K., Chung, H., El-Sheikh, E., Hays-Thomas, R., Thompson, C., Vaughan, P. & Walch, S. E. (March, 2016). *Updates on UWF Faculty Climate and Culture from the 2015 ADVANCE Faculty Culture Survey.* Poster presented at the 15th Annual Women's Studies Conference, March 2016, Pensacola, FL.

Useche, O. and El-Sheikh, E. (2015). An Intelligent System Framework for Measuring Attention Levels of Students in Online Course Environments. ICAI'15: The 17th International Conference on Artificial Intelligence, July 27 – 30, 2015, Las Vegas, NV.

Vaughan, P., Thompson, C., Howard, M., El-Sheikh, E., Schneider, S., Walch, E., Chung, H., Bauer, K., and Kantaras, I. (2015). Exploring Mentoring Considerations of Female STEM Faculty in Higher Education. 2015 National Science Foundation ADVANCE/GSE Program Workshop: *Broadening Participation through Innovations for Institutional and Educational Transformation*, Baltimore, MD, May 31 – June 2, 2015.

Vaughan, P., Thompson, C., Howard, M., El-Sheikh, E., Schneider, S., Walch, E., Chung, H., Bauer, K., and Kantaras, I. (2015). Exploring Mentoring Considerations of Female STEM Faculty in Higher Education. 2015 Faculty Research Showcase, University of West Florida, Pensacola, FL, April 23, 2015.

Mitchell, C., AI Research Group, and El-Sheikh, E. (2015). The Hemingway Effect: A Comparison of Artificial Intelligence and Machine Learning Methods. 2015 Student Scholars Symposium, University of West Florida, Pensacola, FL, April 23, 2015.

El-Sheikh, E., Molek, E., Chung, H. (2014). Faculty-led Strategies for Advancing Undergraduate STEM Education: Best Practices and Lessons Learned. 2014 AAC&U PKAL Conference:

Transforming STEM Higher Education Conference, Nov. 6 – 8, 2014, Atlanta, GA.

Gonen, B., Fang, X., El-Sheikh, E., Bagui, S., Wilde, N., Zimmermann, A., and Petrov, I. (2014). Maintaining SOA Systems of the Future: How Can Ontological Modeling Help? KEOD 2014: The International Conference on Knowledge Engineering and Ontology Development, October 21 – 24, 2014, Rome, Italy.

Maestre, A. and El-Sheikh, E. (2014). A Comparison of Machine Learning Techniques for the Generation of River and Stream Water Quality Estimates. ICAI'14: The 2014 International Conference on Artificial Intelligence, July 21 – 24, 2014, Las Vegas, NV.

Rowberry, B., AI Research Group, and El-Sheikh, E. (2014). Race to the Finish: A Comparison of AI Search, Navigation, and Pathfinding Algorithms. 2014 Student Scholars Symposium, University of West Florida, Pensacola, FL, April 24, 2014.

Gonen, B., Fang, X., El-Sheikh, E., Bagui, S., and Wilde, N. (2014). Semantic Traversing Documents by Using Semantic Relationships. 2014 Faculty Research Showcase, University of West Florida, Pensacola, FL, April 24, 2014.

Wilde, N., Coffey, J., White, L., Snider, D., Reichherzer, T., El- Sheikh, E., and Gonen, B. (2014). A Knowledge Engineering, Team-Based Approach to Introducing Security Assurance Cases. 2014 Faculty Research Showcase, University of West Florida, Pensacola, FL, April 24, 2014.

Schneider, S., Bryan, L., El-Sheikh, E., Hays-Thomas, R., Vaughan, P., and Walch, E. (2014). Development of a Reliable and Valid Faculty Culture Survey for ADVANCE Grant Institutions. 2014 Faculty Research Showcase, University of West Florida, Pensacola, FL, April 24, 2014.

El-Sheikh, E., Bagui, S., Firesmith, D., Petrov, I., Wilde, N., Zimmermann, A. (2013). Towards Semantic-Supported SmartLife System Architectures for Big Data Services in the Cloud. The Fifth International Conferences on Advanced Service Computing, May 27 – June 1, Valencia, Spain.

Stephen, D., Haynes, A., and El-Sheikh, E. (2013). Wernicke: Natural Language Processing for Home Automation. 2013 Student Scholars Symposium, University of West Florida, Pensacola, FL, April 25, 2013.

McGraw, B. and El-Sheikh, E. (2013). Integrating Reinforcement Learning with Communication for Multi-Agent Systems. 28th International Conference on Computers And Their Applications (CATA 2013), March 4 – 6, 2013, Honolulu, HI.

Schneider, S., Koppes Bryan, L., El-Sheikh, E., Hays-Thomas, R., Vaughan, P., and Walch, S. (2013). Development of a Reliable and Valid Faculty Culture Survey for ADVANCE Grant Institutions. 2013 NSF ADVANCE Program Workshop, March 3 – 5, 2013, Washington, DC.

Jackson, R. and El-Sheikh, E. (2012). A Case Study Building a Web-Based Dietitian Expert System. ICAI'12: The 2012 International Conference on Artificial Intelligence, July 16 – 19, 2012, Las Vegas, NV.

El-Sheikh, E. and Lanier, G. (2012). Promoting High-Impact Practices and Student Success: Models for Faculty Development and Reward. AAC&U Student Success: Pushing Boundaries, Raising Bars Conference, Seattle, WA, March 22 – 24, 2012.

McCarthy, J. M. and El-Sheikh, E. M. (2011). Image Generation and Analysis for the Android Platform: Exploring Computer Vision in Mobile Development Environments. IPCVI'11: The 2011 International Conference on Image Processing, Computer Vision, and Pattern Recognition**,** Las Vegas, NV, July 18 – 21, 2011.

Broxton, T. and El-Sheikh, E. (2011). Implementing Swarm Intelligence for Solving Complex Problems. 2011 Student Scholars **Symposium**, University of West Florida, Pensacola, FL, April

21, 2011.

Connor, J. and El-Sheikh, E. (2011). Let's Make Music: Generating Music Using Artificial Intelligence. 2011 Student Scholars **Symposium**, University of West Florida, Pensacola, FL, April 21, 2011.

Davis, J., Ruble, A., and El-Sheikh, E. (2011). Very Intelligent STock Analyzer (VISTA). 2011 Student Scholars **Symposium**, University of West Florida, Pensacola, FL, April 21, 2011.

Dimmig, T., Lorenz, J., and El-Sheikh, E. (2011). Autonomous Virtual Rover: Using AI to Navigate and Survive in Unknown Terrain. 2011 Student Scholars **Symposium**, University of West Florida, Pensacola, FL, April 21, 2011.

King, A. and El-Sheikh, E. (2011). Optimizing Best-Case Performance in WoW Using AI. 2011 Student Scholars **Symposium**, University of West Florida, Pensacola, FL, April 21, 2011.

McConaghy, P., Graves, J., Brown, P., Brewster, T., and El-Sheikh, E. (2011). Argos Glest: Ambitious AI Automating Annihilation (Intelligent Game Play Using AI). 2011 Student Scholars **Symposium**, University of West Florida, Pensacola, FL, April 21, 2011.

Ramirez, Z. and El-Sheikh, E. (2011). An AI Framework for Maze Navigation in Robotic Environments. 2011 Student Scholars **Symposium**, University of West Florida, Pensacola, FL, April 21, 2011.

El-Sheikh, E. M., Perez, C. A., and Glymour, C. (2010). Using Causal Modeling for Determining Connectivity among Brain Regions. ICAI'10: The 2010 International Conference on Artificial Intelligence**,** Las Vegas, NV, July 12 – 15, 2010.

McCarthy, J. M. and El-Sheikh, E. M. (2010). A Cooperative-Agent Architecture for Managing Large Document Collections in Corporate Intranets. ICAI'10: The 2010 International Conference on Artificial Intelligence**,** Las Vegas, NV, July 12 – 15, 2010.

Corliss, J. and El-Sheikh, E. M. (2010). An Intelligent System for Network Traffic Flow Analysis. ICAI'10: The 2010 International Conference on Artificial Intelligence**,** Las Vegas, NV, July 12 – 15, 2010.

Calvo, C. L. and El-Sheikh, E. (2010). Analysis of the A* Search Algorithm: Using AI to Improve Search Effectiveness. SEASTARS 2010: The 7th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 15, 2010.

Cantero, F. M. and El-Sheikh, E. (2010). Can your Robot Move? Navigation and Obstacle Avoidance. SEASTARS 2010: The 7th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 15, 2010.

Corliss, J. and El-Sheikh, E. (2010). Intelligent Network Traffic Flow Analysis: the "Brains" of the System. SEASTARS 2010: The 7th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 15, 2010.

Kedambadi, R. and El-Sheikh, E. (2010). Improving the Efficiency of Probabilistic Reasoning. SEASTARS 2010: The 7th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 15, 2010.

McCarthy, J. and El-Sheikh, E. (2010). A Cooperative Intelligent Agent Architecture for Enterprise Search. SEASTARS 2010: The 7th Annual **Scholars of Engineering, Applied Sciences**

& Technology Annual Research Symposium, University of West Florida, Pensacola, FL, April 15, 2010.

Stanny, C. and El-Sheikh, E. (2009). Strategies for Effective Use of Technology to Promote Faculty Development. The 2009 Southern Association of Colleges and Schools Commission on Colleges (SACS-CoC) Annual Meeting, Atlanta, GA, December 5 – 8, 2009.

El-Sheikh, E. and Swain, B. (2009). A Geospatial Natural Language-Based Path Understanding System. ICAI'09: The 2009 International Conference on Artificial Intelligence**,** Las Vegas, NV, July 13 – 16, 2009.

Wells, D. L., El-Sheikh, E. M., Sutton, M. A., Di Santo, V., and Bennett, W. A. (2009). Automated Image Processing of X-Radiographics of Digestion in Stingrays. ICAI'09: The 2009 International Conference on Artificial Intelligence**,** Las Vegas, NV, July 13 – 16, 2009.

Perez, C. and El-Sheikh, E. (2009). Learning and Representing Causal Relationships with Bayesian Networks. CATA-2009: The 24th International Conference on Computers and Their Applications, New Orleans, LA, April 8-10, 2009.

Carff, J., El-Sheikh, E. M., Johnson, M., and Pratt, J. E. (2009). A Human-Robot Team Navigation System for Complex Environments. SEASTARS 2009: The 6th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 16, 2009.

Perez, C. and El-Sheikh, E. M. (2009). Learning and Representing Causal Relationships with Bayesian Networks. SEASTARS 2009: The 6th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 16, 2009.

Perez, C., El-Sheikh, E. M., and Glymour, C. (2009). Discovering Causal Connections between Brain Regions from Functional MRI Data. SEASTARS 2009: The 6th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 16, 2009.

Swain, B. A. and El-Sheikh, E. M. (2009). Where Do We Go From Here? An Approach and System for Path Understanding Using Geospatial Natural Language. SEASTARS 2009: The 6th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 16, 2009.

Wells, D. L., El-Sheikh, E. M., Sutton, M. A., Di Santo, V., and Bennett, W. A. (2009). An Application for Automated Image Processing of Stingray Digestion X-Rays. SEASTARS 2009: The 6th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 16, 2009.

Stanny, C., El-Sheikh, E., and Chung, H. M. (2009). Getting Started with an SoTL Project. 2009 UWF Spring Mini-Conference on Best Practices for the Scholarship of Teaching and Learning (SoTL), University of West Florida, Pensacola, FL, February 27, 2009.

Stanny, C., Hurd, J., and El-Sheikh, E. (2008). Strategies for Assessing the Impact of a Quality Enhancement Plan. The 2008 Southern Association of Colleges and Schools Commission on Colleges (SACS-CoC) Annual Meeting, San Antonio, TX, December 6 – 9, 2008.

El-Sheikh, E., Swain, B., and Khabou, M. (2008). A Comparison of Neural Network Architectures for Handwritten Digit Recognition. Presented at ICAI'08: The 2008 International Conference on Artificial Intelligence**,** Las Vegas, NV, July 14 – 17, 2008.

El-Sheikh, E., Coffey, J., and White, L. (2008). Exploring the Use of Virtual Synchronous Sessions

in an Online Foundational Programming Course. Presented at FECS'08: The 2008 International Conference on Frontiers in Education: Computer Science and Computer Engineering, Las Vegas, NV, July 14 – 17, 2008.

El-Sheikh, E., and Becker, J. (2008). G-Bots: Intelligent Agents in a Complex Simulated Environment. Presented at WMSCI 2008: **The 12th World Multi-Conference on** Systemics, **Cybernetics and Informatics,** Orlando, FL, June 29 – July 2, 2008.

El-Sheikh, E. (2008). Engaging Students in an Online Programming Course: Lessons Learned. Presented at EISTA 2008: **The 6th International Conference on Education and Information Systems, Technologies, and Applications**, Orlando, FL, June 29 – July 2, 2008.

Swain, B., El-Sheikh, E., and Khabou, M. (2008). Recognize This! A Neural Network-Based Recognizer of Handwritten Digits. SEASTARS 2008: The 5th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 14, 2008.

Becker, J. and El-Sheikh, E. (2008). G-Bots: Artificial Intelligence for a Simulated Environment of Gravitation and Newtonian Physics. SEASTARS 2008: The 5th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 14, 2008.

El-Sheikh, E. and Stanny, C. (2007). **Using Assessment Practices to Promote the Scholarship of Teaching and Learning.** 2007 UWF Fall Mini-Conference on Best Practices for Face-to-Face and Online Learning: Promoting Active Learning and Student Engagement, University of West Florida, November 8, 2007.

El-Sheikh, E. and Stanny, C. (2007). Creating Institutional Strategies to Promote, Reward, and Sustain Faculty Work on Assessment and Scholarship of Teaching and Learning. The Association of American Colleges and Universities Conference (AAC&U): Network for Academic Renewal, Savannah, GA, Nov. 1 – 3, 2007.

El-Sheikh, E. (2007). Faculty Development Activities and Services of the Center for University Teaching, Learning, and Assessment. Employee Excellence Program, University of West Florida, Pensacola, FL, October 19, 2007.

El-Sheikh, E., White, L., and Coffey, J. (2007). Reflections in Uncharted Waters: Teaching Foundational Programming Online. EISTA 2007: **The 5th International Conference on Education and Information Systems, Technologies and Applications**, Orlando, FL, July 12 – 15, 2007.

Stanny, C. and El-Sheikh, E. (2007). Integrating Assessment and Faculty Development in a Teaching Center: Issues and Conflicts, 2007 International Assessment and Retention Conference (IARC), St. Louis, MO, June 7 – 10, 2007.

El-Sheikh, E. and Greene, M. (2005). A Program Visualization Tool for Learning Introductory Java Programming. Presented at FECS'05 - The 2005 International Conference on Frontiers in Education: Computer Science and Computer Engineering, Las Vegas, NV, June 20 – 23, 2005.

El-Sheikh, E., Taylor, L., Digman, M., and Carff, C. (2005). Using Interactive Learning Environments in the Introductory Computer Science Curriculum. Presented at FECS'05 - The 2005 International Conference on Frontiers in Education: Computer Science and Computer Engineering, Las Vegas, NV, June 20 – 23, 2005.

El-Sheikh, E., Taylor, L., Digman, M., and Carff, C. (2005). A Concept-Based Tutoring Environment for Object-Oriented Programming. Presented at SEASTATRS: The 2nd Scholars of Engineering, Applied Sciences, and Technology Annual Research Symposium, University of West

Florida, Pensacola, FL, April 19, 2005.

El-Sheikh, E. (2003). A Conceptual Problem-Based Learning Environment for Teaching Introductory Programming. Presented at FIE-2003: The 2003 Frontiers in Education Conference. November 5 – 8, Boulder, CO.

El-Sheikh, E. (2003). Using Hierarchical Classification-Based Expert Systems to Support Tutoring. Presented at IC-AI'03: The 2003 International Conference on Artificial Intelligence. June 23 – 26, Las Vegas, NV.

El-Sheikh, E. (2002). Generating Intelligent Tutoring Systems from Reusable Components and Knowledge-Based Systems. Presented at ITS-2002: The Sixth International Intelligent Tutoring Systems Conf. June 5-7, Biarritz, France.

El-Sheikh, E. (2002). A Task-Specific Architecture for the Generation of Intelligent Tutoring Systems. Presented at FLAIRS-2002: The 15th International Florida Artificial Intelligence Research Society Conference. May 14 – 16, Pensacola Beach, Florida.

El-Sheikh, E. (1999). Development of a Methodology and Software Shell for the Automatic Generation of Intelligent Tutoring Systems from Existing Generic Task-based Expert Systems. Presented at AAAI-99: Sixteenth National Conference on Artificial Intelligence, SIGART/AAAsI-99 Doctoral Consortium. Orlando, Florida.

El-Sheikh, E. (1998). Using a Functional Approach to Model Learning Environments. Presented at ECAI'98: European Conference on Artificial Intelligence Model Based Reasoning for Intelligent Education Environments Workshop, Brighton, UK.

El-Sheikh, E. (1998). A Framework for Developing Intelligent Tutoring Systems Incorporating Reusability. Presented at IEA-AIE-98: 11th International Conference on Industrial and Engineering Applications of Artificial Intelligence and Expert Systems, Benicassim, Castellon, Spain.

El-Sheikh, E. (1997). Utilizing the WWW for Industrial Training. Presented at WebNet 97: World Conference of the WWW, Internet, and Intranet, Toronto, Canada.

El-Sheikh, E. (1997). Intelligent Tutoring for Polymer Composite Molding. Presented at 1997 Symposium on Low-Cost, High-Speed Polymer Composites Processing, Michigan State University, East Lansing, MI.

El-Sheikh, E. (1996). An ITS Shell Leveraging the Generic Task Approach to Problem Solving. Presented at ITS'96: Third International Conference on Intelligent Tutoring Systems Workshop on Architectures and Methods for Designing Cost-Effective and Reusable ITSs, Montreal, Canada.

Invited Talks and Panels

El-Sheikh, E. A Panel Discussion on Cybersecurity Workforce Development, 2017 Florida International Summit, Tampa, FL, February 2, 2017.

El-Sheikh, E. Building Bridges & Pathways – Innovative Solutions for Expanding the Cybersecurity Workforce, Panel Discussion at the Florida Center for Cybersecurity Third Annual Conference, Tampa, FL, October 25, 2016.

El-Sheikh, E. Women in Cybersecurity, Panel Discussion at ITEN Wired, Pensacola Beach, FL, October 11, 2016.

El-Sheikh, E. Strategy for Northwest Florida's Future – Talent Development, Panel Discussion at Gulf Power 2016 Economic Symposium, Panama City, FL, October 3, 2016.

El-Sheikh, E. The Future of Cybersecurity Education, Panel Discussion at SAM 2016: 15th International Conference on Security and Management, Las Vegas, NV, July 25 – 28, 2016.

El-Sheikh, E. Cybersecurity Education and Workforce Development, Panel Discussion at CyberThon 2016, Pensacola, FL, January 23, 2016.

El-Sheikh, E. Accelerating Cybersecurity Practitioner Skills Development – The Nexus of Education & Training, Panel Discussion at the National Initiative for Cybersecurity Education (NICE) 2015 Conference, San Diego, CA, November 4, 2015.

El-Sheikh, E. Undergraduate Research as a High Impact Practice, Invited Presentation, University of West Florida Office of Undergraduate Research Faculty Workshop, Pensacola, FL, October 2, 2015.

Lean In: Women, Work and the Will to Lead – A Panel Discussion. University of West Florida, Pensacola, FL, September 25, 2014.

El-Sheikh, E. Women in Computer Science, PSY4991: Women in Science, University of West Florida, Pensacola, FL, April 11, 2012.

El-Sheikh, E. Mentoring Undergraduate Students in Research, CUTLA Workshop, March 11, 2011.

El-Sheikh, E. Women in Computer Science, EXP4990: Women in Science, University of West Florida, Pensacola, FL, February 9, 2011.

Conferences, Symposia and Workshops Organized

Co-Coordinator, STEM Retention Workshop University of West Florida, Pensacola, FL, February 28, 2014.

Co-Coordinator, 2013 UWF Scholars Week and NSF ADVANCE Annual Showcase, University of West Florida, Pensacola, FL, April 23 – 26, 2013.

Coordinator, SEASTARS 2010: UWF 7th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 15, 2010.

Coordinator, SEASTARS 2009: UWF 6th Annual **Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium**, University of West Florida, Pensacola, FL, April 16, 2009.

Organizer and facilitator, 2009 UWF Spring Mini-Conference on Best Practices for the Scholarship of Teaching and Learning (SoTL), University of West Florida, Pensacola, FL, February 27, 2009.

Organizer and facilitator, 2008 UWF Fall Mini-Conference on Best Practices for Student Engagement in Face-to-Face and Online Courses, University of West Florida, Pensacola, FL, October 3, 2008.

Organizer and facilitator, 2008 UWF Spring Mini-Conference on Best Practices for Assessment and Curricular Reform, University of West Florida, Pensacola, FL, February 29, 2008.

Organizer and facilitator, 2007 UWF Fall Mini-Conference on Best Practices for Face-to-Face and Online Learning: Promoting Active Learning and Student Engagement, University of West Florida, Pensacola, FL, November 8, 2007.

Organizer and facilitator, 2007 UWF Spring Mini-Conference on Best Practices for Active Learning and Student Engagement, University of West Florida, Pensacola, FL, March 2, 2007.

Technical Reports

El-Sheikh, E. **Building Institutional Programs to Advance Science and Engage Learners through Multi-Disciplinary Strategies and Community Outreach**.

El-Sheikh, E., and Perkins, A. Developing an Intelligent Search-Based File Transfer Application.

Dissertation

El-Sheikh, E. (2002). An Architecture for the Generation of Intelligent Tutoring Systems from Reusable Components and Knowledge-Based Systems. Ph.D. Dissertation, Michigan State University, East Lansing, MI.

Research Activities

Faculty Advisor, AI Research Group & Lab, UWF, Spring 2010 – present.

Launched and currently serve as the faculty advisor for the AI Research Group to promote interest and develop expertise in AI research among undergraduate and graduate students.

Member, Service-Oriented Architecture Research Group, UWF, 2011 – 2016.

Research Grants and Proposals

Funded

PI, 2017 NSA CAE Cybersecurity Expansion Program, Total budget: $195,071.

PI, 2017 NSA CAE Regional Center for South East Region, Total budget: $196,829.

PI, 2017 NSA CyberSecurity Core Curriculum Development, Secure Development for Software and Industrial Control Systems, Total budget: $176,922.

PI, 2017 Florida Cyber Pathways, Florida Center for Cybersecurity, Total budget: $93,127.

PI, 2017 NSA GenCyber Program, Pathways to Cyber, Total budget: $89,150.

PI, 2016 Pathway to Cyber Program, Florida Center for Cybersecurity, Total budget: $30,000.

PI, NSF ADVANCE Program Award, Title: "Enhancing the Culture for Recruiting, Retaining and Advancing Women in STEM," 2011 – 2017, Total budget: $598,354.

PI, Advancing STEM at UWF: Improving Retention, Faculty Development and Visibility for STEM Programs. 2013 Pace Academic Development Award Proposal, Total budget: $20,700.

PI, Intelligent Learning Environment for Foundational Computer Science Topics, Research and Sponsored Programs, University of West Florida, September 2012 – August 2013, Total budget: $7,297.

Co-PI, A Knowledge Engineering, Team-Based Approach to Introducing Security Assurance Cases, Snider, D., Coffey, J., El-Sheikh, E., Gonen, B., Reichherzer, T., White, L., Wilde, N., Northrop Grumman Corporation via the Security and Software Engineering Research Center (S2ERC), January – December 2013, $22,050.

Co-PI, Knowledge Modeling for Supporting Program Comprehension, Reichherzer, T., Coffey, J., El-Sheikh, E., White, L., Wilde, N. Blue Cross Blue Shield Association via the Security and Software Engineering Research Center (S2ERC), December 2011 – August 2013. $23,315

PI, 2011 UWF Instructional Technology Enhancement Program, Title: "An Intelligent Learning Environment for Computer Science Foundations and Outreach Activities to Support Student Engagement, Recruitment, and Retention," Total budget: $21,900.

Co-PI, 2011 UWF Instructional Technology Enhancement Program, Title: "Enhancement and Adaptation of the TellusPoint™ Platform for Undergraduate Education in the Humanities and Sciences," Total budget: $33,780.

2007 Summer Research Award, Research and Sponsored Programs Office, University of West Florida, Title: "Adapting Problem-Based Learning for Computer Science Education: A Collaborative Approach for Teaching Foundational Programming."

2005 Graduate Research Assistantship Award, Office of Research and Graduate Studies, University of West Florida, Title: "Using Problem-Based Learning in Computer Science Education."

2004 Summer Research Award, Office of Research and Graduate Studies, University of West Florida, Title: "Development of an Adaptive Tutoring System for Teaching Object-Oriented Programming."

2003/2004 Scholarly and Creative Activity Faculty Award, Office of Research and Graduate Studies, University of West Florida.

National Alumni Association Faculty Grant, University of West Florida, Fall 2003.

2003 Summer Research Award, Office of Research and Graduate Studies, University of West Florida.

2002 Summer Research Award, College of Arts and Sciences, University of West Florida.

2002 Enhancing Teaching and Learning with Technology Award, Center for University Teaching and Learning, University of West Florida.

Submitted / Under Review

Co-PI, 2016 Florida Center for Cybersecurity Seed Grant Program, "Malware Detection Tool for Linux Data structure using Machine Learning," Total budget: $67,928.

Co-PI, Florida Regional Alliances and Multistakeholder Partnerships to Stimulate Cybersecurity Training and Workforce Development, 2016 NIST RAMPS Program, Total budget: $200,000.

PI, Pathway to Cyber Program, 2016 NSA/NSF GenCyber Program, Total budget: $70,640.

Co-PI, REU Site: Cybersecurity and Large Scale Data Analytics, 2014 NSF CISE REU Program, Total budget: $286,822.

Co-PI, Integrating Research Experiences in UWF Courses to Increase Student Retention and Success. 2014 Pace Academic Development Award Proposal, Total budget: $26,000.

Co-PI, First Year Interdisciplinary Applied Research Course. 2014 Pace Academic Development Award Proposal, Total budget: $19,970.

PI, 2014 PKAL TIDES Program, "Paving Pathways to Computer Science: A Two-Course Approach to Increase Diversity, Recruitment and Retention", Budget: $276,253.

Co-PI, 2012 Dept. of Education Strengthening Institutions Program. Title: UWF STEM Scholars, Budget: $2,002,324.

Co-PI, 2012 NSF Computing Education for 21st Century Program. Title: Robotic Interactive Learning Environments, Approximate budget: $600,000.

Co-PI on proposal submitted to 2011 Next Generation Learning Challenges Wave 2 Program, Title: "iShareHistory: An Adaptive and Transformative Model for Improving College Readiness and Completion," Total budget: $250,000, Pre-proposal was one of 40 out of 240 selected nationally for the final round.

Lead PI on proposal submitted to 2007 UWF Pace Academic Development Fund, Title: "A Program to Increase Enrollment and Retention of Women in the University of West Florida's Computing Disciplines," Total budget: $25,845.

Co-PI on proposal submitted to 2007 NSF Broadening Participation in Computing Program, Title: "Outreach, Curriculum, and Culture Change (OC-cubed): A Program to Increase Enrollment and Retention of Women in Computing Disciplines," Total budget: $212,161.

Co-PI on proposal submitted to 2005 NSF Research on Learning and Education Program, Title: "Improving STEM Learning Outcomes and Evaluation with LEO: A Learning Environment Organizer," Total budget: $657,008.

Lead PI on proposal submitted to 2004 NSF Course, Curriculum, and Laboratory Improvement Program – Adaptation and Implementation Track, Title: "Adapting Problem-Based Learning for Computer Science Education: An Integrated Approach for Teaching Foundational Programming," Total budget: $199,996.

Teaching Experience

University of West Florida
Taught and developed course materials for:

CAP4601 Artificial Intelligence
Developed and taught a new undergraduate Computer Science course, which is designed to give students an introduction to core AI principles, programming techniques, and applications.

CAP4053 AI Programming for Interactive Environments
Developed and taught a new undergraduate Computer Science course, which is a follow-up course to CAP4601 to give students additional experience in using AI techniques for developing interactive environments including games, simulations, and educational environments.

COP2253 Java Programming (face-to-face and online)
A foundational programming course for the CS, CIS, and IIT programs that focuses on foundational object-oriented programming skills using Java.

COP2334 C++ Programming
A required course for CIS and IIT programs that focuses on core C++ programming skills.

COP4020 Programming Languages (face-to-face and online)
A core course for CS, CIS, and IIT programs that addresses design and implementation of a programming language and surveys various programming paradigms, including procedural, object-oriented, functional, and rule-based languages.

COP4331 & COP4331L Object-Oriented Programming & OOP Lab
An upper-level required course for CS students that focuses on the analysis, design, and

development of object-oriented systems.

COP4601 Software Systems
An upper-level project-based elective for CS and CIS programs that focuses on issues related to developing a large-scale software system, including software engineering, technical skills, and project management.

COP4905/CAP4905 Directed Study
COP4905 and CAP4905 are upper-level electives for the CS and CIS programs. I supervised several students towards the development and evaluation of intelligent, large-scale software systems.

CAP5600 Artificial Intelligence (face-to-face and hybrid)
A required graduate course for CS students and an elective for SE students that focuses on foundational AI topics including AI theory, search techniques, knowledge representation and reasoning, machine learning, and applications.

CEN6930 Advanced Topics in Software Engineering
An elective for the CS and SE graduate programs. I supervised a graduate student on a software engineering project focusing on the development of an intelligent agent-based system for news content recommendation.

COT6931 Computer Science Project
A project-based capstone course for CS graduate students. I supervised several graduate students on computer science projects focusing the application and integration of artificial intelligence principles and techniques for the development of intelligent and agent-based software systems.

CIS6971 Computer Science Thesis
A thesis-based capstone course for CS graduate students. I supervised a graduate student on a thesis focusing on real-world route reconstruction from natural language-based path descriptions. I supervised another graduate student, whose thesis focused on the use of causal modeling to discover effective connectivity among brain regions.

CEN5915 Graduate CS Research and COP5905/COP6905 Directed Study
Electives for the CS and SE graduate programs. I supervised several graduate students in researching current issues in artificial intelligence and interactive learning environments, and towards developing related software systems.

Doctoral Dissertation Committees

John Bolyard

Master's Projects and Theses Supervised

Brett Rowberry (2015). An Intelligent iOS Application for People Counting.

Omer Useche (2015). An Intelligent System for Measuring Attention Levels of Students in Online Course Environments.

Alexander Maestre (2013). Machine Learning Tool for Weighted Regressions in Time, Discharge, and Season.

Ben McGraw (2012). Integrating Reinforcement Learning with Communication for Multi-Agent Systems.

Renee Carnley (2012). Using Data Mining with Bayesian Learning to Analyze Lottery Numbers.

Steven Satterfield (2012). The Application of Structural Case-Based Reasoning to Activity

Recognition in the Smart Home (committee member).

Jose R. Fernandez (2011). CluSandra: A Framework and Algorithm for Data Stream Cluster Analysis.

Robert Jackson (2011). A Case Study Building a Web-Based Dietitian Expert System.

John McCarthy (2011). Image Generation and Analysis for the Android Platform: Exploring Computer Vision in Mobile Development Environments.

Carlos Perez (2009). Discovering Causal Relationships from fMRI Data.

Bradley Swain (2009). Path Understanding using Geospatial Natural Language.

John Carff (2009). Human Robot Team Navigation.

Daniel Wells (2009). Automated Image Processing of X-Radiographics of Digestion in Stingrays.

Joel Becker (2008). G-Bots: Intelligent Agents in a Complex Simulated Environment

Michael Wooten (2006). An Intelligent System for Recommended RSS/Atom Content.

Undergraduate and Graduate Capstone Projects and Directed Studies

John Baggs
Chad Carff
John Carff
Matthew Digman
Matthew Kirkland
James Horsley
Jeff Hunter
Carlos Perez
James Spencer
Douglas Stephen
Bradley Swain
Laura Taylor
Mikayla Timm
Stephen Weathers
Michael Wooten

Michigan State University

CSE131 Introduction to Technical Computing (taught and developed materials)
A lower-level university-wide requirement that focuses on basic programming and problem solving skills.

CSE440 Introduction to Artificial Intelligence (teaching assistant and lab instructor)
An upper-level elective for CS students that focuses on the foundations of AI including theoretical issues and applications.

CSE449 Senior AI Capstone (teaching assistant and lab instructor)
A senior project-based capstone project that allows students to use their knowledge and skills to develop a software system for a real-world problem.

Service

Departmental Service

Member, ABET Committee, Spring 2016 – present

Member, Ph.D., Intelligent Systems Committee, 2016-17

Member, Cyber Security Faculty Search Committee, Fall 2013 – present

Member, Cyber Security Program Development Team, Spring 2013 – Spring 2014

Member, Faculty Mentoring Committee, Fall 2012 – present

Member, Office Assistant Search Committee, Summer 2012

Member, Faculty Search Committee, Spring 2012 – present

Member, Advisor Search Committee, Spring 2012

Chair/Member, Assessment Committee, Fall 2008 – present

Assessment Coordinator, Spring 2004 – Summer 2008

Member, Tenure and Promotion Committee, Fall 2009 – present

Member, Computer Science Recruitment and Outreach Committee, Fall 2008 – Spring 2012

Member, Computer Science Curriculum Committee, Fall 2001 – present

Member, Scholarship Committee, Spring 2002 – Spring 2013

Member, Chair Search Committee, Spring 2005

Member, Online Working Group, Spring 2005

Course Coordinator for COP2253: Java Programming, Fall 2001 – Spring 2009

Course Coordinator for COP2334: C++ Programming, Fall 2002

Member, Ad Hoc Curriculum Design Group, 2001 – 2002

College and University Service

Chair, Cybersecurity Steering Committee, Fall 2015 – present

Co-Chair, Cybersecurity Chairs Group, Fall 2015 – present

Chair, CAE Work Group, Fall 2015 – present

Chair/Member, Distinguished Faculty Service Award Selection Committee, 2014 – 2016

Chair, CSEH Marketing Coordinator Search Committee, Spring 2015

Member, CSEH Office Administrator Search Committee, Spring 2015

Member, Graduation Intervention Work Group, Fall 2014 – Summer 2015

Member, 50th Anniversary Celebration Academic Experiences Committee, Fall 2014 – Spring 2015

Judge, Student Scholars Symposium, Spring 2015 – present

Judge, Northwest Florida Regional Science Fair, Fall 2014 – present

Co-Chair, IT Performance Funding Faculty Work Group, Spring 2013 – Summer 2013

Chair, CAS Chairs Mentoring Group, Fall 2012 – Spring 2013

Member, Chairs Handbook Work Group, Fall 2012 – Spring 2013

Member, Assistant Vice President for Enrollment Management Search Committee, Spring 2013

Member, Graduate Thesis Supervision Task Force, Fall 2012 – Spring 2014

Chair, External Advisory Board, NSF ADVANCE Program, Fall 2012 – present

Chair, Internal Steering Committee, NSF ADVANCE Program, Fall 2011 – present

Chair and Coordinator, STEM Steering Committee, Spring 2012 – Spring 2015

Co-Coordinator, Northwest Florida Regional Science Olympiad, Spring 2012

Member, CAS Administrative Assistant Search Committee, Fall 2012

Member, Faculty Search Committee, School of Psychological and Behavioral Sciences, Spring 2012

Member, Professional Education Council, Fall 2011 – Spring 2013

Member, Responsible Conduct of Research Task Force, Spring 2011

Member, Graduate School Administrative Assistant Search Committee, Spring 2011

Member, SACS Fifth-Year Compliance Report Committee, Fall 2010 – Spring 2011

Member, Web Advisory Committee, Fall 2010 – present

Member, Academic Programs Assessment Council, Spring 2010 – Spring 2015

Member, Graduate Council, Fall 2009 – Fall 2013

Member, Academic Appeals Committee, Fall 2009 – Spring 2015

Member, CUTLA Advisory Board, Fall 2009 – Spring 2015

Coordinator, Research Connections Program, Fall 2009 – Spring 2015

Co-Coordinator, Teaching Partners Program, Fall 2008 – Spring 2010

Judge, BEST Robotics Competition, 2008 – 2014

Member, School of Science and Engineering Building Grand Opening Planning Committee, Spring 2009 – Spring 2010

Member, Dean of Libraries Search Committee, Summer – Fall 2009

Member, Associate Vice President for Diversity and International Studies Search Committee, Spring 2009

Volunteer, Explore UWF Open House, Spring 2002 – present

Coordinator, Scholarship of Teaching and Learning Interest Group, Fall 2007 – Spring 2009

Member, Quality Enhancement Plan Evaluation Committee, Spring 2007 – Spring 2013

Member, College of Arts and Sciences SEASTARS (Scholars of Engineering, Applied Sciences & Technology Annual Research Symposium) Advisory Committee, Spring 2007 – Spring 2008

Member, University Planning Council, UWF, Fall 2003 – Spring 2006

Member and Co-Chair, UPC Marketing, Enrollment Growth and Retention Committee, Fall 2003 – Spring 2006

Chair, International Affairs Committee, Fall 2004 – Spring 2006

Member, International Affairs Committee, Fall 2003 – Spring 2006

Volunteer, UWF Faculty Phone-a-thon, Spring 2003, Spring 2004

Volunteer, UWF Majors Fair, Spring 2003, Spring 2004

Volunteer, UWF Career Fair, 2002 – present (employer recruitment, student awareness, etc.)

Lead Judge, Annual Florida Panhandle Science and Engineering Fair, UWF, 2002

Community and Professional Service

Chair, FC2 State University System Cybersecurity Curriculum Committee, Spring 2015 – present

Volunteer/mentor, CyberThon, 2016 – present

Mentor, local area high school students, 2002 – present

Program Committee Member, SAM 2017: 16th International Conference on Security and Management, Las Vegas, NV, July 17 – 20, 2017.

Program Committee Member, SAM 2016: 15th International Conference on Security and Management, Las Vegas, NV, July 25 – 28, 2016.

Program Committee Member, IDEA 2016: 2nd International Workshop on Digital Enterprise Architecture and Engineering, Leipzig, Germany, July 6 – 8, 2016.

Program Committee Member, DEC 2016: Digital Enterprise Computing Conference, Boeblingen, Germany, June 14 – 15, 2016.

Program Committee Member, EHST 2015: 9th International Symposium on eHealth Services and Technologies, Rhodes, Greece, Sep. 17 – 18, 2015.

Program Committee Member, IDEA 2015: International Workshop on Digital Enterprise Architecture and Engineering 2015, Taormina, Italy, Sep. 15, 2015.

Session Chair, KEOD 2014: The International Conference on Knowledge Engineering and Ontology Development, October 21 – 24, 2014, Rome, Italy.

Session Chair, ICAI'14: The 2014 International Conference on Artificial Intelligence, July 21 – 24, 2014, Las Vegas, NV.

Reviewer, Emerging Trends in Image Processing, Computer Vision, and Pattern Recognition, (H. Arabnia and L. Deligiannidis, Editors), Morgan Kaufmann, May 2014.

Steering Committee Member, 2014 International Conference on Computational Science and Computational Intelligence, Las Vegas, NV, March 10 – 13, 2014.

Session Chair, Web Services Session, The Fifth International Conferences on Advanced Service Computing, Valencia, Spain, May 27 – June 1, 2013.

Math volunteer, Creative Learning Academy, 2013

Sunshine Math volunteer teacher, Cordova Park Elementary School, 2006 – 2011

Science volunteer teacher, Cordova Park Elementary School, 2005 – 2006

Session Chair, Novel Applications, ICAI'10: The 2010 International Conference on Artificial Intelligence, Las Vegas, NV, 2010

Reviewer, The International Conference on Society and Information Technologies (ICSIT), 2010

Contributor and reviewer, Big Java textbook, Cay Horstmann, Wiley Publishers, 2009

Program Committee Chair and Reviewer, The 7th International Conference on Education and Information Systems, Technologies, and Applications (EISTA), 2009

Reviewer, The **13th World Multi-Conference on** Systemics, **Cybernetics and Informatics (WMSCI)**, 2009

Reviewer, The 2nd International Conference on Knowledge Generation, Communication and Management (KGCM), 2008

Session Chair, The 6th International Conference on Education and Information Systems, Technologies, and Applications (EISTA), 2008

Session Chair, The 5th International Conference on Education and Information Systems, Technologies, and Applications (EISTA), 2007

Associate Editor and Reviewer, International Journal of Learning, 2005

Program Committee Member and Reviewer, Annual Florida Artificial Intelligence Research Society (FLAIRS) Conference, 2005

Contributor, Java Software Solutions textbook, John Lewis and William Loftus, Pearson Addison Wesley Publishers, 2004

Reviewer, Programming Languages and Methodologies textbook, Robert Schalkoff, Jones & Bartlett Publishers, 2004

Reviewer, International Journal of Artificial Intelligence Tools, 2003

Program Committee Member and Reviewer, Annual Florida Artificial Intelligence Research Society (FLAIRS) Conference, 2003

Program Committee Member and Reviewer, International Parallel and Distributed Systems Conference, 2002

Professional Development

Broadening Participation Workshop, University of West Florida, August 11 - 13, 2015.

Diversity Recruitment, Hiring, and Retention Workshop, University of West Florida, January 29, 2015.

Student Success and Retention Workshop, University of West Florida, October 14, 2014.

STEM Retention Workshop, University of West Florida, February 28, 2014.

Research Design and Evaluation Workshop, Center for University Teaching, Learning, and Assessment, University of West Florida, February 1, 2013.

Preparing for Tenure and Promotion Workshop, Center for University Teaching, Learning, and Assessment, University of West Florida, January 18, 2013.

Communication & Leadership Skills: Dealing With Conflict Workshop, Center for University Teaching, Learning, and Assessment, University of West Florida, November 2, 2012.

Institute for Academic Leadership Workshop, Howey-in-the-Hills, FL, May 23 – 26, 2010.

ABET Best Assessment Processes Symposium, Atlanta, GA, April 25 – 26, 2008.

Assessment Workshops by Dr. Peggy Maki, Center for University Teaching, Learning, and

Assessment, University of West Florida, April 16, 2008.

Studio E Faculty Development Workshops for online course development, University of West Florida, summer 2007.

Assessment Workshops by Peggy Maki, Center for University Teaching, Learning, and Assessment, University of West Florida, 2006 – 2007

Student Assessment Workshop by Barbara Walvoord, Center for University Teaching, Learning, and Assessment, University of West Florida, Spring 2005

NSF CISE Grant Workshop, Office of Research and Graduate Studies, University of West Florida, Spring 2002

Compleat Professor Workshops, Center for University Teaching and Learning, University of West Florida, 2001-2002

Workshop 1: UWF and Florida SUS Orientation, Fall 2001
Workshop 2: Teaching Effectiveness, Spring 2002
Workshop 3: Research and Scholarly Activities, Spring 2002

Enhancing Teaching with Technology Workshop, Center for University Teaching and Learning, UWF, 2001-2002

THOMAS REICHHERZER

RESEARCH GOAL AND INTERESTS

My main goal is to conduct research in artificial intelligence methods and their applications to build intelligent systems. I am also interested in systems and networks and related security issues. My broad research interests include machine learning, natural-language processing, information retrieval, knowledge representation, human computer interaction, and, more recently, sensor networks and simulation of networks.

PROFESSIONAL HISTORY

August 2016 – now: **Associate Professor**, The University of West Florida, Pensacola, FL.

August 2010 – July 2016: **Assistant Professor**, The University of West Florida, Pensacola, FL.

2009 – 2010: **Visiting Assistant Professor**, The University of West Florida, Pensacola, FL.

2007 – 2009: **Director of Technology**, Enkia Corp., Atlanta, GA.

2001 – 2007: **Research Assistant & Associate Instructor**, Indiana University, Bloomington, IN.

2006: **Consultant**, Pragati Synergetic Research, Cupertino, CA.

1994 – 2001: **Research Associate**, Institute for Human & Machine Cognition (IHMC), Pensacola, FL.

1996 – 1998, **Adjunct Instructor**, The University of West Florida, Pensacola, FL.

1991 – 1994: **Teaching Assistant**, **University of Ulm**, Germany.

1991: **Consultant**, Artificial Intelligence Research Institute, Ulm, Germany.

ACADEMIC HISTORY

2001 – 2009, **Indiana University**, Bloomington, IN
Ph.D., Computer Science, Cognitive Science (minor), GPA 3.99.
Certificate in Human-Computer Interaction (HCI).
Thesis title: A Concept Map-based Approach to Document Indexing and Navigation.

1994 – 1996, **University of West Florida**, Pensacola, FL
M.S., Computer Science, GPA 4.0.

1990 – 1996, **University of Ulm**, Ulm, Germany
Diplom, Informatic, GPA 3.45.

PERSONAL DATA

Professional membership: ACM, AAAI.

Wearable Devices Security (2015-present)

Description: The use of wearable devices is on an upward curve with a range of devices now available from a number of manufacturers. The security and privacy issues relating to the hardware, software and the data collected by these devices, however have not been studied extensively. A lack of standards and regulations has contributed to various proprietary protocols being used which may or may not provide adequate protection to a user's data.

Work: In this project, hardware and software security aspects of different kinds of wearable devices and their communication protocols will be studied. Various attack vectors and different kind of attacks will be investigated. Specifically, attacks on the integrity, confidentiality and the privacy of the data will be examined. Finally, solutions and patches for security against the attack vectors and vulnerabilities will be proposed. Research results have been published.

Smart Home Technology (2010-present)

Description: This project aims to build smart home systems consisting of sensor networks and smart software systems integrated into homes to monitor human activities in the home for the purpose of improving the safety and the quality of life of all people living in the home.

Work: In collaboration with graduate and undergraduate students, several methods were developed to capture and analyze sensor data for recognizing human activities and to monitor individuals and suggest corrective actions in situation where activities may cause harm. Different methods of human-machine interaction are being investigated and applied to provide just-in-time support. A prototype sensor network and middleware services has been built and tested. Additional middleware services are being developed to perform activity recognition and an evaluation of the entire system by end users will be conducted soon. The research is described in several publications.

Knowledge Modeling in Health Care (2011-2014)

Description: This project aims to build a knowledge model on health care provider knowledge to promote a better understanding of provider information and collaboration among stake holders. It also pursues capturing semantic information on health care data models to support software development & maintenance activities.

Work: This is a sponsored research project by Blue Cross Blue Shield. In collaboration with domain experts an initial knowledge model was built using concept mapping and published for collaboration with users of provider information within the organization. Furthermore, semantic information of a complex health care data model was captured via concept mapping and used in subsequent case studies to examine how semantic information can facilitate software development and foster greater understanding of a domain. The research is described in several publications.

Intelligent Search Tools to Support Maintenance of Service Oriented Architecture (SOA) Composite applications (2010-2013)

Description: This project focuses on the development of intelligent search tools that mine artifacts of Service Oriented Architecture (SOA) composite applications to provide support for software engineers.

Work: Several case studies have been conducted to identify abstractions of SOA artifacts that support software maintenance activities. A search tool, called SOA Miner, has been developed that extracts and indexes abstractions from SOA artifacts and visualizes them. Rule-based methods have been applied and evaluated to automate the extraction process. The research is described in several publications.

TEACHING EXPERIENCE

Associate Professor
University of West Florida, Pensacola, FL, Fall 2016 – Spring 2017
- Data Structures & Algorithms (face-to-face, graduate & undergraduate sections)
- Algorithm and Program Design (face-to-face, undergraduate)
- Operating Systems (face-to-face, graduate & undergraduate sections)
- Computer Networks (face-to-face, graduate & undergraduate sections)
- Linux System & Network Administration (face-to-face, undergraduate)

Assistant Professor
University of West Florida, Pensacola, FL, Fall 2010 – Spring 2016
- Advanced Computer Systems (face-to-face, graduate)
- Advanced Computer Systems & Networks (face-to-face, graduate section)
- Computer Graphics & Simulation (face-to-face, graduate & undergraduate sections)
- Data Structures & Algorithms (face-to-face, undergraduate)
- Algorithm and Program Design (face-to-face, undergraduate)
- Introductory Programming in Java (face-to-face & online, undergraduate)
- Operating Systems (face-to-face & online, graduate & undergraduate sections)
- Computer Networks (face-to-face & online, graduate & undergraduate sections)
- Linux System & Network Administration (face-to-face, undergraduate)

Visiting Assistant Professor
University of West Florida, Pensacola, FL, Fall 2009 – Summer 2010
- Operating Systems (face-to-face & online, graduate & undergraduate sections)
- Computer Networks (face-to-face & online, graduate & undergraduate sections)
- Software Testing and Verification (online, graduate)
- Introductory Programming in Java (face-to-face, undergraduate)

Adjunct Instructor
University of West Florida, Pensacola, FL, Fall 2008 – Summer 2009
- Operating Systems & Networks (online, graduate)

Associate Instructor
Indiana University, Bloomington, IN, Fall 2004 – Spring 2005
- Computer Models of Symbolic Learning (face-to-face, graduate)
- Introduction to Artificial Intelligence (face-to-face, undergraduate)

Adjunct Instructor
University of West Florida, Pensacola, FL, Summer 1997 – Fall 1998
- Introduction to Computer Graphics (face-to-face, undergraduate)
- Object-Oriented Programming in Java and C++ (face-to-face, undergraduate)

Teaching Assistant
University of Ulm, Ulm, Germany, Spring 1991 – Fall 1994
- Computer Organization (face-to-face, undergraduate)
- Database systems (face-to-face, undergraduate)

TECHNICAL SKILLS

- Programming languages: Java, C, C++, VB, Scheme, Lisp, Prolog, Python, Perl.

- Web programming: J2EE, PHP, GWT.
- Development of GUIs for Windows and Java platforms (MFC, AWT, Swing).
- Web languages: HTML, XML, WSDL.
- Semantic Web technology: OWL, RDF, Protégé, Pellet.
- Virtualization platforms: VMWare Workstation, vSphere Hypervisor
- Experienced with design and usage of database systems including MySQL, ObjectDB.
- Client-server application development using TCP/IP, UDP, RMI, JDBC.
- Experienced user of IDEs including Visual Studio .NET, Eclipse, Netbeans.
- Experienced user of version control systems (CVS, SVN) and software testing tools including white box testing tools.
- Experience in system administration of UNIX and Windows platforms.
- Knowledgeable of HCI design and evaluation principles.

PROFESSIONAL SERVICES

Program Committee

- Sixth International Conference of Concept Mapping, 2014, Santos, Brasil.
- Fifth International Conference of Concept Mapping, 2012, Valetta, Malta.
- Third International Conference of Concept Mapping, 2008, Tallinn, Estonia, Helsinki, Finland.
- Second International Conference of Concept Mapping, 2006, San Jose, Costa Rica.
- First International Conference of Concept Mapping, 2004, Pamplona Spain.

Refereed Journals and Conference Proceedings

- FLAIRS, Context, ECCBR, ICCBR, AI Magazine, IEEE System Man & Cybernetics, IEEE Expert Systems with Applications.

Invited Guest Lectures

- The University of West Florida, March 2015.
- The University of West Florida, September 2012.
- Blue-Cross Blue Shield, Colombia, South Carolina, 2012.
- The University of West Florida, November 2009.
- Doctoral Colloquium, i-Conference, October 2006.
- Exploiting Structure in Concept Maps for Intelligent Support, Vanderbilt University, August 2006.
- National Library of the Netherlands, May 2006.
- Collaborative Knowledge Capture in Ontologies, Indiana University, April 2006.
- Understanding Knowledge Models: Modeling Concept Importance in Concept Maps, Indiana University/Purdue University, April 2006.

Conference Presentations

- 32nd International Conference on Computers and Their Applications (CATA 2017), Honolulu, HI, 2017
- 3rd International Conference on Model-driven Engineering and Software Development, Angers, France, 2015.
- The 2014 International Conference on Security and Management (SAM), Las Vegas, Nevada, 2014.
- 4th International Workshop on Principles of Engineering Service-Oriented Systems.
- 5th International Conference on Concept Mapping, Valetta, Malta, 2012.
- Knowledge Systems for Coalition Operations, Pensacola, Florida, 2012.

- 45th Hawaii International Conference on System Sciences, Maui, 2012.
- Supercomputing 2006, Tampa, Florida, 2006.
- Second International Conference on Concept Mapping, San Jose, Costa Rica, 2006.
- 28th Annual Conference of the Cognitive Science Society, Vancouver, Canada, 2006.
- Joint Conference on Digital Libraries, Chapel Hill, North Carolina, 2006.
- 26th Annual Conference of the Cognitive Science Society, Chicago, Illinois, 2004.
- 16th International Florida Artificial Intelligence Conference, St. Augustine, Florida, 2003.
- Intelligent Tutoring System Workshop on Pedagogical Agents, St. Antonio, Texas 1998.
- 11th International Florida Artificial Intelligence Conference, Sanibel Island, Florida, 1998.
- 9th International Florida Artificial Intelligence Conference, Key West, Florida, 1996.

GRANT APPLICATIONS

- Security in IoT Environments, Security and Software Engineering Research Center (S²ERC), 2016.
- REU SITE: Cybersecurity and Large-Scale Data Analystics, National Science Foundation, 2014.
- Semantic Search in Software Documentation, Security and Software Engineering Research Center (S²ERC), 2013.
- Semantic Data Modeling for System & Data Comprehension, Security and Software Engineering Research Center (S²ERC), 2013.
- Knowledge Modeling for Supporting Program Comprehension, Security and Software Engineering Research Center (S²ERC), 2012.
- Remote Interactive Learning Environments, National Science Foundation, 2012.
- Erosion Simulation and Modeling, Earth Ethics (non-profit), 2011.
- Intelligent Interactive eBooks, IES, Dept. of Education, 2011.
- Monitoring Market Intelligence for Retail Consumers and Producers, National Science Foundation, Information and Communication Technologies, 2009.
- Semantic Wiki for Page Alerting, SBIR Information Systems, 2009.
- Secure Cognitive Systems for Cross-Domain Information Discovery, Access, and Retrieval, BAA Cross-Domain Innovation & Science, 2009.
- Data access and security in a need-to-share environment, SBIR Information Systems, 2008.
- Information Dissemination Agent in Cross-Domain Information Sharing Environment, SBIR Information Systems, 2007.
- Consolidating Entity Information from Heterogeneous Text Sources for Multi-INT Fusion, SBIR Information Systems, 2007.
- Towards a Semantic Web for Instruments, Sensors, and other Real-Time Data Sources, IIS – Information Integration & Informatics, National Science Foundation, 2006.
- Context Models, User Models, and Reasoning for Performance Support in Complex Task Environments, IIS – Human-Centered Computing, National Science Foundation, 2006.
- Empirical Investigations of Representations, Learning, and Reasoning for An Experientially Adaptive Cognitive Agent, Experience-Based Learning, DARPA, 2005.
- Providing Understanding Context: Exploiting Knowledge Models to Support Document Access, Use, and Indexing, NASA Intelligent Systems Program, 2003.

SELECTED PUBLICATIONS

Journal Articles

Coffey, J. W., Baskin, A., Reichherzer, T., Wilde, N. (2016). A Semi-Automated Approach to the Recovery of SOA System Structure From Low-Level Artifacts. *International Journal of Software Engineering and Knowledge Engineering*, Vol. 26, no. 1, pp. 41-62.

Lorenzetti, C., Maguitman, A., Leake, D., Menczer, F., and Reichherzer, T. (2016). Mining for Topics to Suggest Knowledge Model Extensions. *ACM Transactions on Knowledge Discovery from Data*, Vol. 11, Issue 2, article no. 23.

Leake, D., Maguitman, A., Reichherzer, T. (2014). Experienced-Based Support for Human-Centered Knowledge Modeling. *Knowledge-Based Systems*. Vol. 68, pp. 77-87.

Snider, D., Coffey, J., Reichherzer, T., Wilde, N., Terry, C., Vandeville, J., Heinen, A., and Pramanik, S. (2014). Using Concept Maps to Introduce Software Security Assurance Cases. *CrossTalk: The Journal of Defense Software Engineering*. Vol. 27, no. 5.

El-Sheikh, E., Reichherzer, T., White, L., Wilde, N., Coffey, J., Bagui, S., Goehring, G., Baskin, A. (2013). Towards Enhanced Program Comprehension for Service Oriented Architecutre (SOA) Systems. *Journal of Software Engineering and Applications (JSEA)*. Vol. 6, no. 9, pp. 435-445.

Goehring, G., Reichherzer, T., El-Sheikh, E., Snider, D., Wilde, N., Bagui, S., Coffey, J., White, L. J. (2013). A Knowledge-Based System Approach for Extracting Abstractions from Service Oriented Architecture Artifacts. *Journal of Advanced Research in Artificial Intelligence (IJARAI)*. Vol. 2, no. 3, pp. 44-52.

Uszok, A., Bunch, L. Bradshaw, M., Reichherzer, T., Hanna, J. Frantz, A. (2013). Knowledge-based Approaches to Information Management Systems in Coalition Environments, *IEEE Intelligent Systems*. January/February 2013, pp. 34-41.

White, L., Reichherzer, T. Coffey, J., Wilde, N., Simmons, S. (2011). Maintenance of Service Oriented Architectures Composite Applications: Static and Dynamic Support, Journal of Software Maintenance and Evolution Research and Practice. doi: 10.1002/smr.568

Sooriamurthi, R., Reichherzer, T. (2002). FLAIRS 2002 Conference Report. *AI Magazine*. Vol. 23, no. 4, pp. 99-100.

Cañas, A. J., Ford, K. M., Novak, J. D., Hayes, P., Reichherzer, T., Suri, N. (2001). Online Concept Maps: Enhancing collaborative learning by using technology with concept maps. *The Science Teacher*. Vol. 68, No.4, pp. 49-51.

Bradshaw, J. M., Suri, N., Cañas, A. J., Davis, R., Ford, K., Hoffman, R., Jeffers, R., Reichherzer, T. (2001). Terraforming Cyberspace. IEEE Computer. Vol. 34, no. 7, pp. 48-56.

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Book Chapters

Reichherzer, T., Satterfield, S., Belitsos, J., Chudzynski, J., Watson, L. (2016) An Agent-Based Architecture for Sensor Data Collection and Reasoning in Smart Home Environments for Independent Living. In Khoury, R., Drummond, C. (Eds) *Lecture Notes in Computer Science*, Vol. 9673, Springer-Verlag, pp. 15 – 20.

Reichherzer, T., Coffey, J., Gonen, B., Gillett, I. (2015). Knowledge Modeling in the Health Care Domain: Capturing Semantics to Bridge the Gap between Complex Data Models and Object Models, In Desfray, P., Filipe, J., Hammoudi, S., Pires, L. F. (Eds), *Model-Driven Engineering and Software Development*. Springer Verlag, pp. 328-338.

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Maguitman, A., Leake, D., Reichherzer, T. (2006). Cases, Context, and Comfort: Opportunities for Case-Based Reasoning in Smart Environments. In J. C. Augusto and C. D. Nugent (Eds.), *Applications of AI to Smart Home Technology*. Springer-Verlag, pp. 109-131.

Bezdek, J., Lim, G., and Reichherzer, T. (1998). Using Competitive Learning Models for Multiple Prototype Classifier Design. In Kaynak, O., Zadeh, L., Turksen, B., Rudas, I. (Eds.) *Computational Intelligence: Soft Computing and Fuzzy-Neuro Integration with Applications*. Springer-Verlag, Berlin, pp. 352-380.

CURRICULUM VITAE

DR. SIKHA S BAGUI

(850)474-3022 (Office)

PERSONAL INFORMATION

Citizenship: US citizen

ACADEMIC BACKGROUND

Ed.D, Curriculum and Instruction. ***Major: Math/Stat/Science/Computer Science***, University of West Florida, Pensacola, Florida, December, 2000.

MBA, ***IS specialization***, University of Toledo, Toledo, Ohio, August, 1986.
BS, Cuttington University, Monrovia, Liberia, January 1984.

(Also completed one year(1990-1991) in Ph.D. program at Kent State University, Kent, Ohio, MIS specialization).

ACADEMIC EXPERIENCE

Professor, Department of Computer Science, University of West Florida, Pensacola, Florida (August 2013 – present)

Associate Professor, Department of Computer Science, University of West Florida, Pensacola, Florida (August 2008 – August 2013).

Assistant Professor, Department of Computer Science, University of West Florida, Pensacola, Florida (August 2004 – Aug 2008).

Lecturer, Department of Computer Science, University of West Florida, Pensacola, Florida (August 1999-August 2004).

Adjunct Instructor, Department of Computer Science, University of West Florida, Pensacola, Florida (Jan 1992-August 1999).

Graduate Teaching Assistant, Department of Management Information Systems, Kent State University, Kent, Ohio, (August 1990-June 1991).

Instructor, Department of Information Systems, University of Toledo, Toledo, Ohio (June 1986-August 1990).

ADMINISTRATIVE EXPERIENCE

Chair, Department of Computer Science, University of West Florida, Pensacola, FL (August 2012 – August 2017)

Founding Director, Center for Cybersecurity, University of West Florida, Pensacola, FL (January 2014 – March, 2015)

Interim Associate Chair, Department of Computer Science, University of West Florida, Pensacola, Florida (January 2011 – July 2012).

Program Director, CIS/IT, MSA/DBA, MS/CS-DB, Department of Computer Science, University of West Florida, Pensacola, Florida (Fall 2007 – August 2012).

COURSES TAUGHT

Database Systems, Data Mining, Database Administration, Advanced Database Systems, Seminar in SOA, Java Programming, Data Structures and Algorithms, Advanced Visual Programming, Visual Programming, Systems Documentation, Multimedia Systems, Business Systems Design, Microcomputer Application Packages, Introduction to Management Information Systems, COBOL I, COBOL II.

COURSES TAUGHT BY SEMESTER AT UWF

Summer 2017:
COT6931 -- Project

Spring 2017:
COP5725 – Database Systems
COT6931 – Project

Fall 2016:
COP5725 – Database Systems

Spring 2016:
COP5725 – Database Systems

Fall 2015:
COP5725 – Database Systems

Fall 2013:
COP5725 – Database Systems

Spring 2013:
COP5725 – Database Systems

Fall 2012:
COP5725 – Database Systems

Summer 2012:
COP5725/COP4710 – Database Systems
CAP4770/CAP5771 – Data Mining

Spring 2012:
COP5725 – Database Systems
CAP5771 – Data Mining

Fall 2011:

COP5725 – Database Systems (2 sections)
CAP4770/5771 – Data Mining

Summer 2011:

COP4710 – Database Systems
CGS3464 – Visual Programming

Spring 2011:

COP5725 – Database Systems
CAP5771 – Data Mining

Fall 2010:

COP5725 – Database Systems (2 sections)
CAP4770/5771 – Data Mining

Summer 2010:

COP4710 – Database Systems (2 sections)
CGS3464 – Visual Programming

Spring 2010:

COP5725 – Database Systems
CAP4770 – Data Mining

Fall 2009:

CAP4770 – Data Mining (Undergraduate)
CAP5771 – Data Mining (Graduate)
COP5725 – Database Systems

Summer 2009:

COP4710/COP5725 – Database Systems
CGS3559 - Exploring the Internet

Spring 2009:

COP4710 – Database Systems
COP6727 – Advanced Database Systems
COP5725 – Database Systems

Fall 2008:

COP4710 – Database Systems (online) – 2 sections
COP5725 – Database Systems (online) – 2 sections
CAP4770 – Data Mining
CAP5771 – Data Mining

Spring 2008:

COP4723/5775 – Database Administration (online)
COP5990 – Seminar in SOA (online)

Fall 2007:

CAP4770 – Data Mining (online)
COP4710 – Database Systems
CSG3464 – Visual Programming

Summer 2007:

COP4710 – Database Systems (online)

Spring 2007:

COP4710 – Database Systems
COP5715 – Advanced Databases (Developed and delivered online)
COP4173 – Advanced Visual Programming (in Visual Basic 2005)

Fall 2006:

COP4710 – Database Systems
COP4710 – Database Systems (Developed and delivered online)
CGS3464 – Visual Programming Using Visual Basic.NET

Summer 2006:

COP4710 – Database Systems

Spring 2006:

COP5715 – Advanced Databases
COP4710 – Database Systems
COP4173 – Advanced Visual Programming (in VB.NET)

Fall 2005:

COP5715 – Advanced Databases
CGS3464 – Visual Programming Using Visual Basic.NET
COP2253 – Java Programming

Summer 2005:

COP4710 – Database Systems
CGS3464 – Visual Programming Using Visual Basic.NET

Spring 2005:

COP4710 – Database Systems
COP5715 – Advanced Database Systems
COP2253 – Java Programming

Fall 2004:

COP2253 – Java Programming (3 sections)

Summer 2004:

COP4710 – Database Systems
CGS3464 – Visual Programming Using Visual Basic.NET

Spring 2004:

COP4710 – Database Systems
CGS 3464 – Visual Programming Using Visual Basic.NET

COP5715 – Advanced Databases and Data Mining

Fall 2003:
COP4710 – Database Systems
CGS3464 – Visual Programming Using Visual Basic.NET

Summer 2003:
COP4710 – Database Systems
CGS3464 – Visual Programming Using Visual Basic.NET

Spring 2003:
COP4710 – Database Systems (3 sections)
COP5715 – Advanced Databases and Data Mining.

Fall 2002:
COP4710 – Database Systems (2 sections)
COP3530 – Data Structures and Algorithms (in C++)
ISM4113 – Business Systems Design

Summer 2002:
COP4710 – Database Systems
COP3530 – Data Structures and Algorithms (in C++)

Spring 2002:
COP4710 – Database Systems (2 sections)
COP4990 – Advanced Visual Programming (in Visual Basic)
COP5715 – Advanced Database Systems

Fall 2001:
COP4710 – Database Systems (2 sections)
COP3530 – Data Structures and Algorithms (in C++)

Summer 2001:
COP4710 – Database Systems
COP3530 – Data Structures and Algorithms (2 sections) (in C++)

Spring 2001:
COP 3530 – Data Structures and Algorithms (2 sections) (in C++)
COP 4710 – Database Systems
CGS 3464 – Visual Programming (in Visual Basic)

Fall 2000:
COP 3530 – Data Structures and Algorithms (2 sections) (in C++)
COP 4710 – Database Systems (2 sections)

Summer 2000:
COP 3530 – Data Structures and Algorithms (in C)
COP 4710 – Database Systems

Spring 2000:

COP 3530 – Data Structures and Algorithms (2 sections) (in C)
COP 4710 – Database Systems
CIS 3512 – Systems Documentation

Fall 1999:

COP 3530 – Data Structures and Algorithms (in Pascal)
COP 4710 – Database Systems
CGS 3800 – Multimedia Systems
CGS 3464 – Visual Programming (in Visual Basic)

RESEARCH INTERESTS

Database and SQL, database design and architecture, object-oriented databases, web databases, data mining, pattern recognition, statistical computing, computers in Education.

PUBLICATIONS

Books

1. Earp, R. and **Bagui, S**. (2003). *Learning SQL: A Step-by-Step Guide using Oracle*, Addison Wesley, ISBN: 0-201-77363-5.

2. **Bagui, S.** and Earp, R. (2003). *Database Design Using ER Diagrams*, CRC Press, Auerbach Publications, ISBN: 0-8493-1548-4.

3. **Bagui, S**. and Earp, R. (2004). *Learning SQL: A Step-by-Step Guide using Access*, Addison Wesley, ISBN: 0-321-11904-5.

4. Earp, R., and **Bagui, S.** (2006). *Advanced SQL Functions in Oracle 10g*, Wordware Publishing, ISBN: 13: 978-1-59822-021-6.

5. **Bagui, S**. and Earp, R. (2006) *Learning SQL Using SQL Server 2005*, O'Reilly Publishers, ISBN: 0-596-10215-1.

6. Earp, R. and **Bagui, S**. (2008). *Practical Guide to Using SQL in Oracle*, Wordware Publishing, ISBN: 13:978-1-59822-063-6.

7. **Bagui, S**. and Earp, R. (2009). *SQL Essentials in Access*, Linus Publications, ISBN: 13:978-1-60797-040-8.

8. **Bagui, S**. and Earp, R. (2011). *Essential of SQL Using SQL Server 2008*, Jones and Bartlett, ISBN: 978-0-7637-8138-5.

9. **Bagui, S.** and Earp, R. (2012). *Database Design Using ER Diagrams*, 2nd edition, Taylor and Francis. ISBN: 9781439861769.

10. **Bagui, S.,** and Earp, R. (2015). *SQL Server 2014: A Step by Step Guide to Learning SQL*, Nova Publishers. ISBN: 978-1-63463-543-1. E-book version ISBN: 978-1-63463-554-7.

11. **Bagui, S**. and Earp, R. (2015). *Practical Guide to Using SQL in Oracle*, 2nd edition, BVT Publishing. ISBN: 978-1-62751-647-1 (e-Book) or ISBN: 978-1-62751-648-8 (loose leaf version).

International Editions (books)

12. Earp, R. and **Bagui, S**. (2003). *Learning SQL: A Step-by-Step Guide using Oracle*, Pearson Education Asia Limited and Tsinghua University Press, EISBN 0-201-77363-5 and ISBN: 7-302-06755-4 (In Chinese language).

13. **Bagui, S**. and Earp, R. (2004). *Learning SQL: A Step-by-Step Guide using Access*, Addison Wesley, ISBN: 0-321-21075-1 (International Edition).

14. **Bagui, S.** and Earp, R. (2007). *Naucite SQL na SQL Serveru 2005*, O'Reilly Publishers, ISBN: 978-86-7555-309-0.

Journal Articles (Published/Accepted)

1. **Bagui, S**. (1998). Reasons for increase in learning with multimedia, *The Journal of Educational Multimedia and Hypermedia*, **7**(1), 03-18.

2. Bagui, S.C., **Bagui, S.,** Pal, K., and Pal, N. (2003). Breast Cancer detection using Rank Nearest Neighbor Classification Rule, *Pattern Recognition*, **36**(1), 25-34.

3. **Bagui, S**. and Rodgers, E. (2003). Impact of Kolb's Learning Style on Selection of Media During Authoring of Multimedia, *Journal of Interactive Instruction and Development*, **15**(4), 3-11.

4. **Bagui, S**. (2003). Achievements and Weakness of Object-Oriented Databases, *Journal of Object Technology*, **2**(4), 29-41.

5. **Bagui, S**. and Rodgers, E. (2003). Correlation between Kolb's Experiential Learning Style and Selection of a Structure in Multimedia Authoring, *Journal of Interactive Instruction and Development*, **16**(2), 10-24.

6. **Bagui, S**. and Bagui, S.C. (2004). An Algorithm and Code for Computing Exact Critical Values for the Kruskal-Wallis Nonparametric One-Way ANOVA, *Journal of Modern Applied Statistical Methods*, **3**(1), 498-503.

7. **Bagui, S**. and Rodgers, E. (2005). Relationship between Kolb's Experiential Learning Style and Use of Navigational Features during the Authoring of Multimedia Projects, *Journal of Interactive Instruction and Development*, **17**(3), 3-14.

8. **Bagui, S**. and Bagui, S.C. (2005). An Algorithm and Code for Computing Exact Critical Values for Friedman's Nonparametric ANOVA, *Journal of Modern Applied Statistical Methods*, **4**(1), 312-318.

9. **Bagui, S**. (2006). An Approach to Mining Crime Patterns, *International Journal of Data Warehousing and Mining*, **2**(1), 50-80.

10. Bagui, S.C., **Bagui, S.,** Chatterjee, A., and Mehra, K.L. (2006). Classification with repeated independent measurements under separate sampling scheme, *Statistical Methodology*, **3**, 234-251.

11. **Bagui, S**., (2006). Rules for Migrating from Entity Relationship (ER) diagrams to Object Relationship (OR) diagrams, *Computing Letters*, **2**(4), 177-191.

12. **Bagui, S**. and Bagui, S.C. (2006). Computing Percentiles of Skew-Normal Distributions, *Journal of Modern Applied Statistical Methods*, **5**(2), 575-588.

13. **Bagui, S**., Mink, D., and Cash, P. (2007). Data Mining Techniques to Study Voting Patterns in the US, *Data Science Journal*, **6**, 46-63.

14. **Bagui, S**., (2007). A Formal Definition for Translating XML Documents to the ER Model, *International Journal of Metadata, Semantics and Ontologies*, **2**(1), 54-66.

15. **Bagui, S.**, Bagui, S.C., Pal, N.R., and Matin, M.A. (2007). Comparison between *k*-NN and *k*-RNN Classification Rules: A Monte Carlo Simulation Study, *Journal of Statistical Research*, **41**(1), 69-79.

16. **Bagui, S**., (2007). Mapping XML Schema to Entity Relationship and Extended Entity Relationship Models, *International Journal of Intelligent Information and Database Systems*, **3**(4), 325-345.

17. **Bagui, S.** Just, J., and Bagui, S. (2009). Deriving Strong Association Mining Rules Using a Dependency Criteria, the Lift Measure, *International Journal of Data Analysis Techniques and Strategies (IJDATS)*, **1**(3), 297-312.

18. **Bagui, S.** and Loggins, A. (2009). Generating Join Queries for Large Databases and Web Services, *International Journal of Information Technology and Web Engineering* (IJITWE), **4**(2), 54-72.

19. **Bagui, S.** and Ter Haar, L. (2009). Database Education in the New Millenium, *The Journal of Computing Sciences in Colleges*, **24**(4), 80-87.

20. **Bagui, S**. (2009). Mapping OWL to the Entity Relationship and Extended Entity Relationship Models, *International Journal of Knowledge and Web Intelligence (IJKWI)*, **1**(1/2), 125-149.

21. Caffrey, J. M., Landing, W. M., Nolek, S. D., Gosnell, K., **Bagui, S. S.,** and Bagui, S.C. (2010). Atmospheric Deposition of Mercury and Major Ions to the Pensacola (Florida) Watershed: spatial, seasonal and inter-annual variability, *The Journal of Atmospheric Chemistry and Physics*, 10, 4593-4616.

22. **Bagui, S.** Just, J., Bagui, S, and Hemasinha, R. (2010). Using a Cosine-type Measure to Derive Strong Association Mining Rules, *International Journal of Knowledge Engineering and Data Mining (IJKEDM)*, **1**(1), 69-83.

23. **Bagui, S.** and Musgrove, C. (2010). Optimizing Outerjoins in Large Databases Using Cluster Based Partitioning. *International Journal of Data Analysis and Information Systems (IJDAIS),* **2**(2), 55-65.

24. **Bagui, S.** Islam, M., and Bagui, S. (2011). An Architecture for Query Optimization Using Association Rule Mining. *International Journal of Knowledge Based Organizations* (IJKBO), 1(4), 32-55.

25. **Bagui, S.,** Brown, J., Caffrey, J., and Bagui, S. (2012). Designing a Relational Database for Tracking and Analysis of Atmospheric Deposition of Mercury and Trace Metals in the Pensacola (Florida) Bay Watershed, *International Journal of Sustainable Society (IJSSoc),* 4(3), 240-265.

26. **Bagui, S**. and Sweetman, R. (2012). Modeling Service Data Objects (SDO's) To the Entity-Relationship (ER) Model, by Bagui and Sweetman. *International Journal of Information Technology and Web Engineering (IJITWE),* 7(3), 14-36.

27. **Bagui, S.,** Spratlin, S., and Bagui, S. (2013). Calculating Support, Confidence and Lift in Multi-relational XML Data, *International Journal of Data Analysis and Information Systems* (IJDAIS), Vol. 5(1), 13-27.

28. Goehring, G., Reichherzer, T., El-Sheikh, E., Snider, D., Wilde, N., **Bagui, S**., Coffey, J., White, L.J. (2013). A Knowledge-Based System Approach for Extracting Abstractions from Service Oriented Architecture Artifacts in *International Journal of Advanced Research in Artificial Intelligence (IJARAI)*, Vol. 2(3), 44-52.

29. Bagui, S.C., **Bagui, S.**, and Hemasinha, R. (2013). Nonrigorous proofs of stirling's formula, *Mathematics and Computer Education*, Vol. 47(2), 115–125.

30. El-Sheikh, E., Reichherzer, T., White, L., Wilde, N., Coffey, J., **Bagui, S.,** Goehring, G., Baskin, A. (2013). Towards Enhanced Program Comprehension for Service Oriented Architecture (SOA) Systems, *Journal of Software Engineering and Application (JSEA)* Vol. 6(9), 435-445.

31. **Bagui, S.** and Zaynako, A. (2014). Determining Approximate Functional Dependencies using Association Rule Mining, *International Journal of Research in Computer Applications and Management (IJRCM),* Vol. 4(1), 10-17.

32. **Bagui, S.,** and Bouressa, J. (2014). Mapping RDF and RDF-Schema to the Entity Relationship Model, *Journal of Emerging Trends in Computing and Information Sciences,* Vol. 5(12), 953-961.

33. Gonen, B., Fang, X., El-Sheikh, E., **Bagui, S.,** Wilde, N., Zimmerman, A. (2014). Ontological Support for the Evolution of Future Services Oriented Architectures, *Transaction on Machine Learning and Artificial Intelligence (TMLAI),* Vol. 2(6), 77-90.

34. **Bagui, S.,** and Nguyen, L. (2015). Database Sharding: To provide fault tolerance and scalability of Big Data on the Cloud, *International Journal of Cloud Applications and Computing (IJCAC),* Vol. 5(2), 36-52.

35. Fridge, E., and **Bagui, S.** (2016). Impact of Automated Software Testing Tools on Reflective Thinking and Student Performance in Introductory Computer Science and Programming Classes, *International Journal of Information and Communication Technology Education (IJICTE),* 12(1), 24-40.

36. Bagui, S., **Bagui, S**, and Hemasinha, R. (2016). The Statistical Classification of Breast Cancer Data, *International Journal of Statistics and Applications,* 6(1), 15-22.

37. **Bagui, S.,** and Spratlin, S. (2017). A Review of Data Mining Algorithms on Hadoop's MapReduce, *International Journal of Data Science,* in press.

38. **Bagui, S.,** Xingang, F., Kalaimmanan, E., Bagui, S., and Sheehan, J. (2017). Comparison of Machine Learning Algorithms for classification of VPN and non-VPN Network Traffic Flow Using Time-Related Features, *Journal of Cyber Security Technology*, 1(2), 108-126.

39. **Bagui, S.,** Xingang F. and Bagui, S. (2017). "Improving Virtual Screening Predictive Accuracy of Human Kallikrein 5 inhibitors using Machine Learning Models, *Computational Biology and Chemistry,* 69, 110-119.

40. Cox, A., Guzman, I., Crommer, K., **Bagui, S.** Virtual world, Virtual Reality, and Augmented Reality: Different Types, Different Users, Different Purchase Intentions, submitted to *Journal of Virtual Worlds Research.*

Refereed Publication in Encyclopedia

1. **Bagui, S**. (2006). Generalizations and Specializations and Categories in ER Diagrams, *Encyclopedia of Database Technologies,* Idea Group Publishing, 233-239.

Refereed Proceedings

1. **Bagui, S.** (2005). Rules for Migrating from ER and EER diagrams to Object-Relationship (OR) diagram, *Proceedings of the 43rd ACM Southeast Conference*, **1**, 243-244, Kennesaw, GA, March 18-20 (acceptance rate – about 28%).

2. **Bagui, S.** and Walker, D. (2006). A Java Based Parser Software for Converting XML Documents to the ER Model and Relational Databases, *Proceedings of the 2006 International Conference on Semantic Web and Web Services,* 166-169, Las Vegas, Nevada, June 26-29 (acceptance rate –approx.. 32%).

3. **Bagui, S.** (2007). Developing a conceptual model for XML Schema, *Proceedings of the 2007 International Conference on Semantic Web and Web Services,* 69-71, Las Vegas, Nevada, June 25-28 (acceptance rate – about 32%).

4. Prayaga, L., White, L., **Bagui, S.** (2009). Innovative Strategies to Build IT Workforce, *Proceedings of 22nd Conference on Software Engineering Education and Training*, 202-209.

5. **Bagui, S**. Mohammad, I. (2010). Query optimization in large databases using Association Rule Mining, *Proceedings of the 48th ACM Southeast Conference*, Oxford, MS, April 15-17.

6. El-Sheikh, E., **Bagui, S.,** Firesmith, D., Petrov, I., Wilde, N., Zimmermann, A. (2013). Towards Semantic-Supported SmartLife System Architectures for Big Data Services in the Cloud. *Proceedings of the 5th International Conferences on Advanced Service Computing*, May 27-June 1, Valencia, Spain, IARIA XPS Press.

7. Zimmermann, A., Gonen, B., Schmidt, R., El-Sheikh, E., **Bagui**, **S**., and Wilde. N. (2014). Adaptable Enterprise Architectures for Software Evolution of SmartLife Ecosystem. Proceedings of IEEE EDOC – SoEA4EE 2104: *The Sixth Workshop on Service oriented Enterprise Architecture for Enterprise Engineering,* Sept. 1-5, 2014, Ulm, Germany.

8. Gonen, B., Fang, X., El-Sheikh, E., **Bagui, S.,** Wilde, N., Zimmermann, A., and Petrov, I. (2014). Maintaining SOA Systems of the Future: How Can Ontological Modeling Help? Proceedings of KEOD 2014: *The International Conference on Knowledge Engineering and Ontology Development,* October 21 – 24, 2014, Rome, Italy.

Book Chapters

1. Earp, R. and **Bagui, S.** (2000). Building An Entity Relationship Diagram: A Software Engineering Approach, *Data Management Handbook,* CRC Press, Auerbach Publications, **22-10-41**, Dec., 1-16.

2. Earp, R. and **Bagui, S**. (2001). Extending Relationships in the Entity Relationship Diagram, *Data Management Handbook,* CRC Press, Auerbach Publications, **22-10-42**, May, 1-14.

3. Earp, R. and **Bagui, S**. (2002). Binary Relationships in Entity Relationships in Entity Relationship (ER) Diagrams, *Data Management Handbook,* CRC Press, Auerbach Publications, **22-10-43**, April, 1-17.

4. **Bagui, S**. and Earp, R. (2003). Ternary and Higher-Order ER Diagrams, *Data Management Handbook,* CRC Press, Auerbach Publications, **22-10-44**, June, 1-21.

5. Wilde, N., **Bagui, S**., Coffey, J., El-Sheikh, E., Reichherzer, T., White, L., Goehring, G., Terry, C., Baskin, A. (2013). Interoperable Systems and Software Evolution: Issues and Approaches, *Digital Enterprise Design and Management 2013, Advances in Intelligent Systems and Computing*, Volume 205, 2013, chapter 10, 45-56, Springer Berlin Heidelberg, doi={10.1007/978-3-642-37317-6_5}.

Other Publications

1. Earp, R., and **Bagui, S**. (2000). Oracle's Joins, *Oracle Internals,* **2**(3), 6-14.

2. Earp, R. and **Bagui, S**. (2001). Oracle's Triggers, *Oracle Internals,* **2**(10), 14-20.

3. Earp, R. and **Bagui, S**. (2001). An In-depth look at Oracle's Correlated Subqueries, *Oracle Internals*, **3**(4), 2-8.

4. **Saha, Sikha** (1988). Software Review of ENABLE, *Journal of Computer Based Instruction*, **15**(1).

5. **Saha, Sikha**, (1988). Book Review, Files and Databases, An Introduction, *Interfaces,* **18**(3).

Papers re-printed as Book Chapters

1. Earp, R., and **Bagui, S**. (2004). Oracle's Joins, *Oracle Internals: Tips, Tricks, and Techniques for DBAs,* edited by Donald K. Burleson, Auerbach Publications, Taylor and Francis Group.

2. Earp, R. and **Bagui, S**. (2004). Oracle's Triggers, *Oracle Internals: Tips, Tricks, and Techniques for DBAs,* edited by Donald K. Burleson, Auerbach Publications, Taylor and Francis Group.

3. Earp, R. and **Bagui, S**. (2004). An In-depth look at Oracle's Correlated Subqueries, Oracle SQL Training and CBO Internals, edited by Kimberly Floss, Rampant Press.

4. Earp, R., and **Bagui, S**. (2004). Oracle's Joins, Oracle SQL Training and CBO Internals, edited by Kimberly Floss, Rampant Press.

5. **Bagui, S**. (2008). An Approach to Mining Crime Patterns, *Data Warehousing and Mining: Concepts, Methodologies, Tools, and Applications,* edited by John Wang, IGI Global Publications.

6. **Bagui, S.** (2009). An Approach to Mining Crime Patterns, *Selected Readings on Database Technologies and Applications*, edited by Terry Halpin, IGI Global Publications.

7. **Bagui, S.** (2009). Mapping Generalizations and Specializations and Categories to Relational Databases, *Handbook of Research on Innovations in Database Technologies and Applications: Current and Future Trends*, edited by Viviana E. Ferraggine, Jorge H. Doorn, Laura C. Rivero, Information Science Reference. ISBN-13: 9781605662428, 1-11.

8. **Bagui, S.** and Loggins, A. (2011). Automating the Generation of Joins in Large Databases and Web Services, *Web Engineered Applications for Evolving Organizations: Emerging Knowledge*, edited by Ghazi, I. Alkhatib, IGI Global Publications. ISBN: 978-1-60960-523-0.

9. **Bagui, S**., Islam, M., and Bagui, S. (2012). An Architecture for Query Optimization Using Association Rule Mining, *Intelligence Methods and Systems Advancements for Knowledge-Based Business*, IGI Global.

10. **Bagui, S.,** and Nyugen, L. (2015). A Key Based Database Sharding Implementation for Big Data Analytics, *Advanced Research on Cloud Computing Design and Applications*, IGI Global (in press).

Workshops

1. Bilal Gonen, Xingang Fang, Eman El-Sheikh, Sikha Bagui, Norman Wilde, Semantic Traversing Documents by Using Semantic Relationships, *Workshop on Grand Challenges in Engineering and Applied Sciences*, Princeton University, Princeton, NJ, May 15-18, 2014.

Grant Reports

1. Caffrey, J., Landing, W., **Bagui, S**., Bagui, S. (2009). *Atmospheric Deposition of Mercury or Trace Metals to the Pensacola Bay Watershed*, February 15, 2009.

Submittals/In preparation

41. **Bagui, S.,** Devulapalli, K., Coffey, J., "A Heuristic Approach for Load Balancing the FP-Growth Algorithm on MapReduce, submitted to *IEEE* Transactions on Big Data, July 23, 2017.
42. **Bagui, S.,** Devulapalli, K., Sharon, J. "MapReduce Implementation of a Mixed and Multinomial Naïve Bayes Classifier," submitted to *IEEE* Transactions on Big Data, August 1, 2017.
43. **Bagui, S**. and Devulapalli, K. "A Comparison of Hive's Optimization Techniques," submitted to International Journal of Big Data Intelligence, revised and submitted, August 13, 2017.

Series Editor for "Foundation for Database Design Books" for CRC press.

Books in this series:

1. Garmany, J, Walker, J., and Clark, T. (2005). *Logical Database Design Principles*, CRC Press, Auerbach Publications, ISBN: 0-8493-1853-X.
2. Chao, L. (2005). *Database Development and Management*, CRC Press, Auerbach Publications, ISBN: 0-8493-3318-0.

Editorial Board member:

i. *International Journal of Data Analysis Techniques and Strategies (IJDATS).*
ii. *World of Computer Science and Information Technology Journal (WSCIT).*
iii. *Universal Journal of Computer Science and Engineering Technology (UniCSE).*
iv. *Inventi Journals, http://www.inventi.in*
v. *Amity Journal of Engineering and Technology.*
vi. *Journal of Technologies* (http://www.mdpi.com/journal/technologies, ISSN 2227-7080).
vii. *Journal of Applied Information Science* (http://submission.publishingindia.com/index.php/JAIS)
viii. *International Journal of Technology in Computer Science and Engineering (IJTCSE).*

2. Associate Editor:

i. International Journal of Advanced Computer Science and Applications (IJACSA).

Technical Committee Member

International Conference on Intelligent Systems and Control (ISCO'2013).

REVIEWED

Articles for

IEEE Transactions for Data and Knowledge Engineering

IEEE Transactions for Parallel and Distributed Computing

Data and Knowledge Engineering

Pattern Recognition Letters

International Business Schools Computing Quarterly

Encyclopedia of Database Technologies and Applications

Iranian Journal of Electrical and Computer Engineering (IJECE)

Handbook for Technology Management

ACMSE

International Journal of Data Analysis Techniques and Strategies (IJDATS)

International Journal of Knowledge Engineering and Data Mining (IJKEDM)

Consortium for Computing Sciences in Colleges (CCSC)

International Journal of Computer Engineering Research (IJCER)

Data Science Journal

Journal of Systems and Software

International Journal of Intelligent Information and Database Systems (IJIIDS)

International Journal of Advanced Computer Science and Applications (IJACSA)
IEEE Computer

Intelligent Systems and Control (ISCO 2013)

8th International Conference on Knowledge Generation, Communication and Management: KGCM 2014.

Florida Consortium of Cybersecurity (FC2) Seed Grant Program, 2014-2015.

Information.

Grants for

1. Kentucky Science and Engineering Foundation, 2007; April 2012.

2. Kentucky Science and Engineering Foundation. Grant title: Tools for reusing data modeling patterns: Development and evaluation, 2008.
3. NSF Database Grant for Kennesaw State University, titled: Animated Database Courseware (ADbC), 2009.
4. Florida Consortium in Cybersecurity, 2014.

Books

1. *Data Structures and Algorithms in C++* (2002), by Goodrich, Tamassia, & Mount, for John Wiley & Sons.
2. *Oracle – Physical Database Design* by Don Burleson, for CRC Press.
3. *GO Series in Microsoft Office, 2003,* for Prentice Hall.
4. *Quick, Simple MicroSoft Office 2000,* by Erickson, for Prentice Hall.

SELECTED CITATIONS

1. Dusick, D. (1998). Learning Effectiveness and Educational Technology. *Educational Technology Review*, **10**.
2. Szabo, M. and Kanuka, H. (1998). Effects of Violating Screen Design Principles of Balance, Unity, and Focus on Recall Learning, Study Time, and Completion Rate. *Journal of Educational Multimedia and Hypermedia*, **8**(1), 23-42.
3. Rochet, B (1998). Analyse de The Rhythm of French. *The Rhythm of French*, **1**(2), 171-177.
4. Reilly, A. (1998). Reading and Listening: issues in the use of displayed text and recorded speech in educational multimedia. *MA dissertation*, Middlesex University, England.
5. Szabo, M. and Kanuka, H. (1999). Conducting Research on Visual Design and Learning: Pitfalls and Promises. *Canadian Journal of Educational Communication*, **27**(2), 105-123.
6. Kadijevich, D. (1999). An approach to learning mathematics through knowledge engineering. *Journal of Computer Assisted Learning*, **15**(4), 291-301.
7. Hick, S. (2000). New Technology in the Human Services. *New Technology in the Human Service*, **11**(4), 1-10.
8. Alvarez, O. (2000). Dominio de vocabulario, uso del diccionario, analisis contextual, y comprension lectora de textos en formato hipermedial e impreso. *Vian del Mar – Chile*.
9. Stout, P. A., Villegas, J., and Kim, H. (2001). Enhancing learning through use of interactive tools on health-related websites, *Health Education Research*, **16**(6), 721-733.
10. Steffey, C. (2001). The Effects of Visual and Verbal Cues in Multimedia Instruction. *Ph.D. dissertation.* Virginia Polytechnic Institute and State University.
11. Dias, P., Aedo, I, and Panetsos, F. (2001). Modeling the Dynamic Behavior of Hypermedia applications. *IEEE Transactions on Software Engineering*, **27**(6), June, 550-572.
12. Karoulis, A., and Pombortsis, A. (2003). The Cognitive Transfer and the Tutor's Role in a CBL Environment, *Informatics in Education*, **2**(2), 214-256.
13. Wallace, M., Tsapatsoulis, N., and Kollias, S. (2005). Intelligent initialization of resource allocating RBF networks. *Neural Networks*, **18**(2), 117-122.
14. Khalil , M.K., Johnson , T.E., and Lamar, C.H. (2005). Comparison of computer-based and paper-based imagery strategies in learning anatomy. *Clinical Anatomy*, **18**(6), 457-464.
15. Odiase, J.I., and Ogbonmwan, S.M. (2005). Exact Permutation Critical Values for the Kruskal-Wallis One-Way ANOVA, *Journal of Modern Applied Statistical Methods*, **4**(2), 609-620.
16. Orozco, M., Crispi, T., Toro-Almenares, D. (2006). Training of Multilayer Perceptron Neural Networks by Using Cellular Genetic Algorithms., *Lecture Notes in Computer Science,* Vol. **4225,** 389-398.
17. Tan, T.Z., Quek, C., Ng, G.S., Ng, E.Y.K. (2007). A novel cognitive interpretation of breast cancer thermography with complementary learning fuzzy neural memory structure, *Expert Systems with Applications*, **33**(3), 652-666.

18. Shams, L., and Seitz, A.R. (2008). Benefits of multisensory learning, *Trends in Cognitive Sciences*, **12**(11), 411-417.
19. Zhan, J. Z., Matwin, S. and Chang, L. (2010). Privacy-preserving multi-party decision tree induction, *International Journal of Business Intelligence and Data Mining*, **2**(2), 197-212.
20. Buczak, A.L. and Gifford C.M. (2010). Fuzzy Association Rule Mining for Community Crime Pattern Discovery, *Proceedings of ISI-KDD, ACM SIGKDD Workshop on Intelligent and Security Informatics.*
21. Scime, A., Murray, G. R., Hunter, L. Y. (2010). Testing Terrorism Theory with Data Mining, *International Journal of Data Analysis Techniques and Strategies*, **2**(2), 122-139.
22. Medeiros, C.B., Baumann, P., Jucovschi, C. (2010). Introducing Multi-disciplinary Thinking in Computer Engineering: A New Way of Teaching Database Systems, *Education Engineering (EDUCON) 2010 IEEE*, 523-530.
23. Jain, R., VanLeer, M., Chandrasekaran, A. (2011). A Framework for Requirements Engineering Method Selection, *International Journal of Industrial and Systems Engineering*, **8**(2), 198-214.

24. And many more not listed here…

HONORS & AWARDS

Research Awards

1. Recipient of ***2012 Distinguished Research and Creative Activities Award***, UWF.
2. Recipient of ***2007 Distinguished Research and Creative Activities Award***, UWF.

Teaching Awards

1. Recipient of ***Excellence in Teaching and Advising Award***, 2012, UWF.
2. Recipient of ***Excellence in Undergraduate Teaching and Advising Award***, 2006, UWF.
3. Recipient of ***Teaching Incentive Program (TIP***) Award, 2002-2003, UWF.
4. Recipient of ***Excellence in Undergraduate Teaching and Advising Award***, 2001-02, UWF.

Other

Nominated for *Distinguished Teaching Award* by Student Government, 2000-01, UWF.
Recipient of Special Summer Graduate *Scholarship*, 1999, UWF.
Recipient of Delores A. Auzenne Graduate *Fellowship*, 1999, UWF.

GRANTS RECEIVED

1. NSF funded travel grant for Sixth Annual Winter Workshop: Data Mining, Statistical Learning and Bioinformatics, UF Gainesville, January 2004, $400.00.
2. Recipient of University Summer 2005 Research Award of $6250, for proposal entitled, *Pattern Classification in Breast Cancer Data: A Data Mining Approach.*
3. Grant recipient of Graduate Research Assistant, from Graduate Office, UWF, Spring 2006, $1,500.00.
4. Workshop: *Advanced SQL Server (Database) Training*, Operations IT Staff from Saufley Field, US Navy, L3 group (Summer 2005), conducted at ATC, UWF, $5,000.
5. **Senior Key Personnel,** Electric Power Research Institute (EPRI) Grant, titled: "*Atmospheric deposition of mercury and trace metals in the Pensacola Bay Watershed Phase II*", 2009, for $287,020.

6. **Co-PI,** Florida's Great North West Workforce Innovation Consortium Grant, North West Florida Computing and Engineering Training Scholarship Program (Fall 2009 – Dec 2010), $1,000,000.
7. **Senior Key Personnel,** Electric Power Research Institute (EPRI) Grant, titled: "*Atmospheric deposition of mercury and trace metals in the Pensacola Bay Watershed Phase III*", 2010, for $287,020.

GRANTS SUBMITTED (Not funded)

1. PI, *Mining Breast Cancer Data*, grant submitted to Department of Defense, for approx. $300,000 for 3 years. Submitted: 2002.
2. PI, Developing a Java Based Parser Software for Converting XML Documents to the ER and EER model and relational databases, for approx $186.800, for 2 years. Submitted: August 2006.
3. Co-PI, STEP Grant: *Building Sustainable Futures Through STEM Program Initiative*, $994,029, NSF 0856031, 5 years. Submitted: September 2008.
4. Co-PI, PRISM Grant: *PRISM Through Early Engagement of Introductory Level Students in Discovery and Research,* for $960,625. NSF: 08-596 IRF, 3 years. Submitted: February 2009.
5. PI, Longitudinal Study of Multiple Lipid Indices to Predict Cardiovascular Disease, NIH Challenge Grants, RFA-OD-09-003, $246,413, 1 year. Submitted: April 2009.
6. Senior Key Personnel for Synthesis and investigation of superconducting semiconductors and approach for a new generation of electronic components, submitted to AFOSR. Total: ~ $1,500,000 in total for 5 years. Submitted: Summer 2009.
7. Co-PI, S-STEM Grant: Scholarships to Promote Interdisciplinary Undergraduate STEM Research, NSF Proposal Number: 1060363: $598,785, 5yrs. Submitted: Summer 2010.
8. PI, TAACCCT, Department of Labor (DOL) Consortium grant, $500,000, June 2014
9. Co-PI, H1b Grant, DOL Consortium grant, $500,000, June 2014.
10. UWF PI, NSF Grant: Big Data Spokes SPOKE: SOUTH: Collaborative: The Academic and Professional Learning Initiative for Applied Data Science, $400,000, February, 2016.

PRESENTATIONS

International Conferences

1. *A Java Based Parser Software for Converting XML Documents to the ER Model and Relational Databases,* World Congress in Computer Science, WORLDCOMP 2007, Computer Engineering, and Applied Computing, Las Vegas, NV, June, 2006.
2. *Developing a Conceptual Model for XML Schema,* World Congress in Computer Science, WORLDCOMP 2007, Computer Engineering, and Applied Computing, Las Vegas, NV, June, 2007.
3. *Optimizing Outerjoins in Large Databases using Cluster-based partitioning,* World Multiconference on Systemics, Cybenetics and Informatics (WMSCI) 2010, Orlando, FL June 29-July 2, 2010.
4. *Role of Climate and Local Emission Sources in the Wet Deposition of Mercury and Major Ions in the Pensacola Region,* 10th International Conference on Mercury as a Global Pollutant (ICMGP), Halifax, Nova Scotia, July 24-29, 2011.
5. *Temporal and Spatial Variability of Mercury, pH, and Non-Sea Salt Sulfate Fluxes Associated with Changes in Anthropogenic Emissions in the Pensacola Bay Region*, Eighth National Monitoring Conference, April 30 – May 4, 2012, Portland, Oregon.

6. *Interoperable Systems and Software Evolution:Issues and Approaches,* Digital Enterprise Design & Management (DED&M), Paris, France, February, 2013.
7. *Towards Semantic-Supported SmartLife System Architectures for Big Data Service in the Cloud,* SERVICE COMPUTATION 2013, The Fifth International Conferences on Advanced Service Computing, Valencia, Spain, May/June, 2013, http://www.iaria.org/conferences2013.
8. *Ontology-Based SmartLife Enterprise Services Architectures for Big Data in the Cloud,* ESOCC 2013, Malaga, Spain, September 11 – 13, 2013.
9. Bilal Gonen, Xingang Fang, Eman El-Sheikh, Sikha Bagui, Norman Wilde, Alfred Zimmermann and Ilia Petrov, Semantic Search to Support the Evolution of SmartLife Applications, *9th International Joint Conference on Software Technologies*, Vienna, Austria, August 29-31, 2014.
10. Alfred Zimmermann, Bilal Gonen, Rainer Schmidt, Eman El-Sheikh, **Sikha Bagui**, and Norman Wilde, Adaptable Enterprise Architectures for Software Evolution of SmartLife Ecosystems, *The 18th IEEE International EDOC Conference (EDOC 2014) "The Enterprise Computing Conference*", Ulm, Germany, September 1-5, 2014.
11. Kalaimannan, E., Mitchell, C., **Bagui, S.** and Bagui, S. (2015). *An Automated Method of Classifying and Analyzing Malware based Operating System Calls,* Annual Computer Security Applications Conference, December 2015, Los Angeles, CA.

National Conferences

1. *"Discovering Crime Patterns in a State Database"*, presented at University of Florida Sixth Annual Winter Workshop: Data Mining, Statistical Learning and Bioinformatics, January 2004.
2. *"Rules for Migrating from Entity Relationship (ER) and Extended Entity Relationship (EER) diagrams to Object Relationship (OR) diagrams*," presented at ACMSE 2005, Kennesaw, GA, March 18-20, 2005.
3. "*Database Education in the New Millenium*", presented at Consortium for Computing Sciences in Colleges (CCSC), Hammond, LA, April 24-25, 2009.
4. Bilal Gonen, Xingang Fang, Eman El-Sheikh, Sikha Bagui, Norman Wilde, Semantic Traversing Documents by Using Semantic Relationships, Workshop on Grand Challenges in Engineering and Applied Sciences, Princeton University, Princeton, NJ, May 15-18, 2014.

Regional Conferences/Symposiums

1. "*Database Development for Atmospheric Deposition in Pensacola Bay Watershed*", Center for Environmental Diagnostics and Bioremediation (CEDB), University of West Florida, Pensacola, FL., Nov 6th, 2008.
2. "*Some Aspects of Skew-Normal Distribution*", Presented at Mathematics Association of America (MAA) Florida Chapter Meeting, The University of West Florida, Pensacola, FL., Nov. 21, 2008.
3. *"Designing a Relational Database for tracking and analysis of Atmospheric Deposition of Mercury and Trace Metals in the Pensacola Bay Watershed",* Mercury Deposition Meeting, Organized by Center for Diagnostics and Bioremediation, University of West Florida, Pensacola, FL, Jan 13-15, 2010.
5. *Database Development for Tracking and Analysis of Atmospheric Data,* Hg Measurements Meeting, University of West Florida, Pensacola, FL., February 2-3, 2011.
6. *Spatial and Temporal Trends in Atmospheric Deposition of Mercury, Trace Metals and Major Ions in the Pensacola Bay Watershed,* Hg Measurements Meeting, University of West Florida, Pensacola, FL, February 2-3, 2011.

7. *Nonrigorous Proofs of Stirling's Formula,* presented at the Florida Chapter of the MAA Meeting, The University of University of West Florida, November, 2012.

Other Presentations

1. Presented several seminars on using Enable, DBASE III Plus, and Lotus 123 to faculty at The University of Toledo in 1987.
2. "*Multimedia, Hypermedia & CD-ROM technology*", presented at Kent State University, April, 1991.
3. "*Impact of Kolb's Learning Style on the Authoring of Multimedia/Hypermedia*", presented at The Department of Computer Science, The University of West Florida, Pensacola, FL, October, 2000.
4. *"Breast Cancer Detection Using Rank Nearest Neighbor Classification Rules"*, presented in Joint Statistical Meetings of American Statistical Association, Atlanta, GA, August, 2001.
5. "*Mining Association Rules for Insurance Data*", presented at The Department of Computer Science, University of West Florida, Pensacola, FL, March, 2002.
6. "*Data Mining: Discovering Association Rules for Insurance Data*," invited talk, presented at The Department of Computer Science, Florida A&M University, Tallahasse, FL, July 2002.
7. Invited Panel Discussion: *Challenges facing Information Studies/Information Technologies*, participated at Florida State University, College of Information Studies, Tallahasse, FL, July 2002.
8. Invited talk: *Database Concepts*, College of Information Technology, Georgia Southern University, Statesboro, GA, October, 2002.
9. Invited talk: *Database Interface of VB.Net*, Roger Williams University, Bristol, RI, February, 2003.
10. *"Association Rule Mining"*, presented at The Department of Computer Science, Florida A & M University, Tallahasse, FL, July 2003.

Local Symposium Presentations

1. "*An Algorithm and Code for Computing Exact Critical Values for the Kruskal-Wallis Nonparametric One-Way ANOVA*, presented at SEASTARS 2004, April 19, 2004 (poster session).
2. *"Discovering Crime Patterns in a State Database*," presented at SEASTARS 2004, April 19, 2004 (poster session).
3. *"An Algorithm and Code for Computing Exact Critical Values for the Friedman's Nonparametric ANOVA",* presented at SEASTARS 2005, April 19, 2005 (poster session).
4. *"Rules for Migrating from Entity Relationship (ER) Diagrams,"* presented at SEASTARS 2005, April 19, 2005 (poster session).
5. "*A Java Based Parser Software for Converting XML Documents to ER Diagrams and Relational Databases*," presented at SEASTARS 2006, April 26, 2006 (poster session).
6. "*An Algorithm and Code for Computing Percentiles of Skew-Normal Distributions*", presented at SEASTARS 2006, April 26, 2006 (poster session).
7. "*SOA and Databases*", departmental seminar series, Computer Science Department, Sept 8, 2008.
8. *Calculating Support, Confidence and Lift in Multi-relational XML Data*, SSE Seminar Series, Dec 7, 2012.
9. **Bagui, S.,** *The Transformation of Data*, Rite of Passage Lecture, The University of West Florida, March 28, 2014.

10. Gonen, B., Fang, X., El-Sheikh, E., **Bagui, S.,** and Wilde, N. (2014). Semantic Traversing Documents by Using Semantic Relationships. 2014 Faculty Research Showcase, University of West Florida, Pensacola, FL, April 24, 2014.
11. **Bagui, S.,** Cybersecurity at UWF, presentation made to UWF's IT Pack, October 29, 2014.
12. **Bagui, S.,** Cybersecurity, how does it work, presentation made at Open House, April 11, 2015.

Sessions Chaired/Co-chaired

1. **Co-chaired** session at *World Multiconference on Systemics, Cybenetics and Informatics* (WMSCI) 2010, Orlando, FL June 29-July 2, 2010.

SERVICE

Departmental Service, Fall 1999 – Spring 2005

1. Departmental committees:
   Undergraduate Committee (1999 - 2005); Online committee (2005); Chair Search committee (Spring 2005 – Summer 2005), Lecturer Search committee (Summer 2005), Java Programming Committee (COP2253) (Fall 2004 – 2005).
2. Course Coordinator commitments:

Aug 1999 – August 2005:

Microcomputer Application Packages (CGS 2570), Multimedia Systems (CGS 3994), Web Page Design (CGS 3823), Database Systems (COP 4710), Advanced Database Systems (COP 5715), Desktop Publishing (CGS 2580), Visual Programming (CGS 3464). Developed CCRs for the above courses during this period, and was instrumental in putting Microcomputer Application Packages online for the first time.

Summer 2001 to August 2005:

Database Systems (COP4710), Advanced Database Systems (COP5715), Data Structures and Algorithms (COP3530) (Summer 2001 – April 2003)

3. ABET coordinator for review for (Fall 1999 – Fall 2001):
   Database Systems (COP 4710), Data Structures and Algorithms (COP3530).
4. Programming Competitions
   1. Prepared, coordinated, and evaluated UWF's AITP C++ Programming Competition, Spring 2001.
   2. Prepared students for Oracle's Nation-wide competition, 2000-01.
5. Directed Independent Study students: Spring 2009 – 3; Fall 2008 – 1; Fall 2007 – 1; Spring – 2; Fall, 2005 – 1; Spring 2005 – 1; Spring 2003 – 1; Summer 2002 – 1; Fall 2001 – 1.
6. Conducted Java Boot Camp, Fall, 2005.

Departmental Service, FALL 2006 – Present

1. Coordinator, Ed.D. Program, Computer Science specialization (2007 – 2015).
2. Coordinator, Medical Information Technology Program (2007 – 2013).
3. Coordinator for CS Department's Certificate programs (2006 – present).
   Certificates developed:
   i. Certificate in Database Systems (2007).
   ii. Certificate in Web Technologies (2007).
   iii. Certificate in Cybersecurity (2014).
   iv. Certificate in GeoComputing (2014).

v. GeoCyber Certificate (2015).
vi. Data Science Certificate (2015).

4. MSDNAA Coordinator (2007 – 2010).
5. Program reviews:
   i. Chair, IT Program Review, 2009-2010.
   ii. Chair, CS Undergraduate and Graduate Program Review, 2013-2014.
   iii. Chair, IT Program Review, 2016-2017.
6. Committees served on:

a. Search Committees:
   i. Search committee, Office Support Specialist position (in Computer Science), member, Fall 2006
   ii. Chair, CS Faculty Search Committee, Fall 2009, Fall 2010.
   iii. Member, CS Department Faculty Search Committee, Spring, 2012.
   iv. Chair, CS coordinator/advisor search committee, Spring, 2012.
   v. Chair, Cybersecurity Faculty Search Committee, 2013-14.
   vi. Hiring official, Cybersecurity Office Administrator Search Committee, Summer, 2014.
   vii. Hiring official, Cybersecurity Advisor Search Committee, Summer, 2014.
   viii. Hiring official, IT Techie Search Committee, Fall, 2014.
   ix. Hiring official, Battle Lab Techie Search Committee, Fall 2014.
   x. Chair, CS Faculty Search Committee, 2014-15.

b. Other committees:
   i. Junior Faculty Mentoring committee (2005 – 2006)
   ii. Departmental Web Page development committee, 2007- present
   iii. SE Curriculum development committee, member, 2007-2008.
   iv. Grand Opening Planning Committee, member, Fall 2009.
   v. Assessment Committee, member, Summer 2010 – present.
   vi. Common Pre-requisites Committee, department representative, Spring 2011 – present.
   vii. Member, CS departmental scholarship committee, 2009 - present
   viii. Member, CS departmental assessment committee, 2011-present.
   ix. Chair, CS department strategic planning committee, 2013-present.
   x. Battle lab renovation committee, 2014-2015.
   xi. Hadoop Cluster Purchase committee, 2014-2015.
   xii. Chair, CS Department Equipment committee, 2014-present.
   xiii. Member, By-Laws Committee, 2014-present.

7. Developed CCRs for:
   i. Advanced Database Systems (COP6727) – graduate database course
   ii. Data Mining (CAP4770/5771) – dual listed data mining course
   iii. Database Administration (COP4723/5775) – dual listed course
   iv. CIS major, CIS minor, IT major, IT minor
   v. IT Tracks – Networking and Telecommunications Technologies, Human Computer Interaction, Information Technology, and Digital Enterprise.
   vi. MSIT program CCR, 2015.
   vii. MSIT/Cybersecurity specialization, 2015.
   viii. MSIT/Database specialization, 2015.
8. New Courses developed:
   1. Advanced Database Systems (COP6727)
   2. Data Mining(CAP4770/CAP5771)
   3. Database Administration(COP4723/COP5775)
9. Online courses developed:
   1. Database Systems (COP4710/COP5725)

2. Advanced Database Systems (COP6727)
3. Data Mining(CAP4770/CAP5771)
4. Database Administration(COP4723/COP5775)
5. Seminar in SOA(COP5990).

10. New Specializations developed:
    1. MSA/DBA (2007).
    2. MS/CS/DB (2010).
    3. BS/CS/CyberSecurity (2013).
11. New Programs developed:
    1. MSIT
        i. MSIT/Database Management (2015).
        ii. MSIT/Cybersecurity (2015).
12. Student recruitment efforts
    1. Articulation with Junior Colleges: March 2007, March 2008.
    2. CS Department Open House: Jan 2007; Nov 2007; Feb 2009; Nov 2009; April 2010,; June 13, 2011; June 16, 2011; June 20, 2011; June 23, 2011; July 14, 2011; Sept 17, 2011; Oct 15, 2011, Mar 17, 2012; Nov 2013; Nov 11, 2014; April 11, 2014;
    3. Pensacola Junior College visits: March 20, 2008, April 8, 2008.
    4. Holodeck presentation to Middle School teachers, April 16, 2010.
    5. West Florida High School, May 2011.
13. Coordinated, prepared and administered test for student – to test out of Web Page Design Course (CGS3823), Spring 2006.
14. Outreach Activities – visited: Alpha Data Corporation, FW Beach, NAS Pensacola, Bullet Technologies, General Dynamics, Pall Corporation, Cogon, App River, Avalex Technologies, Media Com, Coco, Beyond.com, Booz Allen Hamilton.
15. Participated in SSE Grand Opening Events, Feb 3-5, 2010.
16. Directed independent study students: (2009-2010): 12; supervised one honors thesis; coordinated 6 internships; and served on one master's committee.
17. Advising:
    1. 2009-2010: 55 undergraduate advisees and 42 graduate advisees.
    2. 2010 – 2011: 60 undergraduate advisees and 45 graduate advisees
    3. 2011 – 2012: 55 undergraduate advisees and 48 graduate advisees
18. Chair, Ed.D. committee, 2011 – 2014.
19. International Collaborations:
    1. Working with China, 2013.
    2. Working with Faith University in Turkey, 2014-2015
    3. Working with Reutlingen University in Germany, 2011 – present.
20. Meetings:
    1. Organized and hosted Florida Consortium on Cybersecurity (FC2) at UWF's Department of Computer Science, Sept 16, 2014.
    2. Committee member, STARTUP weekend, 2013-present.
    3. Committee member, Cyberthon, 2015.
21. Articulation Agreements
    1. Articulation with Pensacola State College
22. Non-Disclosure Agreements
    1. General Dynamics IT (GDIT), February, 2015.
    2. Los Alamos Technical Associates, Inc. (LATA), February, 2015.
23. Accreditations and Designations
    1. Professional Master's Designation (PSM) for Master of Science in Administration, with a specialization in Cybersecurity.

2. CAE, 2015.

COLLEGE-WIDE SERVICE

1. Elections Committee (At Large), member, 2006 -2008, 2008-2010, 2011-2013, 2013-2015.
2. Academic Standards Committee, member, 2006-2009.
3. CAS Council, member, 2007-2010.
   a. Chair, CAS Graduate Program Committee (CAS Council ad hoc committee), fall 2010.
4. Search Committee, Art Department, member, 2008.
5. Search Committee, CEDB, member, 2008.
6. Search Committee, Physics, member, 2008.
7. Tenure and promotion mentoring committee, Art Department, member, 2008-09, 2012-13.
8. Tenure and promotion mentoring committee, Biology, 2012-2013.
9. ATC Search Committee, member, Spring 2011.

UNIVERSITY-WIDE SERVICE

1. Excellence in Undergraduate Teaching and Advising Committee, member, 2002-2003.
2. Academic Technology Advisory Council (ATAC), member, Fall 2004 – 2006.
3. Faculty Merit Scholarship Program Review Committee, member, 2005 – 2006.
4. Faculty Phone-A-Thon, Admissions Office, UWF, student recruitment, Fall and Spring, 2006.
5. Excellence in Undergraduate Teaching and Advising Committee, member, 2007.
6. Co-chair, Faculty and Staff Campaign, UWF, 2007 – 2009; member, 2010.
7. Participated in UWF's Fund Raising Campaign – Great Futures Campaign, 2007.
8. Computer Science Video Clips for Office of Admissions (for recruitment), Summer 2009.
9. Faculty Video Profile for SSE, Summer 2009.
10. University Faculty Personnel Committee, 2010-2013.
11. Member of STRIDE task force (part of ADVANCE – NSF grant), 2012 – 2015
12. Member of ADVANCE (part of NSF grant), 2012-2015.
13. Member of Chair's Handbook Composition Committee, 2012-2013.

COMMUNITY SERVICE

1. Judge in Math/Computer Science Judge for 49th Annual West Panhandle Regional Science and Engineering Fair, February, 2004.
2. Lead judge in Math/Computer Science Judge for 50th Annual West Panhandle Regional Science and Engineering Fair, February, 2005.
3. Served for *Tsunami* fund raising event, January, 2005.

PROFESSIONAL SERVICE

1. Guided student in creating database for Gulf Coast Kids Club, Fall 2005.
2. Developed Alumni database for Department of Computer Science, UWF, (Fall 2006-Spring 2007).
3. Serving on Oracle Customer Advisory Panel, 2013 – present.
4. On Advisory Council, Florida Center for Cybersecurity (FC2), 2014-present.
5. Represent Department of Computer Science at Pensacola Chamber of Commerce, 2013-present.

PROFESSIONAL DEVELOPMENT

1. Attended UWF's Mini-Conference on Best Practices for Active Learning and Student Engagement (March, 2007).
2. CUTLA Workshop on Writing and Evaluating Student Learning Outcomes, May 16, 2007.
3. UWF 2007 Mini-Conference on Best Practices for Face-to-Face and Online Learning: Promoting Active Learning and Student Engagement, UWF, Nov 8, 2007.
4. Completed ***LEAD***, UWF's Leadership Training Program, 2007-08.
5. Studio-e – Training for Online Teaching, Fall 2007-08.
6. Attended 2011 ABET Symposium, April 14-16, 2011.
7. Attended Howie-in-the-Hills, September, 2012.
8. Attended SPOL – Strategic Planning Online Workshop, Oct 2013.
9. Attended workshop on Discrimination and Harassment for Supervisors, 10/1/2013.
10. Attended STEM Retention Workshop, 2/28/2014.
11. Attended UWF's Office of General Counsel's, "Identity Theft: Protecting Personal Information," Nov, 21, 2014.
12. Attended Diversity Recruitment, Hiring and Retention, Department Chair Workshop, Jan 28th, 2015.

PROFESSIONAL MEMBERSHIPS

Member of ACM 2004-05; 2010 – 2012.
Member of UWF Charter of Upsilon Pi Epsilon, an International Honor Society for Computing and Information Disciplines (2006 – present).

STUDENTS GUIDED

Graduate Project Advisor

Dustin Mink, 2006-2007, Datamining; Gerald Rush, Bioinformatics with BLAST, 2008-2009; Paul Brown, AERO Project, NAS Pensacola, 2008-2009; Sandeep Ramani, Genetic Algorithm, 2007-2008; Adam Loggins, 2008-2009; Jiri Just, 2008-2009; Brandon Youngblood, Optimizing Queries, 2009 – 2010; Mohammad Islam, Optimizing Queries, 2009-2010; Cecil Musgrove, Optimizing Queries, 2009-2010; Duane Christi, Data Warehousing for Escambia County's School Board System, 2009-2010; James Teichart, 2011-2011; Robert Lyons, Cloud computing, 2012; Sweta Ghosh, 2011-2012; Anton Parker, 2012-2013; Loi Nguyen, Database Sharding, 2012-2014; Sean Spratlin, Mining XML Data, 2011-2013; Mariko Young, Data Mining, 2011-2012; James Bouressa, RDF, 2013-2014; Robert Jamie White, Phishing, 2014; Mason Evans, SQL Injection, 2014; Xingang Fang, Chem-informatics, 2014-2015; Joseph Sheehan, 2015-2016, Malware Analysis.

Thesis Committees

Carlos Perez, 2009-2010

Dissertation Committees (Chair)

Evorell Fridge, 2011-2014

Computer Science Department Honors Project Advisor

Tabatha DeJesus, Fall 2013

Directed Studies and Undergraduate Research
Damien Walker, Developing JAVA based Parser Software, 2005; Utkarsh Shah, Optimizing Queries, Summer 2008; Nicholas Fox, Optimizing Queries, Summer 2008; Clark Mitchell, Malware Analysis - Datamining, Summer 2015; Renan Lordello, SQL Injection Attacks, Summer 2015.

External Dissertation Committee:
Angie Cox, 2015, Trident University.

PostDocs:
Xingang Fang (2015-present)

Appendix H

Biographical Information
Institute for Human and Machine Cognition Researchers

IHMC Scientist	Biographical Summary
Ken Ford, Ph.D.	Kenneth Ford is Founder and Chief Executive Officer of the Florida Institute for Human & Machine Cognition (IHMC) – a not-for-profit research institute located in Pensacola, Florida. IHMC has grown into one of the nation's premier research organizations with world-class scientists and engineers investigating a broad range of topics related to building technological systems aimed at amplifying and extending human cognition, perception, locomotion and resilience. Richard Florida has described IHMC as "a new model for interdisciplinary research institutes that strive to be both entrepreneurial and academic, firmly grounded and inspiringly ambitious." IHMC headquarters are in Pensacola with a branch research facility in Ocala, Florida. In 2004 Florida Trend Magazine named Dr. Ford one of Florida's four most influential citizens working in academia. Dr. Ford is the author of hundreds of scientific papers and six books. Dr. Ford's research interests include: artificial intelligence, cognitive science, human-centered computing, and entrepreneurship in government and academia. Dr. Ford received his Ph.D. in Computer Science from Tulane University. He is Emeritus Editor-in-Chief of AAAI/MIT Press and has been involved in the editing of several journals. Ford is a Fellow of the Association for the Advancement of Artificial Intelligence (AAAI), a charter Fellow of the National Academy of Inventors, a member of the Association for Computing Machinery, a member of the IEEE Computer Society, and a member of the National Association of Scholars. Ford has received many awards and honors including the Doctor Honoris Causas from the University of Bordeaux in 2005 and the 2008 Robert S. Englemore Memorial Award for his work in artificial intelligence (AI). In 2012 Tulane University named Ford its Outstanding Alumnus in the School of Science and Engineering. In 2015, the Association for the Advancement of Artificial Intelligence named Dr. Ford the recipient of the 2015 Distinguished Service Award. Also in 2015, Dr. Ford was elected as Fellow of the American Association for the Advancement of Science (AAAS). In 2017 Dr. Ford was inducted into the Florida Inventor's Hall of Fame. In January 1997, Dr. Ford was asked by NASA to develop and direct its new Center of Excellence in Information Technology at the Ames Research Center in Silicon Valley. He served as Associate Center Director and Director of NASA's Center of Excellence in Information Technology. In July 1999, Dr. Ford was awarded the NASA Outstanding Leadership Medal. That same year, Ford returned to private life and to the IHMC. In October of 2002, President George W. Bush nominated Dr. Ford to serve on the National Science Board (NSB) and the United States Senate confirmed his nomination in March of 2003. The NSB is the governing board of the National Science Foundation (NSF) and plays an important role in advising the President and Congress on science policy

IHMC Scientist	Biographical Summary
	issues. In 2005, Dr. Ford was appointed and sworn in as a member of the Air Force Science Advisory Board. In 2007, he became a member of the NASA Advisory Council and on October 16, 2008, Dr. Ford was named as Chairman – a capacity in which he served until October 2011. In August 2010, Dr. Ford was awarded NASA's Distinguished Public Service Medal – the highest honor the agency confers. In February of 2012, Dr. Ford was named to a two-year term on the Defense Science Board (DSB) and in 2013, he became a member of the Advanced Technology Board (ATB) which supports the Office of the Director of National Intelligence (ODNI). Source: https://www.ihmc.us/groups/kford/ Publications: https://scholar.google.com/citations?sortby=pubdate&hl=en&user=flt9Fh0AAAAJ&view_op=list_works

IHMC Scientist	Biographical Summary
Jerry Pratt, Ph.D.	Jerry Pratt (Ph.D., M.Eng., and B.S. degrees from M.I.T. in Computer Science and B.S. degree from M.I.T. in Mechanical Engineering) leads a research group at IHMC that concentrates around the understanding and modeling of human gait and the applications of that understanding in the fields of robotics, human assistive devices, and man-machine interfaces. Current projects include Humanoid Avatar Robots for Co-Exploration of Hazardous Environments, FastRunner Robot, and Exoskeletons for Restoration of Gait in Paralyzed Individuals. Jerry was the team lead for Team IHMC in the DARPA Robotics Challenge (DRC) project. In 2015 IHMC won second place in the DRC finals. In 2013 Team IHMC achieved first place in the Virtual Robotics Challenge and second place in DARPA Robotics Challenge Trials. Before coming to IHMC, Jerry was the President of Yobotics, Inc., a small company that he cofounded in 2000. At Yobotics, Jerry helped develop the RoboKnee, a powered exoskeleton that allowed one to carry large loads while hiking over rough terrain with little effort. Prior to founding Yobotics, Jerry worked at the M.I.T. Leg Laboratory, where he designed, built, and controlled several bipedal robots. His approach of maximizing speed, agility, and biological similarity through the understanding of biological counterparts, is helping to remove the stereotype of robots as being clunky, jerky-moving machines. Source: https://www.ihmc.us/groups/jpratt/ Publications: https://www.ihmc.us/jpratt-publications/

IHMC Scientist	Biographical Summary
Peter Neuhaus, Ph.D.	Dr. Peter Neuhaus is a Senior Research Scientist at IHMC. He received his B.S. from MIT and his M.S. and Ph.D. from U.C. Berkeley. After graduating, he spent five years working in industry; he co-founded a start-up company for distributed power generation and then managed robotic factory-automation projects. In 2003, he joined IHMC. His work focuses on wearable robotic systems and legged robots. Dr. Neuhaus was one of the lead researchers for the DARPA Learning Locomotion project, developing quadrupedal locomotion algorithms for the Little Dog robot; some of the algorithms include dynamic maneuvers, reactive control, and the Xgait. His work on wearable robotic devices centers on lower extremity exoskeleton devices with application for mobility assistance for people with paralysis and paresis, gait rehabilitation, strength and endurance enhancement, and smart exercise devices. He has developed a series of mobility assistance exoskeletons, including the IHMC Mina exoskeleton, which has demonstrated assisting two persons with paraplegia in walking mobility. After that, he completed the X1 exoskeleton with NASA Johnson Space Center, which offers strength enhancement for able-bodied people in addition to mobility assistance. He has been developing software and assisting in managing the IHMC humanoid robotics effort on the DARPA Robotics Challenge and National Robotics Initiative (NRI) projects. Source: https://www.ihmc.us/groups/pneuhaus/

IHMC Scientist	Biographical Summary
Niranjan Suri, Ph.D.	Niranjan Suri is a Research Scientist at the Institute for Human and Machine Cognition (IHMC) and a Visiting Scientist at the US Army Research Laboratory. He received his Ph.D. in Computer Science from Lancaster University, England, and his M.Sc. and B.Sc. in Computer Science from the University of West Florida, Pensacola, FL. Niranjan's current research activity is focused on the notion of Agile Computing – which supports the opportunistic discovery and exploitation of resources in highly dynamic networked environments. He also works on Process Integrated Mechanisms – a novel approach to coordinating the behavior of multiple robotic, satellite, and human platforms. Niranjan's other research interests include distributed systems, networking, communications protocols, virtual machines, energy-aware computing, and software agents. In the past, he has worked on several other projects at IHMC, including CmapTools, Tactile Interfaces, and Oz. He co-organized the Agents, Interactions, Mobility, and Systems (AIMS) track at the ACM Symposium on Applied Computing from 2002 to 2006. He has taught Undergraduate and Graduate courses in Computer Science at the University of West Florida for 10 years. He has been a principal investigator of numerous research projects sponsored by the US Army Research Laboratory (ARL), the US Air Force Research Laboratory (AFRL), the Defense Advanced Research Projects Agency (DARPA), the Office of Naval Research (ONR), and the National Science Foundation (NSF). He has authored or co-authored over 150 papers, has been on the technical program committees of several international conferences, and has been a reviewer for NSF as well as several international journals. Source: https://www.ihmc.us/groups/nsuri/ Publications: https://scholar.google.com/citations?sortby=pubdate&hl=en&user=nNs41i8AAAAJ&view_op=list_works

IHMC Scientist	Biographical Summary
James F. Allen, Ph.D.	Dr. James Allen is Associate Director and a Senior Researcher at the Institute for Human and Machine Cognition in Pensacola. He has had a very distinguished research and teaching career at the University of Rochester where he retains a 50% appointment as the John H. Dessauer Professor of Computer Science. He received his PhD in Computer Science from the University of Toronto and was a recipient of the Presidential Young Investigator award from NSF in 1984. Dr. Allen is an international leader in the areas of natural language understanding and collaborative human-machine interaction. A Founding Fellow of the American Association for Artificial Intelligence (AAAI), he was editor-in-chief of the journal Computational Linguistics from 1983-1993. He was general chair of the Second International conference on Principles of Knowledge Representation held in Boston in 1991, and the Fourth International Conference on AI Planning Systems in Pittsburgh in 1999. Dr. Allen's research concerns defining computational models of intelligent collaborative and conversational agents that can interact effectively with humans in a wide range of problem solving and analysis tasks. The body of research is unique in its focus on combining what are often treated as separate fields in Artificial Intelligence: knowledge representation and reasoning, language understanding, planning, intention recognition and learning. The TRIPS system is a high-performance generic collaborative agent that can be rapidly adapted to new problem solving domains. In the past decade Dr. Allen and his colleagues have demonstrated versions of TRIPS that engage in many domains, including collaborative planning, data analysis and problem solving, providing advice about a person's medications, coordinating human-robot teams, and learning from instruction and demonstration. His paper on dialogue-based task learning won the best paper award at the National Conference on Artificial Intelligence (AAAI) in 2007. These systems constitute a well-established track record of managing multi-investigator, multi-institution collaborations that result in large-scale high-performance demonstrations. Dr. Allen has authored numerous research papers in the areas natural language understanding, knowledge representation and reasoning, and spoken dialogue systems. His paper "Maintaining Knowledge About Temporal Intervals" (CACM, 1983) is regularly included in lists of the most-cited papers in Computer Science. He is the author of several books, including the influential textbook Natural Language Understanding, published by Benjamin Cummings in 1987, with a second edition published in 1995. Source: https://www.ihmc.us/groups/jallen/

IHMC Scientist	Biographical Summary
	Publications: https://scholar.google.com/citations?user=FzzeDG4AAAAJ&hl=en

IHMC Scientist	Biographical Summary
Bonnie J. Dorr, Ph.D.	Dr. Bonnie J. Dorr, a leading researcher in the field of natural language processing, is joining the Florida Institute for Human & Machine Cognition (IHMC) as an associate director and senior research scientist at IHMC's Ocala facility. Natural language processing is a growing research field at IHMC, and Dr. Dorr's expertise is at the cutting edge. Her extensive research and project management experience includes deep language understanding and semantics, large-scale multilingual processing, and summarization. She and her colleagues have carried out seminal work in cross-language divergence detection, machine translation, paraphrasing and automatic evaluation metrics. Dr. Dorr joins IHMC from the University of Maryland, where she is Professor Emerita in the Institute for Advanced Computer Studies and the Department of Computer Science. She was an associate dean of the College of Computer, Mathematical and Natural Sciences, and co-founded the Computational Linguistics and Information Processing Laboratory. She was also principal scientist for two years at the Johns Hopkins University Human Language Technology Center of Excellence. In 2011 she became a program manager at the Defense Advanced Research Projects Agency (DARPA), overseeing research in human language technology. Her significant DARPA projects include Broad Operational Language Translation (BOLT), Deep Exploration and Filtering of Text (DEFT), Multilingual Automatic Document Classification, Analysis, and Translation (MADCAT), and Robust Automatic Transcription of Speech (RATS). She holds both a Master's and a Ph.D. in computer science from the Massachusetts Institute of Technology, with a Bachelor's from Boston University. She is a Sloan Fellow, a NSF Presidential Faculty (PECASE) Fellow, and a former president of the Association for Computational Linguistics. She has served on the Executive Council of the Association for Advancement of Artificial Intelligence (AAAI) and on the Executive Board of the Association for Computational Linguistics (ACL). She was elected AAAI Fellow in 2013, was graduated in the Class of XXXIII of Leadership Florida in 2015, and was elected ACL Fellow in 2016. Source: https://www.ihmc.us/groups/bdorr/ Publications: https://scholar.google.com/citations?sortby=pubdate&hl=en&user=jSjEWosAAAAJ&view_op=list_works

IHMC Scientist	Biographical Summary
Matthew Johnson, Ph.D.	Dr. Matthew Johnson is a Research Scientist in the area of human-machine teaming for technologies such as robotics, software agents, and autonomous vehicles, in a variety of domains including disaster response, space applications, aviation, and military operations. Matt came to the Florida Institute for Human & Machine Cognition (IHMC) out of the military where he served as a Naval Aviator, flying both fixed wing aircraft and helicopters. Matt continued in the Navy Reserves retiring after 20 years of service. Matt obtained his undergraduate degree in Aerospace Engineering at the University of Notre Dame (go Irish!) prior to entering the Navy. He obtained a Masters of Science in Computer Science from Texas A&M – Corpus Christi while on active duty. Matt completed his PhD from Delft University in the Netherlands; his thesis proposed a new approach to human-machine system design called Coactive Design. Matt has been a researcher with IHMC – a not-for-profit research institute located in Pensacola, Florida – since 2002. Matt is passionate about making technology more flexible, resilient, and effective, through human-machine teamwork. His research areas include human-machine teaming, human-machine system design, human-centered computing, human-machine interface design, and multi-robot control. Currently Matt is involved in several projects: • Working with Xerox PARC to brainstorm human-machine teaming concepts • Working with AeroVironment to explore the complexities of people controlling large numbers of vehicles • Working with NASA on characterizing the nature of foundational and applied research that need to evolve in order to develop advanced intelligent technologies that reduce cost, enhance performance and improve safety. • National Robotics Initiative: Toward Humanoid Avatar for Co-exploration of Hazardous Environments. Developing humanoid behaviors and advanced interface concepts to enable complex work using both Boston Dynamics Atlas robot and NASA's Valkyrie robot. Previous projects include: • DARPA Aircrew Labor In-Cockpit Automation System (ALIAS) to develop a robotic copilot (video) • Nissan Fleet Management for Autonomous Vehicles • The DARPA Robotics Challenge (DRC) for disaster response • AFRL Micro-Air Vehicles to develop a novel UAV interface • NASA rotorcraft noise minimization • OZ flight display • DARPA Augmented Cognition project to develop technology to enhance human performance

IHMC Scientist	Biographical Summary

	• NASA Human-Robot Teamwork for exploration
	• DARPA Learning Locomotion quadrpedal walking over complex terrain
	• ARL applying semantic technologies to support information gathering and sharing for the soldier
	• ONR Coordinated Operations for multiple people working with multiple robots
	
	Additional Qualifications
	
	• Commercial Pilot Ratings
	  ○ Airplane Single Engine Land
	  ○ Rotorcraft-Helicopter
	  ○ Instrument Airplane and Helicopter
	• Small Unmanned Aircraft Systems
	
	Source: https://www.ihmc.us/groups/mjohnson/
	
	Publications: https://www.ihmc.us/matthew-johnsons-publications/

IHMC Scientist	Biographical Summary
Dawn Kernagis, Ph.D.	Dr. Dawn Kernagis is a Research Scientist in the area of human performance optimization and risk mitigation for operators in extreme environments, such as those working undersea, at altitude, and in space. Dawn came to IHMC from Duke University Medical Center, where her postdoctoral research was funded by the Office of Naval Research (ONR) and the American Heart Association to identify mechanisms and potential therapeutic targets in multiple forms of acute brain injury. She completed her PhD at Duke University as ONR Undersea Medicine's first Predoctoral Award recipient; her thesis research focused on gene array-based diagnostic development in the settings of undersea medicine and cancer. Dawn obtained her undergraduate degree in Biochemistry at North Carolina State University, where she was a recipient of the Sigma Xi Undergraduate Research Award. Dawn has also been a diver and leader with numerous underwater exploration, research, and conservation projects around the world since 1993, including the deep underwater exploration of Wakulla Springs and surrounding caves for over a decade. Based on her extensive underwater exploration, mentorship, and research experience in the diving community, she was selected as an inductee into the Women Divers Hall of Fame, Class of 2016. Dawn was also selected as one of six crew members to join NASA's 21st undersea mission, NEEMO, in 2016. In addition to her research, Dawn is co-host of IHMC's podcast, STEM-Talk. She is a member of the DoD Biotechnologies for Human Performance Council; a member of Leadership Florida's Class XXXV; a grant writer for Guardian Group; and a Board of Directors member for NWF Marine EDGE. Source: https://www.ihmc.us/groups/dkernagis/

IHMC Scientist	Biographical Summary
Jonathan Clark, Ph.D.	Jonathan B. Clark is a Senior Research Scientist at IHMC and an Associate Professor of Neurology and Space Medicine at Baylor College of Medicine (BCM) and teaches operational space medicine at BCM's Center for Space Medicine (CSM). He is also the Space Medicine Advisor for the National Space Biomedical Research Institute (NSBRI). Clark is a Clinical Assistant Professor at the University of Texas Medical Branch in Galveston where he teaches at the Aerospace Medicine Residency. He received a B.S. from Texas A&M University, an M.D. from the Uniformed Services University of the Health Sciences, and is board certified in Neurology and Aerospace Medicine. Clark is a Fellow of the Aerospace Medical Association. He was a Member of the NASA Spacecraft Survival Integrated Investigation Team from 2004 to 2007 and a Member of the NASA Constellation Program EVA Systems Standing Review Board from 2007 to 2010. Clark worked at NASA from 1997 to 2005 and was a Space Shuttle Crew Surgeon on six shuttle missions and was Chief of the Medical Operations Branch. He devoted 26 years to active service with the U.S. Navy, during which he headed the Spatial Orientation Systems Department at the Naval Aerospace Medical Research Laboratory in Pensacola; the Aeromedical Department at the Marine Aviation Weapons and Tactics Squadron One in Yuma, Arizona; and the Neurology Division and Hyperbaric Medicine at the Naval Aerospace Medical Institute. He was a DOD Space Shuttle Support Flight Surgeon covering two space shuttle flights and flew combat medical evacuation missions in Operation Desert Storm with the U.S. Marine Corps. Clark qualified as a Naval Flight Officer, Naval Flight Surgeon, Navy Diver, U.S. Army parachutist and Special Forces Military Freefall Parachutist. He was Chief Medical Officer for Excalibur Almaz, an orbital commercial space company, from 2007 to 2012, and since 2013 is Chief Medical Officer for the Inspiration Mars Foundation. Clark was Medical Director of the Red Bull Stratos Project, a manned stratospheric balloon freefall parachute flight test program. On 14 October 2012, the program successfully accomplished the highest stratospheric freefall parachute jump (highest exit altitude) from 127,852 feet, achieving human supersonic flight (Mach 1.25) or maximum vertical speed without a drogue chute at 843.6 miles per hour/1357.6 kilometers per hour. His professional interests focus on the neurologic effects of extreme environments and crew survival in space. Source: https://www.ihmc.us/groups/jonathan-clark/

IHMC Scientist	Biographical Summary
Robert Hoffman, Ph.D.	Robert R. Hoffman, Ph.D. is a recognized world leader in cognitive systems engineering and Human-Centered Computing. He is a Senior Member of the Association for the Advancement of Artificial Intelligence, Senior Member of the Institute of Electrical and Electronics and Engineers, Fellow of the Association for Psychological Science, Fellow of the Human Factors and Ergonomics Society, and a Fulbright Scholar. Hoffman has been Principal Investigator, Co-Principal Investigator, Principal Scientist, Senior Research Scientist, Principal Author, or Principal Subcontractor on over 60 grants and contracts totaling over $15M. He has led efforts including large, multi-partner, multi-year grant collaborations, contracted alliances of university and private sector partners, and multi-university research initiatives. Hoffman's Ph.D. is in experimental psychology from the University of Cincinnati, where he received McMicken Scholar, Psi Chi, and Delta Tau Kappa Honors. Following a Postdoctoral Associateship at the Center for Research on Human Learning at the University of Minnesota, Hoffman joined the faculty of the Institute for Advanced Psychological Studies at Adelphi University. Hoffman has been recognized internationally in cognitive systems engineering, applied psychology, artificial intelligence, and human factors engineering—for his research on the methodology of cognitive task analysis and human-centering issues for human-systems integration systems technology. Hoffman is a Co-Editor for the Department on Human-Centered Computing in *IEEE: Intelligent Systems*. He was a co-founder of *The Journal of Cognitive Engineering and Decision Making.* His current research focuses on methodological and measurement issues in the analysis of complex systems, and performance measurement for complex work systems. Source: https://www.ihmc.us/groups/rhoffman/ Publications: http://cmapsinternal.ihmc.us/viewer/cmap/1197480481720_777343812_10092

IHMC Scientist	Biographical Summary
Peter Pirolli, Ph.D.	Peter joined IHMC in 2017. Previously he was a Research Fellow in the Interactive Intelligence Area at the Palo Alto Research Center (PARC), where he studied human information interaction. Before joining PARC, he was a Professor in the School of Education at UC Berkeley. Peter received his doctorate in cognitive psychology from Carnegie Mellon University in 1985. He received a B.Sc. in psychology and anthropology from Trent University. Pirolli has been elected as a Fellow of the American Association for the Advancement of Science, the American Psychological Association, the Association for Psychological Science, the National Academy of Education, and the ACM Computer-Human Interaction Academy. Peter is the author of "Information Foraging Theory: Adaptive Interaction with Information." Peter is currently an Associate Editor for Human Computer Interaction. Source: https://www.ihmc.us/groups/peter-pirolli/

IHMC Scientist	Biographical Summary
Robert Griffin, Ph.D.	Robert Griffin is a Research Scientist at IHMC, and focuses on improved mobility with legged robotic devices. He received his B.S. from Tennessee Tech, and his Ph.D. from Virginia Tech in 2017 with a primary research focus on the control of bipedal robotic mobility for humanoids and exoskeletons. In 2016, Robert joined IHMC's team for the 2016 Cybathlon, where they placed second in Powered Exoskeleton race. This project focused on using lower extremity exoskeleton devices to enable people with paralysis to complete a timed obstacle course, for which Robert functioned as the software and controls lead. Robert returned to IHMC full time in 2017, where he now focuses on improving mobility over complicated terrain for both humanoid robots and exoskeletons. He is particular interested in combining the use of reduced order models that approximate walking systems with optimization techniques, allowing the natural dynamics of the walking system to evolve while still performing numerically precise control. It is his hope that, by examining nature to determine the most important characteristics for control, bipedal robots will become useful enough to be used outside of the laboratory environment and in every day life. Prior to joining IHMC, Robert was at the Virginia Tech Terrestrial Robotics, Engineering, & Controls lab (TREC) as a controls engineer for their humanoid robot projects. While there, he functioned as the controls lead for the Shipboard Autonomous Firefighting Robot program through the Office of Naval Research, where his team successfully demonstrated in 2014 the first fire suppression on a Navy ship using a humanoid robot. He was also the controls lead for Virginia Tech's entry into the 2015 DARPA Robotics Challenge, where they fielded their custom humanoid robot, ESCHER. He also worked with TREC to develop a lower body exoskeleton for balance assistance in paralyzed individuals under the National Robotics Initiative (NRI). Source: https://www.ihmc.us/groups/robert-griffin/ Publications: https://www.ihmc.us/robert-griffin-publications/

Appendix I

Research Statement
Institute for Human and Machine Cognition

Florida Institute for Human and Machine Cognition, Inc. (IHMC)

IHMC is a world-renowned research institute working in the areas of artificial intelligence, cyber security, robotics, assistive technologies, natural language understanding, data mining, and other related high technology fields. A 501(c)3 statewide research institute created pursuant to Section 1004.447 F.S., IHMC is part of the State University System of Florida with formal research affiliations with FAU, FIT, UCF, UF, USF, UWF, MOTE Marine and the Moffitt Cancer Center. IHMC has also entered into a formal collaborative research protocol with the Tampa Veterans Administration and is currently engaged in several projects with that venue. IHMC has received national recognition for its community outreach initiatives, including its highly popular public evening lecture series, summer robotics camp, and youth-oriented science and educational outreach initiatives (Science Saturdays and I LOVE Science). In 2016, IHMC launched its STEM-Talk Series, a free podcast series featuring some of the most interesting people in science and technology. With 43 episodes online, STEM-Talk has maintained a 5-star rating with over 500,000 listeners.

A recognized economic driver, IHMC was honored with the top US Department of Commerce Award for Excellence in Technology-Driven Economic Development. In June of 2015, IHMC scientists and researchers made worldwide news after placing second in the international DARPA dynamic walking robotics competition held in Pomona, California. In October of 2016, IHMC won the Silver Medal for its powered exoskeleton in the Cybathlon held in Zurich. Also of importance, IHMC's CEO Dr. Ken Ford and Senior Research Scientist Dr. Jerry Pratt have both been inducted into the Florida Inventor's Hall of Fame. CEO Ken Ford, Senior Research Scientist Bill Clancey and Research Scientist David Fries have recently been honored as elected Fellows of the National Inventors Academy.

Researchers at IHMC pioneer technologies aimed at leveraging and extending human capabilities. Current active research areas include: knowledge modeling and sharing, adjustable autonomy, robotics, advanced interfaces and displays, communication and collaboration, computer-mediated learning systems, intelligent data understanding, software agents, cyber security, sensory substitution, natural language understanding, expertise studies, work practice simulation, knowledge representation, and other related areas. IHMC prides itself on a broad and interdisciplinary approach to addressing societal issues and creating advanced technological solutions, thus its research staff includes well-known computer scientists, cognitive psychologists, neuroscientists, physicians, and engineers.

IHMC faculty and staff collaborate extensively with industry and government to develop science and technology that can be enabling with respect to society's broader goals. IHMC researchers receive contract and grant funding from an array of government and private sources. IHMC research partners have included: DARPA, NSF, NASA, Army, Navy, Air Force, NIH, DOT, IBM, IDEO, Sun Microsystems, Microsoft, Boeing, Lockheed, and SAIC, among many others.

In 2016 in Pensacola, IHMC completed an $8,000,000 dollar state of the art research building that includes a state of the art robotics lab and a sensory augmentation lab. The building is equipped with a glass walkway on its second floor where student field trips and visitors can watch activities in the robotics lab. It is our expectation that this unique experience of watching young scientists and engineers at work on futuristic technologies including walking robots and powered exoskeletons will help excite local youth about careers in STEMM (science, technology, engineering, math and medicine) fields. This building opened its doors to the public

in October 2016. Since that time, it has hosted numerous public school student field trips as well as expanded outreach in the community for visitors including international groups and professional organizations.

Over the past several years, IHMC has worked to expand and diversify its research areas by attracting several new Research Scientists. One of these scientists is the holder of 35 patents and works in the development of microsystems and robotics/automation for sensing applications, advanced sensor development (e.g. chemical, physical and biological probes technologies) and mobile robotic systems for field applications. His technical activities also touch upon advancements in advanced manufacturing technology, systems technology, medical instrumentation, technology commercialization, and even arts-science. Another Research Scientist specializes in the field of human performance optimization and risk mitigation for operators in extreme environments, such as those working in undersea diving, high altitude aviation, and space. A third Senior Research Scientist and the holder of 74 patents joined IHMC this summer. His research involves a mix of cognitive science, artificial intelligence, and human-computer interaction, with applications in digital health, sensemaking, and information foraging. IHMC believes all three of these new research arenas will be very successful and assist IHMC in attracting more federal research dollars to Florida.

In July of 2017, IHMC purchased a 2 acre lot across the street from its main facility with the plan to build additional lab space for the three new research areas discussed above and future space to locate PhD students for research dissertation studies in intelligent systems and robotics.

In summary, IHMC continues to enhance its operations and expand in research of national significance including advanced cognitive assistance technologies, network/cyber security, companion devices, exoskeletons, natural language understanding, critical infrastructure protection, human performance optimization, and sustainable energy modeling and simulation. This research expansion is happening in both downtown Pensacola and downtown Ocala, in part through the successful recruitment of top scientists and researchers to Florida. Maintaining prominence in current research areas and developing strength in these emerging research areas are vital to IHMC's continued growth and of critical importance to our national defense, security and overall societal needs.

Appendix J

Copies of Articles from *The New York Times*, *Wall Street Journal*, and *The Economist*

IFR International Federation of Robotics

Press release

IFR forecast: 1.7 million new robots to transform the world´s factories by 2020

Frankfurt, September 27th, 2017 **– By 2020 more than 1.7 million new industrial robots will be installed in factories around the world. Today, the strongest growth in the robotics industry is in Asia – lead by China as the world´s number one marketplace. In 2017 robot installations are estimated to increase by 21 percent in the Asia-Australia region. Robot supplies in the Americas will surge by 16 percent and in Europe by 8 percent. Important drivers of this development: robot adoption is a response to faster business cycles and the requirement to produce with greater flexibility tailored to customer demand in all manufacturing sectors. A new generation of industrial robots will pave the way for ever more flexible automation. So says the 2017 World Robotics Report, as published by the International Federation of Robotics (IFR).**

"Robots offer high levels of precision and their connectivity will play a key role in new digital manufacturing environments," says Joe Gemma, President of the International Federation of Robotics. "Increasing availability enables more and more manufacturers from companies of all sizes to automate."

Industrial robots in operation

In terms of units, it is estimated that by 2020 the worldwide stock of operational industrial robots will increase from about 1,828,000 units at the end of 2016 to 3,053,000 units. This represents an average annual growth rate of 14 percent between 2018 and 2020. In Australasia the operational stock of robots is estimated to increase by 16 percent in 2017, by 9 percent in the Americas and by 7 percent in Europe. Since 2016, the largest number of industrial robots in operation has been in China. In 2020, this will amount to about 950,300 units, considerably more than in Europe (611,700 units). The Japanese robot stock will slightly increase in the period between 2018 and 2020. About 1.9 million robots will be in operation across Asia in 2020. This is almost equal to the global stock of robots in 2016.

TOP five markets in the world

There are five major markets representing 74 percent of the total sales volume in 2016: China, South Korea, Japan, the United States and Germany.

China has significantly expanded its leading position as the largest market with a share of 30 percent of the total supply in 2016. With sales of about 87,000 industrial robots China came close to the total sales volume of Europe and the Americas combined (97,300 units). Chinese robot suppliers continued to expand their home market share to 31 percent in 2016.

International Federation of Robotics
(IFR) Secretariat

President
Joe Gemma
Secretariat
Gudrun Litzenberger

c/o FV R+A im VDMA
Lyoner Straße 18
60528 Frankfurt am Main, Germany

Phone +49 69 66 03-16 97
Fax +49 69 66 03-26 97
E-mail: secretariat@ifr.org
Internet www.ifr.org

South Korea is the second biggest market in the world. Due to major investments by the electrical and electronics industry in robots, annual sales increased considerably. About 41,400 units were sold in 2016. This is a rise of 8 percent compared to 2015. South Korea has the highest level of robot density in the world, about 630 robots installed per 10,000 employees in the manufacturing industry in 2016. Korea is a market leader in LCD and memory chip manufacturing.

In **Japan** robot sales increased by 10 percent to about 38,600 units (2016), reaching the highest level since 2006 (37,400 units). Japan is the predominant robot manufacturing country. Since 2010, the production capacity of Japanese robot suppliers has increased in order to meet the growing demand for industrial robots: production more than doubled from 73,900 units in 2010 to 152,600 units in 2016 (52 percent of the global supply in 2016).

In the **United States** robot installations increased by 14 percent to a peak of 31,400 units (2016). The driver for this continued growth since 2010 was the ongoing trend to automate production in order to strengthen the competitiveness of American industries in overseas markets. Investments have been made to keep manufacturing at home, and in some cases, to bring back manufacturing that had previously been relocated overseas. Due to this dynamic development, the robot density in the United States increased considerably – in particular in the automotive industry. With a density of 1,261 installed robots per 10,000 employees the United States ranked second in 2016 after the Republic of Korea. Most of the robots in the USA are imported from Japan, Korea and Europe.

Germany is the fifth largest robot market in the world and by far the largest in Europe. The annual supply and operational stock of industrial robots in 2016 had a share of 36 percent and 41 percent respectively of total robot sales in Europe. In 2016, the number of robots sold increased slightly to 20,039 units compared to 2015 (19,945 units).

Future trend: smart factory

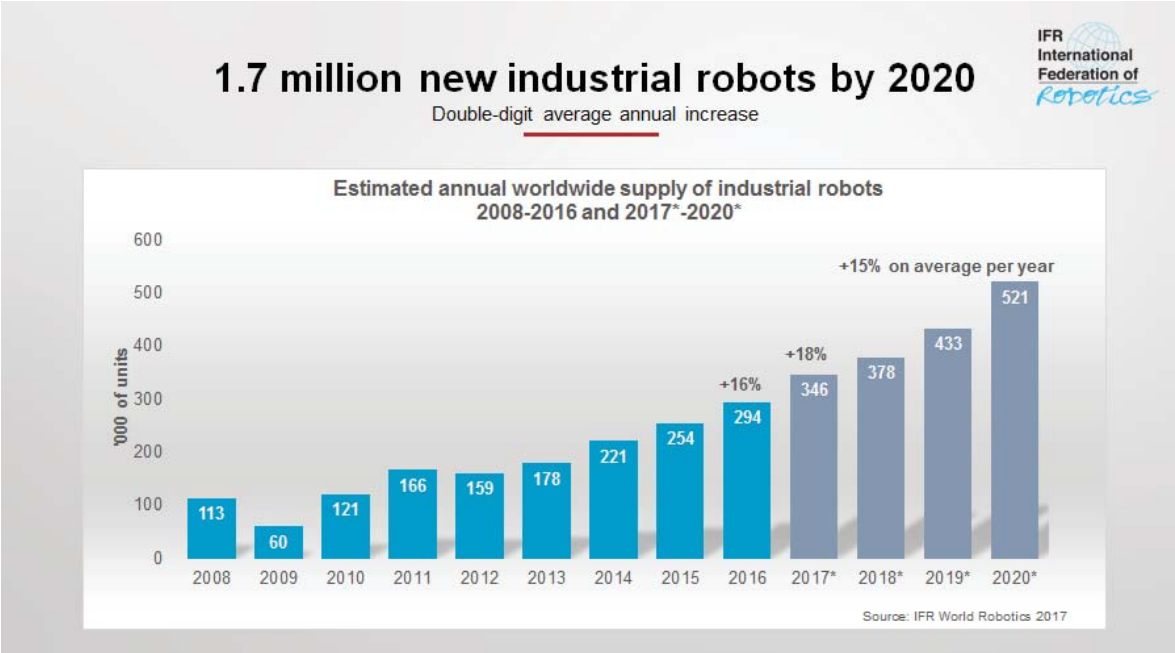
Industry 4.0 - linking the real-life factory with virtual reality - will play an increasingly important role in global manufacturing. As obstacles like system complexities and data incompatibility are overcome, manufacturers will integrate robots into factory-wide networks of machines and systems. Robot manufacturers are already developing and commercializing new service models: these are based on real-time data collected by sensors which are attached to robots. Analysts predict a rapidly growing market for cloud robotics in which data from one robot is compared to data from other robots in the same or different locations. The cloud network allows these connected robots to perform the same activities. This will be used to optimize parameters of the robot’s movement such as speed, angle or force. Ultimately, the advent of big data in manufacturing could redefine the industry boundaries between equipment makers and manufacturers.

Future trend: small-to-medium-sized manufacturers to automate

Some robot manufacturers are also considering leasing models, particularly in order to accelerate adoption by small-to-medium-sized manufacturers. Simplification is a key trend for this market segment. The ongoing need for robots which are easier to use and to program and the increasing need for ever more flexible automation initiated the development of smarter solutions. This is especially useful for industries with a lack of specialized production engineers in-house. Thus, it is important to provide easy-to-use robots that can easily be integrated into and operated in standard production processes. Robots that are uncomplicated to use will

enable the deployment of industrial robots in many industries to sustain efficient and flexible manufacturing.

https://ifr.org/ifr-press-releases/news/ifr-forecast-1.7-million-new-robots-to-transform-the-worlds-factories-by-20



About IFR

The International Federation of Robotics: www.ifr.org

The IFR Statistical Department publishes two robotics studies each year:
World Robotics - Industrial Robots: This unique report provides global statistics on industrial robots in standardized tables and enables national comparisons to be made. It contains statistical data from around 40 countries broken down into areas of application, industrial sectors, types of robots and other technical and economic aspects. Production, export and import data is listed for selected countries. It also describes the trends in relation to robot density, e.g. the number of robots per 10,000 employees in relevant sectors.

World Robotics - Service Robots: This unique report provides global statistics on service robots, market analyses, case studies and international research strategies on service robots. The study is jointly prepared with our partner Fraunhofer IPA, Stuttgart.

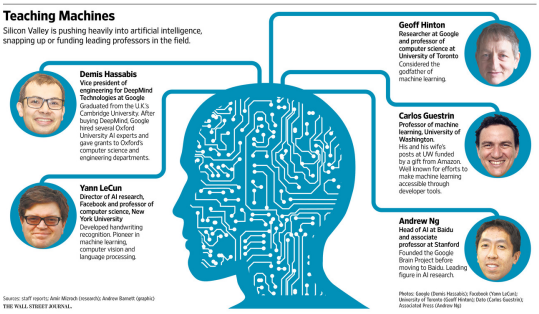
Press contact

econNEWSnetwork
Carsten Heer
Tel. +49 (0) 40 822 44 284
Email: press@ifr.org

TECH

Artificial-Intelligence Experts Are in High Demand

Tech firms, universities stock research centers amid push in hot area of computer science



By Amir Mizroch

Updated May 1, 2015 5:41 a.m. ET

When the University of Washington's computer-science department wanted to poach artificial-intelligence expert Carlos Guestrin from Carnegie Mellon, it turned to Amazon.com Inc. AMZN **+0.37%** ▲

The Seattle-based tech giant ponied up $2 million to fund two professorships: one for Mr. Guestrin, and another for his wife, who also works in the field. To seal the deal, Amazon Chief Executive Jeff Bezos met the academic during a campus visit.

"[Mr. Bezos] is a very smart guy. He has a crazy laugh," said Mr. Guestrin, now UW's Amazon Professor of Machine Learning. "We got quickly into technical things: What was I working on in large-scale machine learning? How could I impact Amazon? What could this mean for the business of data?"

MORE

- At the Heart of Facebook's AI, Human Emotions

Google Inc., GOOGL **+0.34%** ▲ Facebook Inc., FB **+1.16%** ▲ Amazon and other technology companies are scrambling to push the bounds of artificial intelligence, or AI, and in that effort they are stocking their own research centers with big-name academics and aspiring Ph.D. candidates.

Tech companies also are pouring funds into universities with expertise in the once-obscure field. University of Washington, based in the same state as Microsoft Corp. MSFT **+0.76%** ▲ and Amazon, has long been a center of excellence for computer science, including artificial intelligence. Microsoft, Intel Corp. and Google, as well as Amazon, all fund some of UW's AI research.

UW also has become a Silicon Valley hunting ground. Before it recruited Mr. Guestrin—who earned his reputation creating artificial-intelligence-related tools for developers—the university lost seven AI-related professors to Google.

Containers move along conveyors at the Amazon.com Inc. fulfillment center in Tracy, Calif. PHOTO: DAVID PAUL MORRIS/BLOOMBERG NEWS

"There's a massive battle under way for talent," said Oren Etzioni, on leave from UW's computer-science faculty and now heading up the Seattle-based Allen Institute for Artificial Intelligence, a nonprofit set up by Microsoft co-founder Paul Allen. "Virtually every professor at the UW computer-science department has been called many times to work at these companies, and frankly it's a very compelling pitch."

Companies are on the prowl not just for big names in the field, but for newly minted Ph.D.s. Amazon is advertising for more than 50 AI positions in the U.S. and Europe, hunting for doctorate-holders in fields like machine learning, information science and statistics.

Last year, Google bought DeepMind, a startup founded by Cambridge University graduates. After the Google deal, DeepMind absorbed two Oxford University spin-offs specializing in AI. As part of the transaction, Google agreed to a research partnership with Oxford's computer-science program.

Google and Amazon declined to comment about their AI ambitions.

AI is a broad academic field, encompassing techniques aimed at giving computers the ability to make decisions that a human might, based on data analysis. Machine learning and other subsets are a more-targeted discipline inside the broader AI field.

Commercial uses for AI are still limited. Predictive text and Siri, the iPhone's voice-recognition feature, are early manifestations. But AI's potential has exploded as the cost of computing power drops and as the ability to collect and process data soars. Big tech companies like Facebook and Google now vacuum up the huge amount of data that needs to be processed to help machines make "intelligent" decisions.

"AI has become 'like wow,' in Silicon Valley today," said Akli Adjaoute, founder and CEO of Brighterion, a software company that uses machine learning techniques to spot financial fraud for credit card customers.

> **'The high value of this work encourages companies like Google to keep their progress more secret.'**
>
> —Tom Mitchell, a department head at Carnegie Mellon's computer-science program

Microsoft is working on understanding context in human interaction. The company has been awarded a patent for Internet-connected glasses that can detect and interpret the emotions of people within their field of vision in real time and provide feedback to the wearer. The patent for "a wearable emotion detection feedback system," was filed in October 2012, and awarded this Tuesday.

Asked about Google's top priorities at a conference last week Executive Chairman Eric Schmidt said the "core thing" his company is working on these days is machine learning. He cited

progress in image and speech recognition. Regarding the latter, he said it is a “sore point” that Apple Inc.’s Siri “gets all the credit.”

The relationship between tech giants and academia can be difficult to navigate. Some faculty members complain tech companies aren’t doing enough in the many collaborative efforts now under way. One big gripe: Companies aren’t willing to share the vast data they are able to collect.

“The high value of this work encourages companies like Google to keep their progress more secret,” said Tom Mitchell, a department head at Carnegie Mellon’s computer-science program.

Those who embrace the relationship say it can provide real-world incentive for scientific advances. Hank Levy, head of UW’s computer-science program, said he isn’t bitter about the poaching from Google over the years.

“Often, people go off for a year or two and then they come back and bring new experiences that expand both their teaching and research,” he said.

In late 2013, Facebook hired Yann LeCun, one of the world’s most prominent AI academics, from New York University. As an AT&T engineer in the 1980s and ’90s, he helped pioneer handwriting-recognition processing used by banks to authenticate checks. He is now Facebook’s chief of artificial intelligence.

As part of the courtship, Facebook let him keep his post at NYU, a block up Broadway from Facebook headquarters. He still works for the university part time. Facebook partnered with the university on a new center dedicated to data science, a key element of AI research. Facebook scientists lecture at NYU, and NYU Ph.D. students can apply for long-term internships at Facebook’s AI lab.

Facebook Chief Executive Mark Zuckerberg read some of Mr. LeCun’s papers before meeting him during the recruitment process. “That completely floored me,” says Mr. LeCun.

—Rolfe Winkler in San Francisco contributed to this article.

Write to Amir Mizroch at amir.mizroch@wsj.com

Artificial intelligence

Million-dollar babies

As Silicon Valley fights for talent, universities struggle to hold on to their stars

Print edition | Business Apr 2nd 2016 | SAN FRANCISCO

THAT a computer program can repeatedly beat the world champion at Go, a complex board game, is a coup for the fast-moving field of artificial intelligence (AI). Another high-stakes game, however, is taking place behind the scenes, as firms compete to hire the smartest AI experts. Technology giants, including Google, Facebook, Microsoft and Baidu, are racing to expand their AI activities. Last year they spent some $8.5 billion on deals, says Quid, a data firm. That was four times more than in 2010.

In the past universities employed the world's best AI experts. Now tech firms are plundering departments of robotics and machine learning (where computers learn

from data themselves) for the highest-flying faculty and students, luring them with big salaries similar to those fetched by professional athletes.

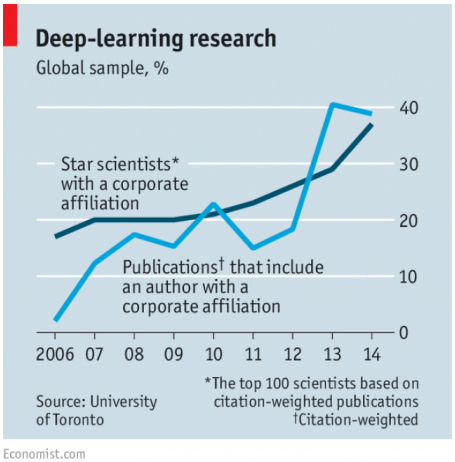
Last year Uber, a taxi-hailing firm, recruited 40 of the 140 staff of the National Robotics Engineering Centre at Carnegie Mellon University, and set up a unit to work on self-driving cars. That drew headlines because Uber had earlier promised to fund research at the centre before deciding instead to peel off its staff. Other firms seek talent more quietly but just as doggedly. The migration to the private sector startles many academics. "I cannot even hold onto my grad students," says Pedro Domingos, a professor at the University of Washington who specialises

in machine learning and has himself had job offers from tech firms. “Companies are trying to hire them away before they graduate.”

Experts in machine learning are most in demand. Big tech firms use it in many activities, from basic tasks such as spam-filtering and better targeting of online advertisements, to futuristic endeavours such as self-driving cars or scanning images to identify disease. As tech giants work on features such as virtual personal-assistant technology, to help users organise their lives, or tools to make it easier to search through photographs, they rely on advances in machine learning.

Tech firms’ investment in this area helps to explain how a once-arcane academic gathering, the Conference on Neural Information Processing Systems, held each December in Canada, has become the Davos of AI. Participants go to learn, be seen and get courted by bosses looking for talent. Attendance has tripled since 2010, reaching 3,800 last year.

No reliable statistics exist to show how many academics are joining tech companies. But indications exist. In the field of “deep learning”, where computers draw insights from large data sets using methods similar to a human brain’s neural networks, the share of papers written by authors with some corporate affiliation is up sharply (see chart).



Tech firms have not always lavished such attention and resources on AI experts. The field was largely ignored and underfunded during the “AI winter” of the 1980s and 1990s, when fashionable approaches to AI failed to match their early promise. The present machine-learning boom began in earnest when Google started doing deals focused on AI. In 2014, for example, it bought DeepMind, the startup behind the computer’s victory in Go, from researchers in London. The price was rumoured to be around $600m. Around then Facebook, which also reportedly hoped to buy DeepMind, started a lab focused on artificial intelligence and hired an academic from New York University, Yann LeCun, to run it.

The firms offer academics the chance to see their ideas reach markets quickly, which many like. Private-sector jobs can also free academics from the uncertainty of securing research grants. Andrew Ng, who leads AI research for the Chinese internet giant Baidu and used to teach full-time at Stanford, says tech firms offer two especially appealing things: lots of computing power and large data sets. Both are essential for modern machine learning.

All that is to the good, but the hiring spree could also impose costs. One is that universities, unable to offer competitive salaries, will be damaged if too many bright minds are either lured away permanently or distracted from the lecture hall by commitments to tech firms. Whole countries could suffer, too. Most big tech firms have their headquarters in America; places like Canada, whose universities have been at the forefront of AI development, could see little benefit if their brightest staff disappear to firms over the border, says Ajay Agrawal, a professor at the University of Toronto.

Another risk is if expertise in AI is concentrated disproportionately in a few firms. Tech companies make public some of their research through open sourcing. They also promise employees that they can write papers. In practice, however, many profitable findings are not shared. Some worry that Google, the leading firm in the field, could establish something close to an intellectual monopoly. Anthony Goldbloom of Kaggle, which runs data-science competitions that have resulted in promising academics being hired by firms, compares Google's pre-eminence in AI to the concentration of talented scientists who laboured on the Manhattan Project, which produced America's atom bomb.

Ready for the harvest?

The threat of any single firm having too much influence over the future of AI prompted several technology bosses, including Elon Musk of Tesla, to pledge in December to spend over $1 billion on a not-for-profit initiative, OpenAI, which will make its research public. It is supposed to combine the research focus of a university with a company's real-world aspirations. It hopes to attract researchers to produce original findings and papers.

Whether tech firms, rather than universities, are best placed to deliver general progress in AI is up for debate. Andrew Moore, the dean of Carnegie Mellon

University's computer-science department, worries about the potential for a "seed corn" problem: that universities could one day lack sufficient staff to produce future crops of researchers. As bad, with fewer people doing pure academic research, sharing ideas openly or working on projects with decades-long time horizons, future breakthroughs could also be stunted.

But such risks will not necessarily materialise. The extra money on offer in AI has excited new students to enter the field. And tech firms could help to do even more to develop and replace talent, for example by endowing more professorships and offering more grants to researchers. Tech firms have the cash to do so, and the motivation. In Silicon Valley it is talent, not money, that is the scarcest resource.

Correction: This article has been amended to make clear that the $8.5 billion spent by technology companies was on deals and did not include money spent on research and hiring.

The New York Times | https://nyti.ms/2ztsqZy

Tech Giants Are Paying Huge Salaries for Scarce A.I. Talent

Nearly all big tech companies have an artificial intelligence project, and they are willing to pay experts millions of dollars to help get it done.

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By CADE METZ OCT. 22, 2017

SAN FRANCISCO — Silicon Valley's start-ups have always had a recruiting advantage over the industry's giants: Take a chance on us and we'll give you an ownership stake that could make you rich if the company is successful.

Now the tech industry's race to embrace artificial intelligence may render that advantage moot — at least for the few prospective employees who know a lot about A.I.

Tech's biggest companies are placing huge bets on artificial intelligence, banking on things ranging from face-scanning smartphones and conversational coffee-table gadgets to computerized health care and autonomous vehicles. As they chase this future, they are doling out salaries that are startling even in an industry that has never been shy about lavishing a fortune on its top talent.

Typical A.I. specialists, including both Ph.D.s fresh out of school and people with less education and just a few years of experience, can be paid from $300,000 to

requested anonymity because they did not want to damage their professional prospects.

Well-known names in the A.I. field have received compensation in salary and shares in a company's stock that total single- or double-digit millions over a four- or five-year period. And at some point they renew or negotiate a new contract, much like a professional athlete.

At the top end are executives with experience managing A.I. projects. In a court filing this year, Google revealed that one of the leaders of its self-driving-car division, Anthony Levandowski, a longtime employee who started with Google in 2007, took home over $120 million in incentives before joining Uber last year through the acquisition of a start-up he had co-founded that drew the two companies into a court fight over intellectual property.

Salaries are spiraling so fast that some joke the tech industry needs a National Football League-style salary cap on A.I. specialists. "That would make things easier," said Christopher Fernandez, one of Microsoft's hiring managers. "A lot easier."

There are a few catalysts for the huge salaries. The auto industry is competing with Silicon Valley for the same experts who can help build self-driving cars. Giant tech companies like Facebook and Google also have plenty of money to throw around and problems that they think A.I. can help solve, like building digital assistants for smartphones and home gadgets and spotting offensive content.

Most of all, there is a shortage of talent, and the big companies are trying to land as much of it as they can. Solving tough A.I. problems is not like building the flavor-of-the-month smartphone app. In the entire world, fewer than 10,000 people have the skills necessary to tackle serious artificial intelligence research, according to Element AI, an independent lab in Montreal.

"What we're seeing is not necessarily good for society, but it is rational behavior by these companies," said Andrew Moore, the dean of computer science at Carnegie Mellon University, who previously worked at Google. "They are anxious to ensure that they've got this small cohort of people" who can work on this technology.

Costs at an A.I. lab called DeepMind, acquired by Google for a reported $650 million in 2014, when it employed about 50 people, illustrate the issue. Last year, according to the company's recently released annual financial accounts in Britain, the lab's "staff costs" as it expanded to 400 employees totaled $138 million. That comes out to $345,000 an employee.

"It is hard to compete with that, especially if you are one of the smaller companies," said Jessica Cataneo, an executive recruiter at the tech recruiting firm CyberCoders.

The cutting edge of artificial intelligence research is based on a set of mathematical techniques called deep neural networks. These networks are mathematical algorithms that can learn tasks on their own by analyzing data. By looking for patterns in millions of dog photos, for example, a neural network can learn to recognize a dog. This mathematical idea dates back to the 1950s, but it remained on the fringes of academia and industry until about five years ago.

By 2013, Google, Facebook and a few other companies started to recruit the relatively few researchers who specialized in these techniques. Neural networks now help recognize faces in photos posted to Facebook, identify commands spoken into living-room digital assistants like the Amazon Echo and instantly translate foreign languages on Microsoft's Skype phone service.

Using the same mathematical techniques, researchers are improving self-driving cars and developing hospital services that can identify illness and disease in medical scans, digital assistants that can not only recognize spoken words but understand them, automated stock-trading systems and robots that pick up objects they've never seen before.

With so few A.I. specialists available, big tech companies are also hiring the best and brightest of academia. In the process, they are limiting the number of professors who can teach the technology.

Uber hired 40 people from Carnegie Mellon's groundbreaking A.I. program in 2015 to work on its self-driving-car project. Over the last several years, four of the best-known A.I. researchers in academia have left or taken leave from their professorships at Stanford University. At the University of Washington, six of 20

artificial intelligence professors are now on leave or partial leave and working for outside companies.

“There is a giant sucking sound of academics going into industry,” said Oren Etzioni, who is on leave from his position as a professor at the University of Washington to oversee the nonprofit Allen Institute for Artificial Intelligence.

Some professors are finding a way to compromise. Luke Zettlemoyer of the University of Washington turned down a position at a Google-run Seattle laboratory that he said would have paid him more than three times his current salary (about $180,000, according to public records). Instead, he chose a post at the Allen Institute that allowed him to continue teaching.

“There are plenty of faculty that do this, splitting their time in various percentages between industry and academia,” Mr. Zettlemoyer said. “The salaries are so much higher in industry, people only do this because they really care about being an academian.”

To bring in new A.I. engineers, companies like Google and Facebook are running classes that aim to teach “deep learning” and related techniques to existing employees. And nonprofits like Fast.ai and companies like Deeplearning.ai, founded by a former Stanford professor who helped create the Google Brain lab, offer online courses.

The basic concepts of deep learning are not hard to grasp, requiring little more than high-school-level math. But real expertise requires more significant math and an intuitive talent that some call “a dark art.” Specific knowledge is needed for fields like self-driving cars, robotics and health care.

In order to keep pace, smaller companies are looking for talent in unusual places. Some are hiring physicists and astronomers who have the necessary math skills. Other start-ups from the United States are looking for workers in Asia, Eastern Europe and other locations where wages are lower.

“I can’t compete with Google, and I don’t want to,” said Chris Nicholson, the chief executive and a co-founder of Skymind, a start-up in San Francisco that has

hired engineers in eight countries. “So I offer very attractive salaries in countries that undervalue engineering talent.”

But the industry’s giants are doing much the same. Google, Facebook, Microsoft and others have opened A.I. labs in Toronto and Montreal, where much of this research outside the United States is being done. Google also is hiring in China, where Microsoft has long had a strong presence.

Not surprisingly, many think the talent shortage won’t be alleviated for years.

“Of course demand outweighs supply. And things are not getting better any time soon,” Yoshua Bengio, a professor at the University of Montreal and a prominent A.I. researcher, said. “It takes many years to train a Ph.D.”

Follow Cade Metz on Twitter @CadeMetz

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