KNIGHT FOUNDATION WRITE-UP

Preliminary write-up includes a Benchmark comparison to other universities in the State of Florida

Data was obtained from various sources including University Webpages, inputs from several Departmental Chairs, information on Google. We are still awaiting information from few Chairs.

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Points of Pride

FIU SCIS and the College has committed and continued to recruit talented and high-quality faculty from various prestigious Schools such as CMU, MIT, Cornell, Purdue, Georgia Tech, University of Illinois Urbana-Champagne, UCLA and other top ranked Universities. The implication of this hiring has been a direct impact in getting many prestigious awards and on recruiting top-notched students from all around the world and after graduation, we have been able to place them in top industries and various other Universities. This is truly a reflection on FIU SCIS in transition to greatness in the context of National visibility (national awards like IEEE Fellows, ACM Fellows, AAAS Fellows, etc.) and rankings. More importantly, many students/faculties have co-authored textbooks published by MIT Press, Springer etc.

Part I

Org Structure Doc (Current State) – Current organizational structure showing 30 computer science faculty now, specifying general areas of expertise and which and how many are tenured, tenure track, adjunct faculty.

Source: https://www.cis.fiu.edu/people/faculty/.

School of Computing and Information Sciences (SCIS) Organization Structure is:
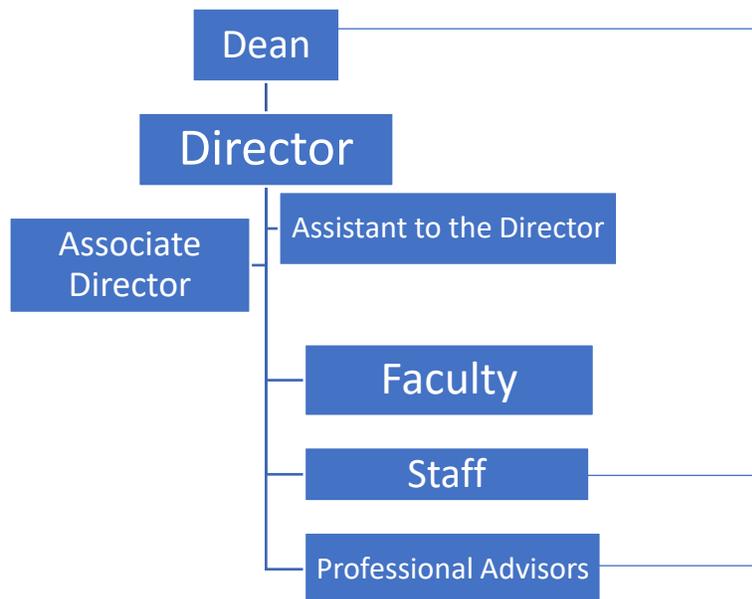
Director

Associate Director

Faculty

- o Full Professor (11)
- o Associate Professor (11)
- o Assistant Professor (8)
- o Full Teaching Professor (1)
- o Associate Teaching Professor (7)
- o Assistant Teaching Professor (9)
- o Professor Emeritus (2)
- o Visiting Assistant Teaching Professor (2)

Staff (Most of them work through the college CEC)
- o Graduate Program Advisor
- o Office Coordinator
- o Program Specialist
- o System Network Administrator
- o Assistant Director, Research Programs
- o Academic Advisors – 7
- o Business Support
- o Systems/Network manager
- o Assistant Director, Academic Support Services
- o Exec. Director, Technology
- o Associate Director Academic Support Services
- o HR Coordinator
- o Office Assistant
- o IT Generalist
- o Assistant to the Director
- o Financial Analyst I
- o Finance Manager

Part II

SCIS Student Enrollment (Fall 2020)

- Number of Undergraduates (In all areas of Computer Science) – 2,718
- Number of Graduate Students (including Masters and Ph.D.) - 332

Part III

Faculty Profiles (Future State) – State that in the future, we will have 50+ faculty and how many will be tenured, associate professors, lecturers. The rest of the doc will have profiles of 15 to 20 faculty at other universities/private sector as examples of the level and caliber of faculty the School is thinking of hiring

- Total number of Tenure track faculty - 30
    - o 11 Full Professors
    - o 11 Associate Professors
    - o 8 Assistant Professors

- Professor of Teaching - 17
    - 1 Full Teaching Professors,
    - 7 Associate Teaching Professors,
    - 9 Assistant Teaching Professors

Current Faculty Research Profiles

The 30 tenure and tenure track faculty can be roughly divided into eight areas: biocomputing and bioinformatics, computer systems, database and data management, networks and cyber-physical systems, cybersecurity, A.I. machine learning and data science, software engineering, and theory and optimization.

Faculty National Visibility

The School has 3 IEEE Fellows, 1 ACM Fellow, 3 AAAS Fellows, 2 Test of Time Prestigious Awards, Taylor Booth Award, IEEE Awards, 8 NSF CAREER awards, 1 DOE award, ACM Distinguished Computer Scientists, Fellow of the National Academy of Inventors, Member of the European Academy of Science, NSA Security Research Award and various national awards.

Degree Offerings

The School offers B.S., M.S., and Ph.D. degrees in Computer Science, and M.S. degrees in Telecommunications and Networking, Cyber-security, and Information Technology as well as B.S./B.A. degrees in Information Technology. M.S. program in Data Science.

Rankings

- 10th in the number of C.S. degrees awarded in C.S. –ASEE
- 26th Best online I.T. degree – Online Schools Report
- 39th nationwide in NSF externally funded research expenditures.
- 86th leading University in U.S. Top Computer Science Universities Ranking -- Guide2Research

Capacity

SCIS has six research centers/clusters with first-class computing and support infrastructure and enjoys broad and dynamic industry and international partnerships.

Part IV

SCIS Significant strategic growth vision

- Digital Forensics
- Bioinformatics and Biodevices
- Human-computer interaction and Robotics

Area 1: Digital Forensics – Digital Crime Scene Investigation

Digital forensics is a subfield of forensic science focusing on the discovery and investigation of evidence found in digital devices, often in relation to computer crime and digital data authenticity. Forensics science is a preeminent program at FIU, and digital forensics is a strength within computer science and engineering. Building our program in digital forensics by adding digital forensics faculty will enhance our national and international research profile and will drive the development of FIU expertise across a number of broader areas of importance, including artificial intelligence and machine learning, natural language processing, big data analytics, data visualization, robotics, computer systems, and software engineering.

An infusion of new faculty in this area will (1) create a pipeline of students with the digital forensics expertise needed to support the administration of justice and the intelligence community across the country, (2) yield impactful approaches that enhance digital forensics gathering and are rich targets for patents and startup companies, and (3) generate open-source software that can increase FIU's visibility and reputation through global use.

Specific research areas might include: (a) building on FIU's strengths in optimization and theoretical computer science to develop new optimization techniques with constrained satisfaction and search to develop powerful new tools for solving previously "impossible" large-scale problems related to inverse problems in digital forensics; (b) developing novel advanced computer and network systems to enable effective digital forensics within dynamic datacenter-scale and Internet-scale networks, harnessing FIU's strengths in computer and network systems research, including cloud computing systems, datacenters, edge-computing systems, embedded and real-time systems, wireless cellular networks, and sensor networks; (c) developing new techniques in machine learning, natural language processing, and cloud computing to enable entirely new types of digital forensic analysis, building on FIU's strengths in these areas.

Area 2: Bioinformatics and Bio Devices

Biology, and Chemistry, and specific clinical fields such as Neurology, and pathology have moved from hypothesis-driven to a data-centric method in recent years. Data sets are powering personalized medicine to more efficiently detect and prevent diseases, including cancer, autism, and ADHD—and at a cost savings. Indeed, the promise of wearable electronics and remote health will help realize personalized medicine. This area will see dramatic growth, as entire academic departments are now being formed in personalized medicine and bioinformatics. Market demand for personalized medicine will require research into the design and development of complex computational and engineering infrastructure for a variety of clinical settings. To this end, high-performance computing will play in pivotal role in precision and personalized medicine which will require extensive expertise in high-performance computing algorithms, architectures, and big data analytics.

Our goal is to integrate multimodal large-scale omics datasets and combine them with machine learning to achieve a much deeper understanding and insight into personalized and precision medicine. This can be done with high-performance computing techniques, allowing us to integrate, process, train, and infer real-time clinical decision-making. Already, this research has started at MIT and Harvard, but science like this requires much larger teams of investigators and resources. Of specific interest is the integration of big data from multiple modalities of omics data that can provide insights and transform how clinical medicine is accomplished. With the expansion of faculty in this area, we will develop the technologies needed to treat Miami's large elderly and minority populations (for large-scale genomics, proteomics, and neuro-connectomics studies).

Area 3: Human Computer Interaction and Robotics

Jobs in the new computing economy will rely heavily on human-computing interaction (HCI) and visualization technologies. The integration of mixed reality (VR/AR), artificial intelligence, machine learning, affective computing, and natural language processing will create new products and services that enhance a variety of human endeavors. Examples include: robotic systems that work safely and effectively alongside humans in hazardous conditions; mixed reality simulations that are used for training in hazardous or difficult-to-replicate situations such as natural disasters or fires; virtual agents that are used to dramatically expand access to mental health services; and artificially intelligence reasoning systems that are sensitive and responsive to cultural contexts of the user.

Computing at FIU already has a strong foundation in this area. CEC and SCIS have established multi-disciplinary collaborations between numerous on-campus entities and external entities, such as local or state public agencies and private companies. For example, the FIU Disaster Response Tracker (FIUDRT) developed by SCIS was adopted by Miami-Dade County Emergency Management's Business Recovery Program to facilitate information exchange among public and private sector organizations during the hurricane seasons and the 2020 Super Bowl. CEC and CARTA have also created two HCI/Visualization research facilities—the Integrated Computer Augment Virtual Environment (I-CAVE) and Robotics and Digital

Fabrication (RDF) Lab—which have already produced impactful outcomes. Using the I-CAVE, for example, researchers have developed Fire360, a virtual reality-based incident command training simulator used to train over 300 firefighters from fire departments in Miami, Coral Gables, and Hialeah. As one of its many activities, the RDF Lab collaborated with Miami Beach Chamber of Commerce (MBCC) to develop a mobile application for building intelligent supply chains in response to COVID-19.

FIU is poised to take its strength in this area to the next level by adding faculty with expertise in visual analytics, artificial intelligence, machine learning, natural language processing, and big data processing. Investments in faculties with these areas—which are in great demand by research funding agencies and companies—will reinforce the college's multi-disciplinary research of HCI and Visualization, create new talents and opportunities to meet the growing demands of the job market, and positively impact the South Florida, Florida, and National economy.

Part V

Strategic Planning for Hiring Faculty members

Area of Digital Forensics/A.I./Machine Learning/Bioinformatics and Bio devices/Human Computer Interaction and Robotics may become a strategic area of development that can be tied in with all the other areas (i.e., as an application and/or supporting area of all other areas). If we are increasing the faculty to 50+, I would like to see that we significantly grow tenure and tenure track positions to 50 and hire in these strategic areas. In this case, we maintain our teaching capacity and can significantly grow the research productivity (and funding) to get within the top #50 C.S. ranks. In terms of distribution of Professors/Assoc. Professors/Asst. Professors, I think 15-20-15 would be a good estimate (accounting for retirements and promotions of our current faculty members).
We also want to create Knight Fellowships both for Undergraduates and Graduates.

Part VI
Benchmarking

Who our peers are in the state, and how do we compare in the following categories: <mark><We are waiting for some more data from the chairs of the Dept.></mark>

- **Patent production**
    - Florida International University (2017-2019) – 21
    - University of Florida, Gainesville (2017-2019) – 30
    - University of Central Florida, Orlando (2017-2019) – 20 (approx.. based on Google Search)
    - University of South Florida, Tampa (2016-2018) – 24
    - Florida State University, Tallahassee (2017-2019) – Approx. 20 for Computer Science (34 for the University as a whole) as reported by a faculty

- **Research dollars per faculty** and total (FYI, based on 2018 ASEE data),
  - Florida International University – 138K (Total number of Tenure track faculty - 30)
  - University of Florida, Gainesville - 117K (Total number of Tenure track faculty – 57)
  - University of Central Florida, Orlando - 98K (Total number of Tenure track faculty - 86)
  - University of South Florida, Tampa – 80K (Total number of Tenure track faculty - 40)
  - Florida State University, Tallahassee – Approx. <mark><60K</mark> (Total number of Tenure track faculty - 34) -not listed in ASEE database

Source: http://profiles.asee.org/profiles/8232/screen/29?school_name=Florida+International+University

- **Two-year retention rate**
  - Florida International University– 91.2%
  - University of Florida, Gainesville – 96%
  - University of Central Florida, Orlando – 90%
  - University of South Florida, Tampa – 90%
  - Florida State University, Tallahassee – 94%

- **Four-year graduation rate**
  - Florida International University– 48% (Potential optimistic value SCIS 2017 FTIC Cohort is 54%)
  - University of Florida, Gainesville – 66%
  - University of Central Florida, Orlando – (72% - 6 year graduation rate)
  - University of South Florida, Tampa – 43%
  - Florida State University, Tallahassee – 68.4%

- **Tech Startups**
  - Florida International University – 3
  - University of Florida, Gainesville – 2
  - University of Central Florida, Orlando – 590+ over 20 years
  - University of South Florida, Tampa – 39 over the past 6 years
  - Florida State University, Tallahassee – Around 10 over the past several years

Looking at the FIU and CEC 2025 strategic plan, we should be able to reach (and lead) in many in college (research funding and expenditures, student 2-yr retention rate, 4/6-yr graduation rate, Ph.D. production, postdocs, graduates' wages, tech startups, and national recognition). We are looking into new degree programs that are not currently capable of offering, such as A.I., biocomputing, quantum computing (C.S. is most versatile in coping with the growing technology field). In this case, we will be able to grow bachelor and graduate degrees in "strategic areas". The accountability metrics in the FIU strategic plan can be used as guidelines or objectives.

Part VII

Conclusion

The above metrics suggest that SCIS is on the way to: faculty hiring, funding, expenditure, graduation rate, recognitions, and recently created programs (MS/BS cybersecurity, M.S. data science).

FIU SCIS and the College has committed and continued to recruit talented and high-quality faculty from various prestigious Schools such as CMU, MIT, Cornell, Purdue, Georgia Tech, University of Illinois Urbana-Champagne, UCLA and other top ranked Universities. The implication of this hiring has been a direct impact on recruiting top-notched students from all around the world and after graduation, we have been able to place them in top industries and various other Universities. This is truly a reflection on FIU SCIS in transition to greatness.