Welcome! This is the Spring/Summer 2016 Newsletter for the Department of Computer Science and Engineering at the University of South Florida.

Our Department offers BS and MS degrees in Computer Science, Computer Engineering, and Information Technology, and a PhD in Computer Science and Engineering.

We have a great department and it is built on a great faculty. Our faculty includes IEEE, ACM, and IAPR Fellows, ten NSF CAREER award recipients, and two Distinguished University Professors. Our faculty members value research, teaching, and service. They do outstanding research in areas that are fundamental to the Computer Science and Computer Engineering disciplines. The following are faculty research areas: artificial intelligence and intelligent systems, computer and network security, computer vision and pattern recognition, computing education research, databases, distributed systems, graphics and visualization, location-aware information systems, networks, programming languages, robotics, VLSI, computer architecture, and parallel processing. Multiple faculty members have been awarded Outstanding Undergraduate Teaching awards from the University. Our faculty members are also very involved with service to professional societies, such as IEEE-CS and ACM, and to our community.

This past year has been a particularly successful year for our faculty in attracting external research funding. Since July 2015, Department faculty members have been awarded a total of $3,285,972 in new federal grants and $149,621 in new corporate grants. This includes an NSF CAREER grant awarded to Dr. Yao Liu and a DARPA Young Faculty Award to Dr. Swaroop Ghosh.

At the present time, we are searching for a new Department Chair to begin in the Fall of 2016. The new Chair is expected to provide a vision and to work with the faculty to lead the Department to international prominence. The new Chair will lead efforts to increase the number of PhD graduates and to develop cross-disciplinary, multi-institutional, and industry relationships for large team research efforts.

More information on the Chair Search is on the Department website.

I hope that you will enjoy reading our latest Newsletter.

Rafael Perez
Professor and Interim Department Chair
Yao Liu received an NSF CAREER award for 5 years totaling $499,950. The grant is titled: “CAREER: A Pathway towards Channel Camouflage and Manipulation Techniques for Wireless Security.”

Wireless channels exhibit what is known as the spatial uncorrelation property. That is, the characteristic of a wireless channel becomes uncorrelated every half carrier wavelength over distance. From this property, it becomes possible to use wireless channel characteristics to authenticate and locate a wireless transmitter. Yao has identified an important attack against schemes that use the uncorrelation property for authentication and location. Notably, an attacker can bypass authentication or camouflage location changes by creating an artificial wireless channel similar to the real one. How to counter this attack is a major network security problem – a problem that Yao and her students will tackle.

Yao’s CAREER project will focus on two important directions of research to counter the artificial wireless channel attack: (i) it will investigate methods that can enable a receiver to effectively detect the existence of an attack where an attacker can
bypass authentication or camouflage location changes by creating an artificial wireless channel similar to the real one, and (ii) it will also explore how the creation of artificial wireless channels can pave the way for significant advancement in wireless security techniques, such as key establishment and anonymous communication. Yao’s project has the potential to substantially improve the security of existing channel-based authentication and location schemes. Yao’s project also creates an entirely new research direction in creating artificial wireless channels to solve practical wireless security problems.

Yao’s research will be coupled with education and training for introducing students to wireless security research, as well as broadening security education to non-specialists.
Swaroop Ghosh received a DARPA Young Faculty Award (YFA) for 2 years totaling $500,000. The grant is titled: “Threshold Defined Logic Engines.” There is a possibility for an extension of $250K for an additional year.

The new technology that Swaroop has proposed will enable a single fixed chip design and layout to present itself as multiple disparate logic engines, where each logic engine is defined solely by the threshold voltages asserted on each device during manufacturing. The logic engines are distinct from one another, with each being stable and robust to conventional process, voltage, and temperature (PVT) tolerances. Using this technology, a true logic engine can assume very different personalities given the same inputs, dependent only upon the threshold voltages selected while respecting high performance and low power in each of its realizations, and obeying conventional reliability rules for NBTI, PBTI, Hot Electron Effect, and electromigration wear-out effects.

The threshold defined logic that Swaroop will develop is a new class of logic family with multi-faceted applications. It will enable personalization of logic during manufacturing to cut down design time by
orders of magnitude. The state-of-the-art technologies that offer similar flexibility include Field Programmable Gate Array (FPGA) and Programmable Logic Array (PLA) both of which demand significant Silicon area, design complexity, and power.

Through this grant Swaroop will be supporting two to three graduate students and one post-doctoral research fellow. To date, the project has resulted in one patent filing and three paper publications.

Professor Swaroop Ghosh
New Grants Awarded to Faculty

Sriram Chellappan awarded NSF grant
Sriram Chellappan received a two-year grant from NSF for $271,799 for a project titled “Human Behavior Assessment from Internet Usage: Foundations, Applications and Algorithms.” This grant is a continuation award for Sriram’s CAREER grant. The goal of this project is to advance human behavior assessment based on real Internet usage data without manual intervention while carefully maintaining user privacy expectations. The project builds on Sriram’s previous work that exploited real Internet usage data collected from Cisco NetFlow records to identify fine-grained Internet usage features associated with symptoms of depression.

Anda Iamnitchi awarded NSF grant
Anda Iamnitchi received a three-year grant from NSF for $661,289 for a project titled “Structural Anonymization Techniques for Large, Labeled, and Dynamic Social Graphs.” The objective of this work is to provide big data owners with tools to safely share their social networks data with the research community. The research focuses on scaling up the computational techniques to be able to anonymize social (thus, sparse) graphs in the order of millions of nodes. The project also contributes to the understanding of dynamic processes on social graphs; involves graduate and undergraduate students in interdisciplinary research; shares resulting code on GitHub; enhances curriculum via collaborative teaching targeted at Sociology and Computer Science students; and disseminates resulting knowledge to audiences ranging from middle school to graduate students via presentation, publications, and summer schools.

Yao Liu and Jay Ligatti awarded NSF grant
Yao Liu and Jay Ligatti received a three-year grant from NSF for $300,000 for a project titled “TWC: Small: Techniques and Tools for Enforcing Proximity-based Policies in Wireless Systems.” Proximity-policy enforcement would improve the security of many wireless devices, however robust techniques and tools do not yet exist for enforcing such policies. This project will create such techniques and tools. The proximity-authentication techniques will allow a device to passively authenticate the location of remote device without having to send messages to, or share secrets with, the remote device. The proximity-policy enforcement tools will specify remote-device location policies, statically analyze specified location policies, and transform valid policies into concrete enforcement code that can be made part of existing connection-establishment code.
Paul Rosen awarded ALMA grant
Paul Rosen along with Bei Wang (University of Utah), Chris Johnson (University of Utah), Jeff Kern (NRAO), and Betsy Mills (NRAO) received a one-year ALMA Development Project grant from the National Radio Astronomy Observatory for $185,000 for a project titled “Feature Extraction and Visualization of AMLA Data Cubes through Topological Data Analysis.” The project is a feasibility study for applying forms of data analysis and visualization never before tested by the ALMA community. As part of this project, prototype software to create visualizations that help in characterizing and analyzing the spectra of complex spectral line sources within a given data cube will be developed.

Sudeep Sarkar awarded NSF grant
Sudeep Sarkar along with Paul Sanberg and Michael Fountain received a three-year grant from NSF for $300,000 (renewable after 3 years) for a project titled “I-Corps Site at USF.” This is a new entrepreneurship program designed for scientists and engineers based on Lean Launch Pad from Stanford and UC Berkeley. USF is one of the only two sites in Florida - nationally, there are 51 sites. USF has the largest number of I-Corps team in Florida.

Yu Sun awarded NSF grant
Yu Sun has received a two-year grant from NSF for $299,887 for a project titled “EAGER: Characterizing Physical Interaction in Instrument Manipulations.” As personal robots become common in our homes, they will perform a broad range of helpful tasks for their owners. The goal of this project is to gather data and develop algorithms that will allow a personal robot to understand how to grasp tools in a way that facilitates its ability to operate that tool safely and effectively.

Yicheng Tu, Jay Ligatti, Sudeep Sarkar, and Swaroop Ghosh awarded NSF grant
Yicheng Tu, Jay Ligatti, Sudeep Sarkar, Swaroop Ghosh along with Sagar A. Pandit from Physics have received a grant from NSF for $679,798 for a project titled “A Research Platform for Heterogeneous, Massively Parallel Computing.” Dmitry Goldgof and Lawrence Hall and Ming Ji from the School of Nursing are Senior Personnel. The main goal of this project is to build a computer cluster with heterogeneous, massive parallel computing capabilities to accelerate existing research and enable ground-breaking new research that shares the same need for intensive computation at USF. The infrastructure is expected to facilitate collaboration and cross-pollination of algorithms, models, representations, and data sets across individual project areas, building a collaborative network across the investigators. Direct benefits to education and research will also be extended to the larger community through the applied aspects of projects, teaching and training.
Swaroop Ghosh awarded 2015 USF Outstanding Research Achievement Award

Swaroop Ghosh is one of the 13 USF researchers who received this award for 2015, which is given to faculty who receive national and international peer recognition for their research in the last calendar year. Swaroop leads the Laboratory Of Green and Secure Integrated Circuits and Systems (LOGICS) with a focus on low-power circuits and hardware security. This team of five PhD, two MS, and multiple REU students has produced 10 IEEE journal articles and over 22 IEEE conference papers since 2012. His research is supported by NSF, SRC, Intel, and DARPA.

Swaroop Ghosh awarded the ACM SIGDA Outstanding New Faculty Award

Swaroop Ghosh was awarded the ACM SIGDA Outstanding New Faculty Award for 2015. The SIGDA Outstanding New Faculty Award recognizes a junior faculty member early in her or his academic career who demonstrates outstanding potential as an educator and/or researcher in the field of electronic design automation. The selection committee considers the impact that the candidate has had on her or his department and on the EDA field during the initial years of their academic appointment. The award is presented annually at Design Automation Conference, and currently consists of a $1,000 award to the faculty member, along with a citation.
Jay Ligatti receives the ACM Test of Time award for 2015

Jay Ligatti received the Test of Time Award at the 2015 ACM Conference on Computer and Communications Security (CCS), for the impact of his CCS 2015 paper, “Control Flow Integrity.” Jay wrote, “In 2003, when I had the idea to embed IDs in [machine code] jump destinations and detect attacks by checking IDs before jumping, in a technique I called control-flow-integrity (CFI) enforcement, I didn’t realize how much attention it would receive. My effort on the project was entirely theoretical, creating the mechanism and proving its soundness for a model machine language. [Coauthors] Úlfar Erlingsson, Martín Abadi, and Mihai Budiu deserve all the credit for making the theoretical design practical, implementing and empirically evaluating the technique, and writing up the descriptions in the original research papers.” As of 2015, Control-Flow Integrity is an active research area, with approximately 50 of the 600 papers submitted to CCS this year being on the topic.

Sudeep Sarkar on team creating new form of computing using circular nanomagnets

Sudeep Sarkar along with Sanjukta Bhanja, D.K. Karunaratne, Ravi Panchumarthy, and Srinath Rajaram (all from Electrical Engineering) have proposed a new form of computing that uses circular nanomagnets to solve quadratic optimization problems orders of magnitude faster than that of a conventional computer. A wide range of application domains can be potentially accelerated through this research such as finding patterns in social media, error-correcting codes to Big Data and biosciences. This work has been published in Nature Nanotechnology titled as “Non Boolean computing with nanomagnets for computer vision applications,” This work was sponsored in part by multiple NSF grants. Most of the fabrication and characterization was done at USF Nanotechnology Research and Education Center (NREC).

Sudeep Sarkar elected as AIMBE Fellow

Sudeep Sarkar is one of four USF faculty elected to the 2016 College of Fellows of the American Institute for Medical and Biological Engineering (AIMBE). Sudeep was elected “for distinguished contributions to the field of gait biometrics and burn scar analysis.” He is considered the world leader in gait biometrics. The benchmark developed by him is the defacto standard in the development of gait recognition algorithms. His research topics range from video image processing to biometrics, and medical image analysis of burn scars.
Shamaria Engram awarded a National GEM Consortium PhD Fellowship

Shamaria Engram, a first-year doctoral student is the recipient of a National GEM Consortium PhD fellowship. In addition to a one-year stipend sponsored by The MITRE Corporation, she will be supported with an R&D internship and professional development activities during summer 2016. Shamaria is working in the Software Security and Programming Languages research group under the supervision of Jay Ligatti. In May 2015, Shamaria earned her B.S. in Computer Engineering from Bethune Cookman University in Daytona Beach, Florida.

USF students are finalists in Embedded System Challenge at CyberSecurity Awareness Week Conference (CSAW) 2015

USF undergraduate students John Gangemi and Sebastian Otero advised by Swaroop Ghosh qualified as finalists in the Embedded System Challenge in CyberSecurity Awareness Week Conference (CSAW), 2015. The security challenge was to hack a voting system so that the decision of the voting could be changed to the desired candidate. The objective was to weaken the homomorphic encryption system using an FPGA and hack the tally server. The students prepared a detailed plan to achieve these objectives and submitted the report. A FPGA platform was also developed to validate the ideas.

Work by USF student researchers featured in IEEE Xplore Innovation Spotlight

USF student researchers Anirudh Srikant and Kenneth Ramclam, supervised by Swaroop Ghosh, tested a physics-based model of Domain Wall Memory (DWM) to determine how it behaves under temperature, radiation, and velocity. They inadvertently discovered that DWM’s characteristics make it a potential asset for hardware security purposes. The students showed that the process variations in the nanowire in a DWN are not good towards robustness, but can be very useful for device authentication enabling uncloneable chips to be built. Their findings have been published in the IEEE Xplore Innovation Spotlight.
2015 Doctoral Graduates

Amin Ahmadi Adl  
Dissertation title: “Computational Methods for Biomaker Identification in Complex Disease”  
Advisor: Xiaoning Qian  
Position: Data Scientist with City of Hope

Caitrin Eaton  
Dissertation title: “Reducing the Control Burden of Robotic Legged Locomotion through Biometric Consonance in Mechanical Design and Control”  
Advisor: Luther Palmer  
Position: Postdoc appointment at UC Irvine

Baishali Chaudhury  
Dissertation title: “The Use of Textural Kinetic Habitats to Mine Diagnostic Information from DCE MR Images of Breast Tumors”  
Advisor: Dmitry Goldgof and Larry Hall  
Position: Postdoc at Moffitt Cancer Center, Tampa

Mou Zhou  
Dissertation title: “Knowledge Discovery and Predictive Modeling from Brain Tumor MRIs”  
Advisor: Larry Hall and Dmitry Goldgof  
Position: Postdoc at Stanford University

Md Imrul Kayes  
Dissertation title: “Content Abuse and Privacy Concerns in Online Social Networks”  
Advisor: Anda Iamnitchi  
Position: Big data analytics at Sonobi

Shilpa Pendyala  
Advisor: Srinivas Katkoori  
Position: CAD Engineer at Intel Corporation

Ravi Panchumarthy  
Dissertation title: “Direct Solutions to Perceptual Organization Problems”  
Advisor: Sudeep Sarkar and Sanjukta Bhanja  
Position: Big Data Systems Engineer at Intel Corporation
When did you first come to USF?
I started with MS in Computer Science in Fall 2001.

Why did you choose USF?
Great research programs & courses offered were important factors in decision making. I got funding in the form of Teaching Assistantship at the time of admission which made the decision a no-brainer.

What was the high point of your time here at USF?
Participating in research that helped the department enter into a new research area in form of American Sign Language Recognition and eventually securing an NSF grant was the high point. Another unforgettable experience of lifetime was Bucs winning Super Bowl XXXVII in 2002!

What recommendations would you give to future students?
Go out and explore different areas of interest. Often it takes time to figure out what drives passion in you, however it’s worth it!

You are the co-founder and VP of Engineering for Unifi Software. Please tell us more about this...
Most of my professional life I have been in big data space. Being part of the founding engineering team at Greenplum gave me an insight into how products are built and eventually used by customers. Greenplum was a startup that created a Massively Parallel Processing Database & it was later acquired by EMC. As the space evolved with Hadoop taking center-stage of the big data movement, the idea of Unifi came into being. At that time, I was working on a Hadoop implementation at a big enterprise customer & understood the pain points that business users faced while working with & preparing data for their analysis. Eventually I met the other co-founders (former co-workers at Greenplum), who saw the same problem from sales standpoint. And that’s when we came together to start Unifi Software. I am leading the engineering team. It has been absolute fun to create the product from scratch & work with an amazingly talented team.
What problem does Unifi Software solve?

Unifi Software is a ‘Self Service Data Preparation’ product that solves the first mile problem of getting data prepared for analysis. The product in centered around idea of democratization of data analysis and it helps business users and data analysts in discovery, acquisition, profiling, cleansing, enrichment & transformation of data so that curated data can be used in upstream applications for reporting, visualization & other tasks. The product provides an easy, user friendly interface to express complicated data problems in very simple fashion. It has a strong recommendation engine that helps users to easily operate on data. Other Unifi product features that enable users are social interaction around data, metadata repository that acts as the single source of truth around data definition, ability to track data lineage & doing all of the tasks in a secure way.

What are the important challenges in starting a company?

There are different challenges at different stages of a startup. One of the initial challenges is around fund raising. You learn a lot on how to be articulate & explain the problem statement you plan to solve to the investment community that may not have similar background as you. After you get over the hump of fund raising, the most important challenge is to scale the organization. For me particularly, it was a very good experience on how to take a 3 people founding engineering group to 25 people engineering organization that’s further growing. There are lessons learnt on both leadership and technical front. As a leader I learnt that it’s important to keep the efficiency and the culture similar while you grow & that leads to organization scaling in productivity. On technical side the learning was to innovate and design the product architecture so that feature development can be scaled. Finally, of course new challenges keep coming up & that’s helping me learn more…..

Changes in the Faculty

We are very saddened by the recent death of Paul Bao due to illness. Paul passed away in January 2016. Paul was an Associate Professor in the Department and taught extensively in the undergraduate and graduate Information Technology programs. Paul is missed by the faculty, staff, and students.

In August 2016 we will have two new full-time Instructors joining the Department. Valentina Korzhova, previously a Visiting Instructor, has been hired as full-time Instructor 1. Valentina will be teaching upper-level undergraduate courses in the Computer Science and Computer Engineering programs with an emphasis on theory courses. Phil Ventura, previously Professor of Computer Science and Department Chair of Computer Science and CAPTURE at Palm Beach State College, Boca Raton Campus has been hired as a full-time Instructor 2. Phil will be teaching a broad range of undergraduate and graduate courses in the Information Technology and Computer Science programs.
Aziz Batihk
Expected BS in Computer Science graduate May 2016 who will be joining Twitter upon graduation.

When did you first come to USF?
Started at USF St. Petersburg in Spring 2012, transferred to USF Tampa in Fall 2013.

Why did you choose USF?
I’m an International Student and a First Generation in College in my family, so going to the US for college was a big step. I was really unsure where to go, I applied to several universities in Florida but I had friends from the US who recommended it, so I went with it. From the very first semester, I enjoyed it and that continued all the way through.

What has been the high point of your time here at USF?
The people (professors, co-workers, fellow classmates) have definitely made the experience here a memorable one.

What has been the low point?
During my earlier time at USF, I wish there were more hack-a-thons and programming competitions, but that seems to be changing as of recently!

What recommendations would you give to future students?
Be proactive outside of class, explore organizations, participate in programming competitions, build apps, build connections, most importantly, have fun.

I understand that you will be joining Twitter on graduation. Please tell me more about this . . .

How did you find your position at Twitter?
I attended the SHPE National Conference in Baltimore, MD last Fall and applied there. A month or two later, they contacted me.
What was the interview like?
I was first given an online coding challenge, after which I had a technical phone interview that lasted 45 minutes. Afterwards, I was flown out to their HQ in San Francisco, CA for 5 interviews (4 x 45 minute technical, 1 x 30 minute social) and lunch with an engineer. The technical interviews generally consisted of developing an analyzing an algorithm to solve a specific problem and then discussing how those would scale on larger scale systems.

What course(s) do you think prepared you the best for getting this position?
Analysis of Algorithms, Data Structures, Computer Networks, Mobile Development.

Other than courses, what else prepared you for getting this position?
Pursuing projects outside of class (building apps, web service) and practicing interview questions on HackerRank.com.

Does Twitter expect you to “come up to speed” on anything new before you start?
It was recommended that I dive into Data Mining as well as brush up on Scala & Java. I’m currently taking a Coursera course on Data Mining to help with that.

What will you be doing when you join Twitter?
I’ve been placed on the Anti-Spam team, under the Product Safety division.

“The people (professors, co-workers, fellow classmates) have definitely made the experience here a memorable one."

- Aziz Batihk