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NEWSLETTER



FALL 2008

Message from the Chair



It is with pleasure that I write this letter for our third annual FSU CS newsletter. Much has happened over the last year. We have developed and initiated a new undergraduate degree program in Computer Criminology in Fall 2007 and are now offering an MS in Software Engineering online. We have a record number of PhD students in the department and now almost half of our graduate students are enrolled in the PhD program. CS faculty, staff, and students continue to be honored with various awards. The department's accomplishments are particularly noteworthy given the significant challenges it has faced due to budget cuts imposed upon FSU. I hope you read this newsletter to find out the latest events concerning the department. I also encourage you to explore the department through our web pages and to visit us in person.

Faculty, Staff, and Student Awards

There have been several awards obtained by CS faculty, staff, and students during the last year. Ted Baker is the first recipient of the Mainline Information Systems Professorship that was recently established through an endowment from Mainline Information Systems to honor faculty that have exemplified excellence in the performance of teaching, research, and service. This is the first award for this professorship and Dr. Baker will be the Mainline Information Systems Professor for the next three academic years. Xiuwen Liu received the FSU Developing Scholar Award for 2007-2008. The Developing Scholar Award is based on evidence of a clearly established program of teaching, research and creativity lasting over a number of years. FSU tenured associate professors are eligible to apply and this award is very competitive. Professor Liu is only the third Computer Science professor who has received this prestigious award. Betty Stanton is a recipient of the FSU Undergraduate Advising Award for 2007-2008. This award is established to honor faculty or staff for excellence in undergraduate advising. I am sure many of you benefited from the advice you received from Betty over the years when you attended FSU. Stephen Hines was selected to be a recipient of the FSU Graduate Student Research and Creativity Award for 2007-2008. This awards program is designed to recognize the superior contributions of up to six FSU graduate students for their research and creative endeavors. Awards are made to students in three disciplinary categories: natural and physical sciences including mathematics and engineering (STEM); social and behavioral sciences (SBS); and the humanities and arts (AH). This award is extremely competitive and Stephen Hines is the first Computer Science graduate student to receive this award since it was established in 2005. Alejandro Cabrera received an FSU Presidential University Fellowship. These fellowships are multi-year, provide a higher stipend, and are awarded to newly enrolling graduate students at FSU who must be in a Ph.D. program. Polina Volkova received an FSU University Fellowship.

New Undergraduate Degree Program in Computer Criminology

The FSU Computer Science Department and the College of Criminology and Criminal Justice have developed a new undergraduate degree program in Computer Criminology that officially started in the Fall 2007 semester. The core of the degree program consists of a number of required courses in both Computer Science and Criminology, along with capstone courses having both Computer Science and Criminology prerequisites. A Computer Criminology student will learn both how to use computers to facilitate the study of crime and will study how crimes are accomplished through the use of computers. We anticipate there will be a significant demand for graduates of the Computer Criminology program. There is a pressing need for information technology specialists to handle issues related to information crime, cyberforensics, and computer/network security. However, there is also a need for computer skills for the prevention, detection, and study of all types of crime, whether or not they involve the use of information technology. Graduates of the program will be prepared to work either for law enforcement agencies as information crime specialists, within companies or organizations as network security specialists, or within academia and government to study the causes of crime and the best methods for its prevention.

Alumni Events

Each Friday before Homecoming in the Fall semester, the CS Department sponsors two events. The first event is a "Grad Made Good" presentation by a former FSU CS student. This year this presentation will be at 2pm on November 14 in HCB 316 (the new classroom building just south of the student union). The speaker will be Alan George who graduated from FSU with a PhD in Computer Science in 1991. Dr. George is a professor in the Electrical and Computer Engineering Department at the University of Florida. The second event later that same day from 4pm to 6pm we will have our annual FSU CS alumni gathering, which will be held at Beef O'Bradys. You should be receiving an invitation for these Homecoming events during the Fall semester. Each Spring semester about a week before final exams there is the CS Honors Ceremony. We honor the achievements of CS students and faculty and we also induct the latest set of students who have qualified for Upsilon Pi Epsilon, the CS honor society. Please check the calendar on the department main web page for notification of the CS Honors Ceremony.

Recent CS Faculty Research

Sudhir Aggarwal is Director of the E-crime Investigative Technologies Laboratory (ECIT). ECIT conducts research in support of digital forensic investigations. The R&D activities involve developing new technologies and forensic tools to address real-world problems related to electronic/digital crime. Three current projects are the DNA project, dedicated to developing more efficient techniques for breaking passwords and passphrases; the UnMask project, which is building a comprehensive toolkit for the automatic investigation of phishing email attacks; and the PAPA2 project, which is developing advanced monitoring capabilities that could be used in controlled environments such as the monitoring of internet usage by prisoners.

Ted Baker, Andy Wang, and grad-student Mark Stanovich are working on improving device-drivers for real-time systems, with support of a 4-year grant from the National Science Foundation. They have developed techniques for managing the trade-offs between worst-case I/O completion times, average I/O throughput, and CPU scheduling interference caused by device driver activity, and demonstrated their effectiveness on network and disk devices. This research has been presented at the IEEE Real-Time and Embedded Technology and Applications Symposia in 2007 and 2008. Ted Baker is also doing research on real-time scheduling for multi-core processors, in collaboration with colleagues at the University of North Carolina and the Scuola Sant'Anna in Pisa. A paper on some his most recent work was selected as one of the four best presented at the Euromicro Conference on Real-Time Systems, in Prague.

Mike Burmester's current research interests include cryptography, network security and the security of ubiquitous applications: in particular, the security of MANETs, sensor networks, RFID systems, etc, lightweight cryptography and privacy (unlinkability) issues.

Zhenhai Duan's recent research efforts focus on developing an accountable and dependable Internet with good end-to-end performance in order for the Internet to support critical infrastructures such as communication, finance, energy distribution, and transportation. Towards this goal, he has

developed techniques to control IP spoofing, the act to fake the source addresses of IP packets. IP spoofing makes it hard to tackle many network security problems such as Distributed Denial of Service (DDoS), as attackers can hide their true identities and locations via this technique. In order to tackle the email spam problem, he has also recently studied the behavioral characteristics of spammers at both the mail-server level and the network level, and developed a new message delivery architecture to proactively control email spam. To better support time-sensitive applications, he has also developed techniques to improve the routing stability of the Internet. His recent work appeared in IEEE Transactions on Dependable and Secure Computing and Computer Networks.

Nearest neighbor search is a fundamental geometric approach that is important in various applications, including data mining, machine learning, pattern recognition, computer vision, graphics, statistics, bioinformatics, and data compression. Applications of the nearest neighbor problem are particularly motivated with respect to problems such as reconstruction, visualization, and simplification for geometry processing applications. The advent of new multi-core architectures, as well as their anticipated widespread adoption, is another motivation to redesign algorithmic-based systems and processes for the nearest neighbor problem, even with the added difficulty and complexity of developing multi-threaded applications. Piyush Kumar and Michael Connor (a PhD student of Computer Science) have come up with a fast C++ library called STANN to solve the problem in lower dimensions.

Feifei Li's most recent research interest is the efficient management of probabilistic data that is widely used in scientific databases, streaming and sensor data, multimedia data, etc. Probabilistic data is a more general model to the deterministic data, where a relation can encode exponentially many possible deterministic instances. His work developed novel query processing algorithms for ranking and aggregation queries over probabilistic data. His research has been published in top database conferences, such as ACM SIGMOD, VLDB and IEEE ICDE and has received support from industry research labs, e.g., AT&T Labs-Research. His general research interest is database and data management and he has worked in other topics in this field,

such as, data security and privacy, spatial data, sensor and streaming data.

With recent advances in imaging and sensing technologies in life sciences, efficient and effective image analysis algorithms and systems become critically important for research as well as applications. Xiuwen Liu has been developing computational strategies for analyzing surfaces in medical images and tools for measuring accurate cell properties for stem cell research. By collaborating with FSU colleagues, Xiuwen Liu's group has recently developed and implemented algorithms for computing geodesic distance between surfaces (such cortical areas in the brain), which enables statistical analysis of surfaces that are vital for certain early disease detection and other applications. His group has also developed a fish Finder package that allows measuring automatically nuclei properties that are believed to be important for stem cell research. Here FISH stands for Fluorescence in Situ Hybridization.

During the past year Dr. Mascagni has worked on several seemingly different problems that are linked by the generation and use of random numbers. First, Dr. Mascagni has continued his development of the Scalable Parallel Random Number Generators (SPRNG) library. This is the most widely used tool for random number generation on parallel and distributed computers, and is available from www.sprng.org. He has also been putting these numbers to good use by developing Monte Carlo algorithms for problems in structural biology, biophysics, and materials science. In particular, he has been using Monte Carlo methods, in collaboration with colleagues at FSU and in Europe, to an important problem in continuum electrostatics with a novel method. In addition, he has restarted working in computational neuroscience with FSU colleagues.

Ashok Srinivasan works on High Performance Computing, with an emphasis on applications and algorithms. Emerging computing platforms promise abundant computing power. However, it is not easy to make efficient use of them. His research involves developing new algorithms, often specialized to the specific application considered, which will improve performance. Some of the platforms he is studying are: (i) massively parallel machines, and (ii) accelerators, such as the Cell processor

Faculty Research (cont.)

and GPUs. His work on massively parallel machines is supported by grants from NSF and DOE. Nvidia donates GPUs under their University Partnership Program.

Gary Tyson and David Whalley have recently developed some new architectural innovations that are applicable for being adopted in embedded processors. They have developed an instruction register file that has been shown to both reduce code size of applications while also reducing energy consumption. They have also developed a new instruction filter cache that significantly reduces energy consumption by only accessing the filter cache when instructions are guaranteed to reside in it. This research has been presented at ISCA and MICRO, which are generally recognized as the top computer architecture conferences. Patents have been filed by FSU for both of these inventions and this work received interest from several companies, including ARM and Sun Microsystems.

Robert van Engelen recently developed innovative auto-generation techniques to transform Web services definitions into auto-serialization routines for XML processors and SOAP/XML Web services. The aim is to simplify and significantly expedite the manipulation of XML in document-oriented applications and XML-centric services. Publications include IEEE ICWS, IEEE SCC, IEEE CCGrid, IEEE ITCC, IEEE Internet Computing Journal, and ACM Transactions on Internet Technologies. A startup company "Genivia Inc" was founded to offer new commercialized components for the gSOAP toolkit. The toolkit is licensed to several Fortune 500 companies, Internet startups, and document processing businesses. For example, in the near future the newest generations of office machines (printer, scanner, fax, etc) will run an embedded version of the software. A patent application "the service-oriented file system" was filed by FSU for a related invention.

Andy Wang has recently completed an NSF project, culminating in the design, implementation, and measurement of a Power-Aware RAID (PARAID), which is one of the first energy-saving storage prototypes. PARAID demonstrates up to a 34% of power savings, while retaining similar performance and reliability characteristics. This system was published at the USENIX File and Storage Technology Conference, a flagship event in the storage arena. The paper was also invited to be published in the ACM Transactions on Storage. The evaluation experience of PARAID results in metrics and

quantifications of complex transformations of workloads by the legacy storage data path. This finding was published at the IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems.

The research group led by Prof. Xin Yuan investigates new and more efficient methods for realizing Message Passing Interface (MPI) collective communication routines that are widely used in high performance computing applications such as weather prediction and DNA folding. A software system developed by Prof. Yuan's group, STAR-MPI, is being ported to the IBM Bluegene machine, currently the world's fastest supercomputer.

Zhenghao Zhang has recently been

working on improving the performance of wireless Local Area Networks (LAN). He studied novel techniques including Multi-user Multiple-Input-Multiple Output that could significantly increase the speed of a wireless LAN. This research has been presented at IPDPS and recently he has been focusing on implementing and testing these techniques with Software Defined Radio. He has also been working on optical interconnects for large parallel computers and proposed a new architecture along with the packet scheduling algorithm that achieves low packet latency. He has also been working on wireless ad hoc networks and peer-to-peer networks and proposed robust incentive mechanisms for peer contribution.

Recruiting Help Needed for Computer Science Undergraduate Majors

Many of you may be aware that there has been a nationwide decline in the number of Computer Science undergraduate majors. However, you may not be aware there has also been a significant decline of CS majors here at FSU. The reason we hear most often is the perception that there are not software jobs available in the US due to the dot.com bust and outsourcing. While there has been some outsourcing of some positions, the number of software jobs in the US continues to increase and is significantly higher than at the peak of the dot.com boom. Rarely a week that goes by without the CS department chair getting contacted by a company that is eager to hire our majors. A high percentage of our undergraduate students have part time jobs due to the high demand for their skills even before they graduate and many of our students take internships as well. We believe this is a nationwide crisis since without Computer Science graduates, the United States could lose its dominant position as a technology leader. The FSU CS department has resisted making the CS degree requirements easier in order to attract more students and has instead tried to publicize the demand for CS graduates. While the FSU CS department has provided information to show that Computer Science is an excellent choice for a major (<http://www.cs.fsu.edu/prospective/undergrad/whymajor.php>), we could use your help to dispel these myths that Computer Science graduates cannot get jobs. If you are satisfied with your degree, then please recommend Computer Science as a major to high school students or their parents.

Faculty Changes

The Computer Science Department has had the misfortune of several faculty and staff deciding to leave the department during the last year. Breno de Medeiros left to join Google in Mountain View, CA. Ken Baldauf left to become the director of the newly formed Program in Interdisciplinary Computing at FSU. Ladislav Kohout has retired and is now a Professor Emeritus of Computer Science. Alec Yasinsac has moved to the University of South Alabama to become the Dean of the School of Computer and Information Sciences. We wish each of our former colleagues' success in their new endeavors.





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