

## From the Chairman



As computing now plays a significant role in many other specialties, computer science has truly become a multi-disciplinary field. Our faculty have epitomized this spirit by collaborating with a wide variety of other departments -- ranging from biology and psychology to criminal justice and MIS -- both at the University of Memphis and at other schools.

We are working on giving our curriculum greater depth of coverage in core computer science areas, while also broadening our students' horizons via offerings that cater to the multidisciplinary environment. These options include our recently added Applied Computer Science and Bioinformatics degree programs, as well as courses in computer graphics and 3-D game design. Several of our students are now working with Resolute Games and Apps, a local company specializing in software development for mobile phones.

I continue to be very proud of the achievements of our students and faculty. This semester, students from our new Game Theory in Cyber Security research group have been recognized at both the university and national levels. In addition, we have seen the third Computer Science professor in as many years win an Early Career Research Award from the University of Memphis College of Arts and Sciences.

I look forward to seeing what the future may bring to the Department!

*Dr. Sajjan Shiva*

## Department News

### *U of M Hosts Linguistics Olympiad; Local Student Advances*



**Dr. Vasile Rus** coordinated the local portion of the North American Computational Linguistics Olympiad (NACLO), which was hosted in February on the U of M campus. The Olympiad is a contest in which high-school students solve a variety of linguistic puzzles requiring logic skills.

**Wesley Jones**, a junior from Shelby County's Houston High School, tied for 10th place out of 1117 students who participated in the Olympiad nationally, allowing him to advance to the second round of the competition.

### *Fourth Annual STEP Workshop*

The Computer Science Department, along with MIS and Computer Engineering, are co-hosting the **Fourth International Research Workshop on Advances and Innovations in Software Testing** at the FedEx Institute of Technology from May 3-4. As part of the Systems Testing Excellence Program (STEP), this annual workshop aims to help position the University of Memphis as an internationally recognized leader in the science of systems testing. CS faculty **Dr. Sajjan Shiva** and **Dr. Linda Sherrell** served as the workshop's general chair and registration chair, respectively.

The workshop enjoys support from a number of corporate sponsors, including FedEx, Syntel, Mphasis, and Cisco Systems. For more information and a detailed workshop schedule, please see [step.memphis.edu](http://step.memphis.edu)

### *NSA/DHS Recognize U of M*

The National Security Agency and Department of Homeland Security have designated the U of M as a National Center of Academic Excellence in Information Assurance Research for academic years 2010-2015. According to **Dr. Dipankar Dasgupta**, director of the university's Center for Information Assurance, we are the only Tennessee university to receive this honor, joining about 40 other universities in the nation.

### *Game Theory in Cyber Security*

The **Game Theory in Cyber Security (GTCS)** research group was initiated through a grant from the Office of Naval Research (ONR) in April 2009, with **Dr. Sajjan Shiva** as PI and **Drs. Dipankar Dasgupta** and **Qishi Wu** as co-PIs. The research team has grown to include a postdoctoral fellow (**Dr. Sankardas Roy**), six Ph.D. students (**Harkeerat Bedi**, **Beata Kubiak**, **Chris Simmons**, **Vivek Shandilya**, **Vivek Datla**, and **Nisrine Enyinda**), and one undergraduate (**Charles Ellis**).

GTCS members have been exploring the applicability of game theoretic approaches to address challenging cyber security issues. Their major accomplishments to date have included conducting a thorough survey of the existing game-theoretic solutions to cyber security problems; building a state-of-the-art attack taxonomy; proposing stochastic game models for generic cyber activities (attacks and defenses) that eliminate the unrealistic assumptions of existing models; and modeling the interaction between a class of attacks and the possible countermeasures as a two-player general-sum static and dynamic game. A Game Theory-Inspired Defense Architecture (GIDA) is now being formulated.

GTCS has received recognition from the research community. A paper by the team received the Best Paper award at the 2010 Spring Simulation Multiconference held in Orlando, FL, from April 11-14. This work also won the Best Poster award at the University of Memphis Student Research Forum on April 5. GTCS members have also published papers this year at the 43rd Hawaii International Conference on System Sciences in January, the 5th International Conference on Information Warfare and Security in April, and the Cyber Security and Information Intelligence Research Workshop in April.

### *Programming Challenge 2010*

The annual Programming Challenge allows teams of high-school students from throughout the Mid-South to spend the semester developing a game, which they then present to a panel of professional judges on the University of Memphis campus. The theme of this year's event was to develop a multiplayer game.

Although attendance was low this year due to severe thunderstorms, four teams braved the inclement weather to present their projects on April 24.

**Dr. Sajjan Shiva** has been personally recognized by University of Memphis President Shirley Raines for his volunteer efforts with the accreditation agency ABET. Dr. Shiva has participated in approximately 10 visits to other universities to accredit their computing programs, ensuring that their students receive a quality education.

**Dr. Lan Wang** has been selected to receive a 2010 Early Career Research Award from the University of Memphis College of Arts and Sciences. Dr. Wang's research focuses on computer networking and security issues. Her research areas include Internet attack mitigation, future Internet design, Internet monitoring, and wireless medical monitoring. Since 2006, she has received 2 major research grants and 2 supplemental grants from the National Science Foundation. She has also won 4 research grants and 1 education grant from the University of Memphis. More information can be found at [www.cs.memphis.edu/~lanwang/](http://www.cs.memphis.edu/~lanwang/)

## Faculty Achievements



**Dr. Dipankar Dasgupta** (pictured above) gave a keynote speech at the World Congress on Nature and Biologically Inspired Computing (NaBIC), held in Coimbatore, India, last December. During the same month, he also offered a tutorial on immunological computation at the Second International Conference on Emerging Trends in Engineering & Technology (ICETET 2009), held in Nagpur, India.

On June 23 this year, Dr. Dasgupta will give an invited keynote talk at the Future Challenges in Network Security conference held in Prague, Czech Republic. This conference is sponsored by ONR Global/AFRL.

**Dr. Stan Franklin** and Dr. Wendell Wallach from Yale University are editing a special issue of *TopiCS (Topics in Cognitive Science)*, a journal of the Cognitive Science Society. The special issue is entitled Cognitive Based Theories of Moral Decision Making. Franklin and Wallach (along with Dr. Collin Allen of Indiana) also have a joint paper to appear in that issue.

This summer, **Dr. Max H. Garzon** will deliver invited talks at DNA 16, the International Workshop in Biomolecular Computing, in Hong Kong and the International Joint Conference in Neural Networks in Barcelona.

**Dr. Santosh Kumar** is serving as the Technical Program Committee (TPC) Co-Chair for the 31st IEEE International Conference on Computer Communication Networks (ICCCN) for its Wireless Networks and Emerging Technologies (WNET) Track. He is also co-chairing the Steering Committee of the Network on Exposures to Psychosocial Stress and Addictive Substances (NEPSAS) subgroup of the Genes Environment & Health Initiative (GEI) at the National Institutes of Health (NIH).

Dr. Kumar's **AutoSense** system is now functional and currently being used in a scientific field study at the University of Minnesota Medical School. AutoSense consists of six wearable wireless medical sensors integrated onto a low-power "mote" device (pictured below), wirelessly feeding measurements to an Android G1 smart phone. This project is sponsored by NIH and spans five universities. More information is available at [autosense.memphis.edu](http://autosense.memphis.edu)





# Student Highlights

**Charles Ellis** and **Vivek Datla**, two student members of the Game Theory in Cyber Security research group, were co-authors on a paper that won the Best Overall Paper Award at the Spring Simulation Multiconference (SpringSim'10) held in Orlando, FL, from April 11-15. The paper, entitled "On Modeling & Simulation of Game Theory-based Defense Mechanisms against DoS & DDoS Attacks," also involved contributions from faculty **Dr. Qishi Wu** and **Dr. Sajjan Shiva**, and postdoc **Dr. Sankardas Roy**.

**Yaoqing Liu**, a Ph.D. student in **Dr. Lan Wang's** Networking Research Lab, won second place in the Graduate Math/CS category at the University of Memphis Student Research Forum, for his work on router FIB aggregation. Yaoqing and Dr. Wang are also co-authors of the paper "Evolution towards Global Routing Scalability," which will appear in the *IEEE Journal on Selected Areas in Communications*.

**Ernest McCracken**, another Ph.D. student from the Networking Research Lab, will present his research on "A Multi-Modal Sensor System Integrating COTS Technology for Surveillance and Tracking" at the IEEE International Radar Conference in May.

**Ryan McCall**, a Ph.D. student of **Dr. Stan Franklin**, will present a paper jointly authored with Dr. Franklin and postdoc Sidney D'Mello at this year's Florida Artificial Intelligence Research Society Conference. The paper is entitled "Grounded Event-Based and Modal Representations for Objects, Relations, Beliefs, Etc."

**Yi Gu**, a Ph.D. student with **Dr. Qishi Wu**, was selected as a finalist for the prestigious Google Anita Borg Scholarship. She shared this distinction with finalists from such schools as Carnegie Mellon, Cornell, MIT, Princeton, and Stanford.

Applied CS graduates **David Sears** and **Yanchen Wei** have developed capstone projects for the city of Memphis on GIS services for disaster planning and emergencies. The deadline for applying to the APCS program is July 31.

## CS Research Day 2010



The Computer Science Department held our sixth annual **Research Day** on March 19, in the brand-new University Center. This event allows students to present their research in a friendly environment. Faculty judges select the best submissions, which receive cash prizes.

This year we had a total of 11 presentations and 5 poster submissions. **Mihai Lintean** took first place in the presentation category for his work under Dr. Vasile Rus on "Dissimilarity Kernels for Paraphrase Identification." Second place went to **Salahuddin Masum** for his work under Dr. Santosh Kumar entitled "On Determining Optimal Range to Achieve Barrier Coverage with Directional Sensors." **Santanu Guha**, another of Dr. Kumar's students, took third place with "Self-Contained Infrastructure-Less Tracking of Assets."

In the poster category, **Somnath Mitra** took first place for his work under Dr. Kumar entitled "From Traditional Mote-Style Sensor Networks to Smartphones - A Bridge in the Gap." Second place went to **Vivek Datla** and **Charles Ellis** for their project under Dr. Qishi Wu, "On Modeling and Simulation of Game Theory-Based Defense Mechanisms against DoS and DDoS Attacks."

Congratulations to the winners and to all the participants for making this event a success! Special thanks to **Dr. Stan Franklin** for organizing the event, and to our panel of faculty judges, **Dr. Vinhthuy Phan**, **Dr. Vasile Rus**, and **Dr. Lan Wang**.

We hope to see even more people participate in next year's Research Day! An announcement will be posted in the early spring.

For more about projects and to see winners from past events, please see our online Research Day archive at [www.cs.memphis.edu/researchday](http://www.cs.memphis.edu/researchday)

## ACM Activities

This semester the ACM Student Chapter held two events. A February workshop introduced tools to help programmers more efficiently produce applications. Various features of IDEs were presented, such as code completion, automatic code generation, auto formatting, refactoring tools, usage lookup, insta-imports, and versioning systems.

In March, the chapter held a guest lecture by invited speaker **Jay Dauró**. A software engineer with Intergraph Corp. in Huntsville, AL, Jay discussed his own career and gave advice for students seeking future employment in the field.

Interested in the ACM? Contact **Ernest McCracken**, Student Chapter President ([emccrckn@memphis.edu](mailto:emccrckn@memphis.edu)) or **Craig Herndon**, Student Chapter Vice President ([cthrndon@memphis.edu](mailto:cthrndon@memphis.edu)).

## Spring 2010 Graduates

### M.S. Applied Computer Science

David R. Sears  
Yanchen Wei

### B.S.

Xiaoshan Cai (summa cum laude)  
Jonathan G. Chan  
Ebony Eyvette Haigler  
James Rankin Taylor

## Upcoming Events

The **Second Annual Computational Thinking Summer Camp for Girls** will be held on the U of M campus from July 12-16. This camp aims to encourage female interest and participation in computer science by introducing middle- and high-school girls to the concepts of computational thinking and how it can be applied to our everyday lives. The camp will be free to all attendees; female 8th-11th grade students from throughout the Memphis area are invited to attend. For more information or to register, please contact **Dr. Linda Sherrell** at [sherrell@cs.memphis.edu](mailto:sherrell@cs.memphis.edu)

## CS Colloquium

The CS Colloquium this semester included talks from distinguished visiting researchers as well as members of industry and University of Memphis faculty.

**Madan Birla**, Innovation Culture  
"How to Gain Acceptance of Your Ideas"

**Hal Roberts**, Harvard University  
"Mapping Local Internet Control"

**Jie Wu**, Temple University  
"Mobility in Wireless Networks: Friend or Foe"

**Chris Przybyszewski**, Resolute Games and Apps  
"Comparing Apples to Androids: Ideas in Cross-Platform Software Development"

**Rabinarayan Mahapatra**, Texas A&M University  
"How Do We Handle Many-Core Systems-on-Chip (SoCs)?"

**Kevin Chang**, University of Illinois, Urbana-Champaign  
"Data-Aware Search: Web Scale Integration, Web Scale Inspiration"

**Janet Burge**, Miami University  
"Software Engineering using Rationale"

**Stan Franklin**, University of Memphis  
"Computational Cognitive Architectures: An Overview featuring LIDA"

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