



CS students attend Google Workshop for Women in Engineering

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Graduate students Shweta Padubidri, Cindy Burklow, Priya Rajachidambaram and Gayathri Namasivayam attended the 2008 Google Workshop for Women Engineers in celebration of National Engineers Week and Introduce a Girl to Engineering Day. They were four of 150 female computer scientists selected to attend this three-day, all expenses paid workshop at Google's headquarters in Mountain View, California, February 21- 23. Liangrong Yi was a finalist in the Google scholarship competition. Although she did not get a scholarship, she did get \$1000 and a free visit to Google for a workshop.

Griffioen named to Professorship



Griffioen

outstanding research achievement. It carries an award of \$35,000 to enable professors to pursue their research full time or continue to teach and use the award to support research activities.

Professor Jim Griffioen has been named a University Research Professor for 2008-2009 by the University of Kentucky Board of Trustees. The University Research Professorships, established by the UK Board of Trustees in 1976, recognize

Marek receives award



Marek

Lauderdale, Fla., January 2 - 4 2008. Professor Marek was also invited to give a plenary talk for the winter meeting of the Association of Symbolic Logic in January 2008. This was part of the Annual Meeting of the American Mathematical Society. The subject of the presentation was "Answering Set Programming."

Professor Victor Marek was recognized by colleagues who organized a session on Logic in Artificial Intelligence: Special Session in Honor of the 65th Birthday of Victor Marek as part of the Tenth International Symposium on Artificial Intelligence and Mathematics, held in Fort

see blue.

Spring is Awards Season



CS Department members at the College of Engineering Awards Banquet in April. Left to Right: Jie Wang, Doctoral Student; Ryan McKenzie, Lecturer; Ken Calvert, Department Chair; Jerzy Jaromczyk, Professor; David Krieg, Graduating Senior and Nick Mattei, Teaching Assistant. (Not shown: Casey Lengacher.)

Spring is awards season and the Computer Science Department recognized outstanding students and faculty.

Doctoral student Lian Liu received the Carol Adelstein Outstanding Student Award. The award is presented annually "to students with a disability who best serve as an inspiration to the university community through excellence in academic achievement; leadership; extracurricular activities; and social and personal qualities." Liu is studying with Professor Jun Zhang.

Yi Luo, a doctoral student working with Prof. D. "Mani" Manivannan, received a Kentucky Opportunity Fellowship.

Department awards were presented at the College of Engineering Awards Banquet, which was held April 15. The Thaddeus B. Curtz Annual Memorial Scholarship Award was presented to Jie Wang, a Ph.D. student studying with Prof. Jun Zhang. The ACM/Upsilon Pi Epsilon Outstanding Teacher Award went to Professor Jerzy Jaromczyk. (Prof. Jaromczyk is also a past recipient of the University Alumni Association's "Great Teacher" award.) The ACM/UPE awards for Outstanding Teaching Assistant and Outstanding Graduating Senior went to Nicholas Mattei and David Krieg, respectively.

Two special departmental awards were presented at the awards banquet. One, for "Excellence in Contributions to the Computer Science Enrichment Programs" was presented to Casey Lengacher. Ryan McKenzie received an award for his contributions to excellence in undergraduate education. Ryan received his bachelor's and master's degrees from UKCS, and has been working as a lecturer in the department for several years. He is leaving UK for the University of North Carolina at Chapel Hill, where he will begin work on a Ph.D. in Computer Science this Fall.

The CS Department graduated 10 Ph.D. students during the 2007 - 2008 academic year - a new record.

Distinguished Lecture Series 2008 - 2009

Speaker: Randy Bryant, Carnegie Mellon University
Date: Monday, September 22, 2008, 5:30 p.m.
Place: Auditorium, W. T. Young Library
Title: Data-Intensive Super Computing: Taking Google-Style Computing Beyond Web Search

Speaker: Professor Mary K. Vernon, University of Wisconsin
Date: Thursday, January 15, 2009, 5:30 p.m.
Place: Auditorium, W. T. Young Library
Title: Quantitative System Design

Speaker: Professor K. Mani Chandy, California Institute of Technology
Date: Friday, October 17, 2008, 5:30 p.m.
Place: Room 102, Classroom Building
Title: Sense and Respond Systems

Speaker: Professor T. S. Huang, Beckman Institute for Advanced Science and Technology, University of Illinois at Urbana-Champaign
Date: Friday, March 13, 2009, 5:30 p.m.
Place: Auditorium, W. T. Young Library
Title: Audio-Visual Human Computer Interaction

Alumni Corner

By Billie Sue Chafins, BSCS '97, MSCS '08

When I first started working at Microsoft, I quickly realized that my story was quite different from most of the people around me. Everyone spoke fondly of their first computers (e.g. Radio Shack TRS-80s and Commodore 64s), knew from kindergarten they would go to college, and had their sights set on working at Microsoft from a very young age. I, on the other hand, didn't interact with a computer until I was 16 years old, came from an enormous family where no one had been to college, and never knew about or considered a job outside of Pike County. Unlike the rest of the people around me, my first experience with code was when I took a BASIC programming course at Belfry High School.

That BASIC programming course was so intriguing that when I went to UK two years later, I decided to major in computer science, having absolutely no clue what that meant or what I was getting myself into. I recall sitting in my first CS course, CS 121 Introduction to Computer Science (in Pascal), and feeling completely overwhelmed. In particular, when Dr. Tony Baxter told us that we would "read input from a file," I could not figure out what the heck a file was and wondered how I would ever finish the assignment.

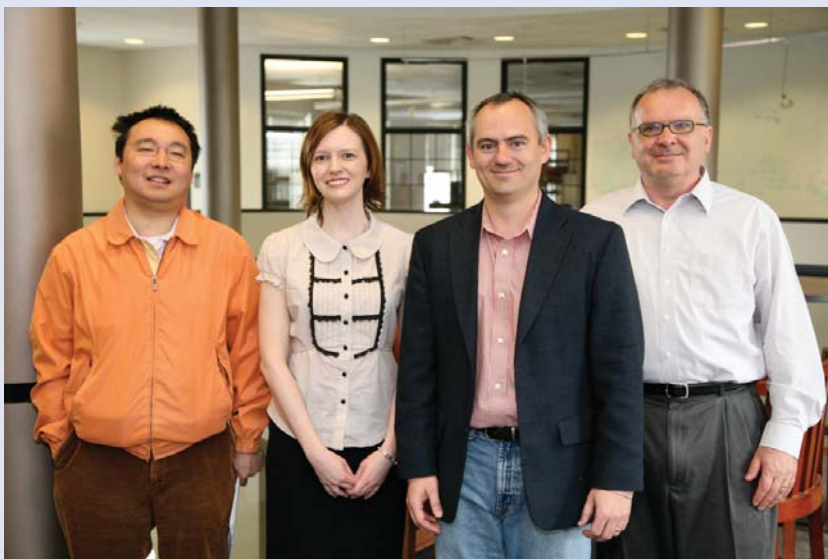
Needless to say, I figured out what a file was and 4 years later graduated with a BS in CS. During my undergrad career, in addition to all my CS courses I also completed minors in mathematics and business and worked as a developer at Ashland Oil for three co-op sessions. Upon graduating, I had offers from Procter & Gamble and Ashland, but decided to stay on at UK and complete my Master's degree in CS. I worked as a TA and lecturer while getting the degree and loved every minute of it.

In my third year of grad school, I decided to work on my Ph.D. and filled out applications to various schools. Around that same time, the UK College of Engineering annual career fair happened and even though I had no interest in getting a job, I decided to go speak with some of the companies anyway. I ended up talking to the Microsoft representative for almost an hour and a week later I was on a plane flying first class (for the first time!) out to Seattle. Much like when I started UK, I had no clue what I was getting myself into and didn't prep for the interview at all. After a long day of 7 interviews with 2 different groups, answering everything from technical questions to logic problems, I received offers from both groups. In less than 2 weeks since the career fair, I had a job in the "real world."

As you can tell from the years my degrees were awarded, something bizarre happened between the BS and MS. Once I got my job offer, a bit of senioritis kicked in and I never defended my project. Fast forward 7 ½ years and I was back on the UK campus as the Microsoft representative for the annual career fair. Dr. Brent Seales tracked me down somewhere between Patterson Office Tower and the Student Center and convinced me that I should finish. So, after 8 years, I dusted off my coding skills and finally defended my project this Spring. It was quite a milestone!

In the past 15 years, I've gone from not knowing what a file was to working on software that affects hundreds of millions of lives each day. It's a pretty amazing feeling to know that the decisions I make every day will be seen by everyone using Office or Windows – it's a bit scary as well! With the technology industry growing every single day, my story is proof that it doesn't matter if you're from New York City or Turkey Creek, Ky., you can have an impact on this explosive field. My success is due in large part to the amazing faculty at UK and the solid foundation I received during my many years as a student and teacher in the CS department.

(Billie Sue lives in Seattle, Washington and is a Senior Program Manager at Microsoft. In her eight years at the company, she has worked on four versions of Microsoft Office and just recently moved to the Windows team where she is working on the next version of the Windows operating system.)



Billie Sue Chafins (second from left) after her successful MS defense on April 13, 2008. Together with her (from left to right) are her MS committee members; Professors Ruigang Yang, Brent Seales and Jerzy Jaromczyk.

Professional Activities

Conference organization/visit:

Professor Andrew Klapper is the General Chair of the Sequences and Their Applications (SETA 2008) conference, to be held September 14-18, at the Radisson Hotel in Lexington, Kentucky. SETA is the top conference on sequences and their applications in communications and cryptography and is held every two years. The conference will draw researchers from around the world. The primary topics are sequences for stream ciphers, sequences for CDMA, highly random sequence generation by high speed devices, correlation and randomness, complexity and randomness of sequences, Boolean functions, and multi-dimensional sequences. Details may be found on the conference web site <http://www.math.ias.edu/~goresky/seta08/>.

Professor Judy Goldsmith is the chair of the Doctoral Consortium for the International Conference on Automated Planning and Scheduling (ICAPS '08) in Sydney, Australia, Sept. 2008.

Professor Wasilkowski hosted a visitor from University of Warsaw, Professor Leszek Plaskota, with whom he has been collaborating for a number of years.

Editorial:

Professor Mirek Truszczyński was invited to serve on the editorial board of Journal of Algorithms in Cognition, Informatics and Logic.

Dr. Judy Goldsmith is co-editor on two special issues of journals: Issue on Preferences in Artificial Intelligence, AI Magazine

Issue on 2007 UAI Workshop on Bayesian Applications, International Journal on Approximate Reasoning.

Professor Mukesh Singhal was appointed to be an associate editor for two journals: *IEEE Transaction on Parallel and Distributed Systems* and *IEEE Trans. on Parallel and Distributed Systems*.

Invited Talks:

Professor Jane Hayes gave the invited talk on "Technique Integration for Requirements Assessment," and "Management and Technical Aspects of Assuring the Quality of Critical Software Systems: Confessions of a Former Dilbert Boss," both at the School of Computer Science, Telecommunications, and Information Systems, DePaul University, Chicago, IL, October 2007.

Andrew Klapper gave the colloquium talk "Algebraic Feedback Shift Registers" at the University of Waterloo, Canada, in September, 2007.

Andrew Klapper gave the invited talk "Feedback with Carry Shift Registers and Arithmetic Transforms" at the NATO Advanced Study Institute (ASI) "Boolean Functions in Cryptology and Information Security" in Moscow, Russia, September 2007.

Andrew Klapper gave the invited talk "Algebraic Feedback Shift Registers" at the International Workshop on Codes and Cryptography, Wuyishan, China, June, 2007.



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My Research

Dr. Judy Goldsmith is a professor in the Computer Science Department and her research areas are Stochastic Models, Planning with Bayes nets and POMDPs, Computational Learning Theory, and Computational Complexity.



Goldsmith

One of the great changes in computer science in the last 15-20 years has been the ability to handle uncertainty. When reasoning under uncertainty, a person or program must take into account many possible causes or outcomes. This increases the computational demand: it takes more---often much more---time and memory to handle the increased possibilities. Reasoning under uncertainty has been the theme of my research for the last decade.

I have been the principal investigator on a project, "Decision-theoretic planning with constraints," that was funded by the National Science Foundation under their ITR program. The emphasis of that program was cross-disciplinary foundational research. The project was to design decision-support software and algorithms that build on my knowledge of planning under uncertainty, Dr. Alex Dekhtyar's work on databases to support reasoning under uncertainty, and Drs. Mirek Truszczynski, Wittek Marek, and Raphael Finkel's knowledge of constraint solvers. The application has been advising in the social welfare system. We worked with Beth Goldstein, from the Department of Education Policy and Evaluation, and Joan Mazur, from the Department of Curriculum and Instruction.

Under the "welfare-to-work" system, clients have up to 60 months of support over their lifetime; the support is supposed to move them into a work-ready state. Case managers negotiate, and renegotiate, plans with the clients; plans can include health care, education, job training, social services, and volunteer work.

On a foundational level, we have discovered many limitations in our theoretical models, and have made significant improvements. One example: the algorithms we considered for planning under uncertainty, at least when we started this project, only considered one action at a time. A welfare client is expected to fill a certain number of hours with volunteer work, education, and job-readiness training. This generally involves a combination of activities. We have recently begun working on algorithms that can handle concurrent actions. We have produced several planning algorithms, although none yet handles anything as complex as the advising the case managers do. (They were delighted when Dr. Goldstein informed them that they are still smarter than our computer programs.)

More practically, we have implemented a resource database for the case managers that supports the type of reasoning and searches they want. This will go live in a local office sometime this summer.

One of the inspirations for the welfare-to-work project was an interest in building better automated advising software. We currently have several advising programs on campus, but they have significant limitations.

- Most assume that students will do well in the recommended classes.
- Many concentrate on fulfilling requirements, instead of looking at the student's preferences and goals.
- Most have clumsy interfaces.

I am working with Dr. Mazur and Dr. Dekhtyar (now on the faculty of California Polytechnic at San Luis Obispo) and several students on

designing an academic advising system that will overcome those limitations. Some of the challenges from the welfare-to-work planning carry over: we must consider concurrent courses, student preferences that are likely to shift over time,

unknown future grades, and unknown future availability of courses. We would like the advising program to plan for many contingencies, and allow students the opportunity to explore "what if" scenarios: What if I took these courses instead? What if I get C's in all my classes that semester? A's? We are interested in exploring the ways in which advisors manipulate students' preferences. For instance, an advisor might urge a student to take a class the student had not considered, with the expectation that the student will discover something else he or she enjoys. We are also interested in using discussion of goals and preferences, and the "what if" explorations, to encourage students to take longer-term views in academic planning.

I am working with another student, as well as colleagues at the University of Duesseldorf, on modeling political lobbying as an optimization problem. The work on lobbying in the computational social choice community assumes that it is the lobbyists who optimize. We are learning, from Dr. Steve Voss, Department of Political Science, that political scientists think about the problem very differently than that.

When papers are submitted to the big artificial intelligence conferences, the program committee members have the opportunity to bid on which papers they'd like to review. Then papers are assigned to the reviewers, based on those bids and other criteria, so that each paper has sufficiently many reviewers and the work load is roughly evenly distributed. It seems that different subfields have solved the problem of optimally assigning problems, but the optimality criteria and the assignment algorithms vary significantly. I am currently studying both the practical problems arising from the conference paper assignment problem and theoretical problems inspired by it. One of my master's students will be implementing the algorithms we design in the context of one of the free conference-management software programs.

One of the standard questions in computational social choice is, How computationally difficult is it to manipulate an election or other social choice mechanism? This arises naturally in the study of lobbying, and in bidding for papers. One aspect of the conference paper assignment problem is to design an assignment algorithm that rewards "team players," namely, those who indicate a willingness to review difficult papers, and sufficiently many papers. This aspect is of great interest to my colleague, Dr. Jerome Lang, IRIT, France. Another colleague, Dr. Patrice Perny, from LIP6, University of Paris, is interested in the multi-criteria optimization aspects of the problem.

Perhaps this work will help me design grading schemes that are harder to manipulate.

Publications/presentation:

The paper entitled "White matter integrity analysis along the cingulum paths in mild cognitive impairment - a geodesic distance approach," co-authored by Xuwei Liang, and Jun Zhang, was selected as one of the two best papers, out of approximately 2200 submitted papers, at the 2008 International Conference on Bioinformatics and Biomedical Engineering, Shanghai, China, May 15-18, 2008.

Rendong Bai, Mukesh Singhal, and Yongwei Wang, "On Supporting High-Throughput Routing Metrics in On-Demand Routing Protocols for Multi-Hop Wireless Networks," *Journal of Parallel and Distributed Computing*, Vol. 67, No.10, October 2007, pp. 1108-1118.

Rendong Bai, M. Singhal and Y. Luo, "Enhancing Performance by Salvaging Route Reply Messages in On-Demand Routing Protocols for MANETs," to appear in *Ad Hoc & Sensor Wireless Networks*.

Peng Dai, Alexander Strehl, and Judy Goldsmith, "Expediting RL by Using Graphical Structures," at the Conference on Autonomous Agents and Multi-Agent Systems, (AAMAS '08) in Portugal in May 2008.

Alex Dekhtyar, Judy Goldsmith, Beth Goldstein, Krol Kevin Mathias, Cynthia Isenhour "Planning for success: The interdisciplinary approach to building Bayesian models," in *International Journal of Approximate Reasoning*, to appear.

Alex Dekhtyar, Jane Huffman Hayes, Judy Goldsmith, "Uncertainty as the Source of Knowledge Transfer Opportunity," Proceedings of the International Workshop on Living with Uncertainties (IWLU'07), associated with Automated Software Engineering (ASE), Atlanta, GA, November 2007.

Alex Dekhtyar, Jane Huffman Hayes, Senthil Sundaram, Ashlee Holbrook, and Olga Dekhtyar, "Technique Integration for Requirements Assessment," Proceedings of the IEEE Conference on Requirements Engineering (RE), New Delhi, India, November 2007. Graduate student Sundaram presented the paper.

Judy Goldsmith, Matthias Hagen, and Martin Mundhenk, "Complexity of DNF and Isomorphism of Monotone Formulas," in *Information and Computation*, to appear.

Jane Hayes, Mary Biddle, "Nancy Mead and Software Engineering Education: Advancements through Action," in Proceedings of the IEEE Conference on Software Engineering Education and Training (CSEET), Charleston, SC, April 2008.

F. J. Hickernell, G. W. Wasilkowski, and H. Wozniakowski, "Tractability of linear multivariate problems in the average case setting," *Monte Carlo and Quasi-Monte Carlo Methods 2006*, (A, Keller, S. Heinrich, H. Niederreiter, eds.), 359-381, Springer, 2008.

Ramakanth Kavuluru and Andrew Klapper, "On the k-operation Linear Complexity of Periodic Sequences," at INDOCRYPT 2007. Graduate student Kavuluru presented the paper.

F. Y. Kuo, G. W. Wasilkowski, and H. Wozniakowski, "Multivariate L_{∞} approximation in the worst case setting over reproducing kernel Hilbert spaces," to appear in *J. Approximation Theory*.

F. Y. Kuo, G. W. Wasilkowski, and H. Wozniakowski, "On the power of standard information for multivariate approximation in the worst case setting," to appear in *J. Approximation Theory*.

D. Laverell, Z. Fei, and J. Griffioen, "Isn't It Time You Had An Emulab?," ACM Technical Symposium on Computer Science Education (SIGCSE), March 2008. David Laverell (Calvin College faculty member) presented the paper.

Huaizhi Li and M. Singhal, "ARPC: Anchor-based Routing Protocol for Mobile Ad Hoc Networks With Cell ID Management System," to appear in *International Journal of Ad Hoc and Sensor Wireless Networks*.

D. Manivannan, R. Finkel, M. Singhal, "RPSF: A Routing Protocol with Selective Forwarding for Mobile Ad-Hoc Networks," *Wireless Personal Communications*, Springer, Volume 43, Number 2, October 2007 pp. 411-436.

D. Manivannan, Qiangfeng Jiang, Jianchang Yang, and Mukesh Singhal, "A Quasi-Synchronous Checkpointing Algorithm that Prevents Contention for Stable Storage," to appear in *Information Sciences*.

L. Plaskota, G. W. Wasilkowski, and Y. Zhao, "The power of adaption for approximating functions with singularities," to appear in *Mathematics of Computation*.

Liangrong Yi, Raphael Finkel, and Judy Goldsmith, "Planning for Welfare to Work," Artificial Intelligence Symposium (FLAIRS '08), May 2008. Graduate student Yi presented the paper.

G. W. Wasilkowski and H. Wozniakowski, "Polynomial-time algorithms for multivariate problems with finite-order weights; average case setting," to appear in *Foundations of Computational Mathematics*.

Yongwei Wang, Venkata Giruka, and Mukesh Singhal, "Truthful Multipath Routing for Ad-hoc Networks with Selfish Nodes," to appear in *Journal of Parallel and Distributed Computing*.

Yongwei Wang and Mukesh Singhal, "A Light-weight Scalable Truthful Routing Protocol in MANETs with Selfish Nodes," to appear in *International Journal of Ad Hoc and Ubiquitous Computing*.

Yongwei Wang and Mukesh Singhal, "On Improving the Efficiency of Truthful Routing in MANETs with Selfish Nodes," *Pervasive and Mobile Computing*, Elsevier, Vol. 3, No. 5, October 2007, pp. 537-559.

Xianwang Wang, Qing Zhang, Ruigang Yang, Brent Seales, Melody Carswell, "Feature-based Texture Mapping from Video Sequence" in Symposium on Interactive 3D Graphics, Proceedings of the 2008 symposium on Interactive 3D graphics and games (SI3D), 2008. Graduate student Xianwang Wang presented the paper.

Ruigang Yang, Xinyu Huang, Sifang Li, Christopher Jaynes, "Toward the Light Field Display: Autostereoscopic Rendering via a Cluster of Projectors," *IEEE Transactions on Visualization and Computer Graphics*, JANUARY/FEBRUARY 2008, VOL. 14, NO. 1, Pages: 84-96.