






click!

MAGAZINE 2013, VOLUME I

New Health Information Technology Center to promote CS research



ALSO IN THIS ISSUE:

-  CS @ ILLINOIS Award Recipients 3
-  Illinois Joins Coursera 19
-  Chicago Recruits on Campus 30
-  Faculty Awards Abound 32
-  ACM and WCS K-12 Outreach 37



click! Magazine is produced twice yearly for the friends of CS @ ILLINOIS to showcase the innovations of our faculty and students, the accomplishments of our alumni, and to inspire our partners and peers in the field of computer science.

Department Head:

Rob A. Rutenbar

Associate Department Heads:

David Forsyth

Klara Nahrstedt

Craig Zilles

CS Alumni Advisory Board:

Alex R. Bratton (BS CE '93)

Ira R. Cohen (BS CS '81)

Vilas S. Dhar (BS CS '04, BS LAS BioE '04)

William M. Dunn (BS CS '86, MS '87)

Mary Jane Irwin (MS CS '75, PhD '77)

Daniel L. Peterson (BS CS '05)

Peter L. Tannenwald (BS LAS Math & CS '85)

Jill Zmaczinsky (BS CS '00)

Contact us:

click@cs.illinois.edu

217-333-3426

Special thanks to these collaborators on this issue of *click! Magazine*:

Editors:

Colin Robertson

Michelle Wellens

Writers:

Janie Chang

Rick Kubetz

Jennifer LaMontagne

Leanne Lucas

Herb Morgan

Megan Osfar

Colin Robertson

Laura Schmidt

Michelle Wellens

Design:

Surface 51

got your CS swag?



<http://my.cs.illinois.edu/buy>

It's not computer literacy that we should be working on, but sort of human-literacy. Computers have to become human-literate.

Nicholas P. Negroponte

click!

MAGAZINE 2013, VOLUME I

2	Letter from the Head
3	CS @ ILLINOIS Awards
12	Alumni News
14	New Health Information Technology Center
17	Illinois-Mayo Alliance
19	Coursera
20	In the Lab
27	CS by the Numbers
28	Students
30	Chicago After Hours
32	Faces
37	Outreach
42	Gifts in Action
49	The #lastword

“ It never ceases to surprise me how things I did as a graduate student come back to inform and support whatever I’m working on at the moment. ”



It never ceases to surprise me how things I did as a graduate student come back to inform and support whatever I’m working on at the moment. Case in point: I spent an intense summer interning at the Mayo Clinic, working on then-new technologies for computed tomography. My group was working on (a crazy goal, back then) 3-D volumetric video-rate tomography. I spent that summer working with a great cross-section of people, from circuits geeks to folks wearing stethoscopes.

Fast forward a few decades, and I am again in a roomful of technologists and Mayo Clinic physicians. But this time, we are working on what will become the Mayo Illinois Alliance, which brings two world-class organizations together to work on some of the biggest research challenges in health and medicine. This strategic alliance will promote a broad spectrum of collaborative research, the development of new technologies and clinical tools, and the design and implementation of novel education programs. We’ve dedicated the theme of this *click! Magazine* to the convergence of information technology with health and medicine, but there are two other stories worth a special introduction from me.

In July, I co-chaired the task force that put Illinois as the first public land-grant institution to partner with Coursera, a start-up out of Stanford that offers the world’s best courses, online, for free. Chancellor Phyllis Wise and Provost Ilesanmi Adesida seized the opportunity to ensure Illinois’ place in the exploration of the massive open online course (MOOC) movement sweeping the nation and reaching the world. And, in November, we celebrated the second group of CS @ ILLINOIS Awards recipients. I take great pride in having initiated this program to recognize the significant contributions to the field of computer science pioneered by our prestigious alumni and faculty. I invite you to be a part of this new tradition: nominate someone you know worthy of this honor and come back to campus to celebrate with each new class.

Rob A. Rutenbar, Head



CS @ ILLINOIS HONORS 15 ALUMNI & FACULTY

BY LAURA SCHMITT

CS @ ILLINOIS has a rich tradition of excellence and innovation, due to our many talented students, alumni, and faculty members. Established in 2011, the CS @ ILLINOIS Awards seek to honor that tradition by recognizing alumni and faculty members who have made professional, technical, educational, and service contributions that bring distinction to themselves, the department, and the university.

On November 1, we invited our second group of Awards winners to campus for a day-long celebration of their achievements. Honorees had the opportunity to meet with faculty, present technical talks, engage current students through networking opportunities and a panel discussion, and receive a tour of the Thomas M. Siebel Center for Computer Science—a first for some. The day culminated in an awards dinner and ceremony held in the nearby National Center for Supercomputing Applications.

We invite you to save the date for this year's event—Thursday, October 24, 2013, which coincides with Homecoming.

DISTINGUISHED ACHIEVEMENT AWARDS

Greg Chesson



Greg Chesson (MS CS '75, PhD '77) spent much of his career as chief scientist with Silicon Graphics Inc. (SGI), the maker of powerful computer workstations and servers whose realistic 3D graphics

technology was popular among movie, game console, and early web companies during the 1980s and early 1990s. Chesson has sometimes been called the godfather of networking due to his many contributions to the area.

As a student at Illinois, Chesson helped bring the UNIX operating system to campus by convincing Professor Donald Gillies to purchase a license. After graduation, he joined Bell Labs, where he contributed to the 6th and 7th releases of UNIX, and designed and implemented the first suite of protocols on Datakit, a predecessor to today's ATM networks.

In 1982, Chesson joined SGI as one of its first technical staff members. His research work concentrated on the implementation and usage of

distributed shared memory and distributed virtual memory in a variety of system configurations, as well as very high-performance (GB/s) local area networks and network adaptor technology. Among his contributions, Chesson invented the Xpress Transfer Protocol (XTP), a flexible transport protocol designed for high-speed networks. XTP was simple enough to implement in VLSI hardware, allowing packets to be processed in real-time with very low latency. He also developed the gigabit system network (GSN), also known as HIPPI-6400, which set a new standard for high-performance network data transfer in 1998 by achieving full duplex transmission capacity of 1600 Mbits/second (200 MB/s). Today, Chesson works on measurement and analysis of large-scale congestion and packet burst phenomena. In between SGI and Google, he worked at wireless LAN startup Atheros Communications Inc., where he contributed to system and chip architecture, wireless chip designs, and Quality-of-Service and security protocol design and development.

In addition to his technical achievements, Chesson is an accomplished musician—primarily drums and piano. In the 1960s, he joined the U.S. Air Force and performed with one of its bands; several years later returned to civilian life and toured the country with several different jazz and R&B groups, including Wayne Cochran and the C.C. Riders, and the Woody Herman jazz orchestra.

"My time at the U of I, beginning in 1972, was formative and led directly to all of the experiences that followed."

Ping Fu



Ping Fu (MS CS '90) is the co-founder and CEO of Geomagic, a company whose innovative software tools are fundamentally changing the way a myriad of products are designed and manufactured worldwide.

Engineers, designers, and artists have used Geomagic software for things ranging from streamlining the manufacture of toy dollhouses, transforming the hearing aid and dental device industries, to guaranteeing the safety of the Space Shuttle Discovery, and recreating engine manifolds for a NASCAR racing team.

The innovation behind Geomagic's technology is the rapid creation of non-uniform rational B-splines on point cloud data, which is key to digitally processing an object—a task that used to take a designer weeks to complete but can now be done in just minutes. Fu is the co-inventor on five of the patents behind this technology.

Before starting Geomagic in 1997, Fu was the director of visualization at NCSA, the University of Illinois supercomputing center, where she supervised work on Mosaic, the world's first practical web browser. Her team also developed new geometry algorithms that enabled the morphing special effects for the robot villain in the movie *Terminator 2*.

In 2005, *Inc. Magazine* presented Fu with its Entrepreneur of the Year award. Among her more recent awards, she was recognized by the U.S. Citizenship and Immigration Services as an Outstanding American By Choice. Besides her CEO role at Geomagic, Ping serves on the National Advisory Council on Innovation and Entrepreneurship at the White House, she is a member of the National Council on Women in Technology, and on the board of directors at the Long Now Foundation.

Fu grew up in China and endured terrible hardships during the Cultural Revolution. As a young adult, she studied journalism and wrote an investigative article about how China's one-child policy was prompting parents to kill their baby girls. The story landed her in prison, though she was eventually ordered to leave China and told never to return. She ended up in the United States, where she earned a degree in computer science at University of California at San Diego before enrolling in the graduate CS program at Illinois.

Ping's incredible story of personal and business resilience, *Bend Not Break*, was published by Penguin in December 2012. And, just announced in the new year, Geomagic was acquired by 3D Systems; Fu appointed as chief strategy officer.

"It was my privilege to study computer science at UIUC, one of the nation's finest programs."

CALL FOR NOMINATIONS

The CS @ ILLINOIS Awards program recognizes computer science alumni or faculty members who have made contributions that bring distinction to themselves, the department, and the university. We welcome participation in this process and invite you to nominate someone deserving of this honor. The deadline for the 2013 awards cycle is April 30, 2013. To submit a nomination, please visit: <http://my.cs.illinois.edu/submit>



MYMINILIFE

Illinois classmates Sizhao Yang, Joel Poloney, Amitt Mahajan, and Luke Rajlich co-founded MyMiniLife. A free to use Flash-based virtual world and social networking application, MyMiniLife, allowed users to express themselves by generating characters, creating and customizing virtual spaces and goods, visiting and interacting with other users' creations, and embedding their work elsewhere on the Web. Before their company was acquired by Zynga in June 2009, MyMiniLife reached 200 million registered users, who were sharing virtual worlds and interacting with the creations of others from all over the world. As the team started talks with Zynga, they started to work on a farm-themed game that was based on the MyMiniLife platform. That game was FarmVille, which became the most popular game on Facebook, with 85 million unique monthly users, and won recognition as the Social Networking Game of the Year for 2010 from the Academy of Interactive Arts & Sciences. Able to handle lots of users and still provide high performance, the MyMiniLife platform eventually became the shared technology platform for all of Zynga's new games.



Amitt Mahajan

"Illinois is where I really got a chance to refine and learn what it meant to be an engineer."



Joel Poloney

"I still hack away on things in my spare time."



Luke Rajlich

"What I enjoyed the most about starting a company was the sense of accountability you have. If you don't fix a specific problem, no one will."



Sizhao "Zao" Yang

"Do projects that help you continue to learn and understand the user best."

Amitt Mahajan

Amitt Mahajan (BS CS '06) began his career as a programmer with Epic Games, where he performed tools development for Unreal Engine 3, and he helped develop Gears of War, a critically acclaimed and best-selling Xbox 360 game. In 2007, he reunited with fellow Illinois alumni to co-found MyMiniLife, Inc.

As Zynga's director of engineering, Mahajan led a team of 15 developers, implementing the scalable technology stack and game engine used in FarmVille, as well as other Zynga games such as CityVille, Treasure Isle, and FrontierVille. He also spent nine months as chief technology officer of Zynga Japan. In 2012, he left Zynga and started Red Hot Labs with Illinois classmate and long-time business partner Joel Poloney. A Bay-Area company, Red Hot Labs builds fun mobile products. As CEO, Mahajan is focused on revolutionizing the way mobile applications are developed.

MAFIAWARS

Roger Dickey

Roger Dickey (BS CS '05) started his first company in 2006 to match tutors with students who needed tutoring. Although the company was short-lived, the experience encouraged him to continue writing innovative software.

In 2007, he launched a social gaming start-up, building a portfolio of 19 Facebook apps and games. The most popular game, Dope Wars, resulted in a large following of 300 million monthly page views and \$250,000 in monthly revenue, attracting the attention of social game developer Zynga. Dickey sold his company in 2008, and he used the back end technology that he had created for Dope Wars to develop a new crime-themed game for Zynga called Mafia Wars, which reached 45 million users by 2010. In three years at Zynga, Dickey also launched FishVille and five other titles. In addition, he served as an international product team advisor for Zynga, helping the company grow its games in India, Japan, and China. Since leaving Zynga in 2011, Dickey has started a new company in San Francisco, named Product X. He also invests in and advises startups, including companies like Facebook, Addepar, DotCloud, E La Carte, Internmatch, HiGear, Speakertext, and Wanderfly.



"Do a wide variety of projects to get a jump on your career early to see what you want to do."

Joel Poloney

Joel Poloney was an undergraduate working part-time at NCSA when he accepted an offer from his friend Sizhao "Zao" Yang to be a part of a new start-up company, Mocha Soft LLC (eventually renamed to MyMiniLife, Inc.).

As Zynga's senior architect, Poloney helped build out the Shared Tech Group and worked extensively on the common game engine and platform that Zynga used to launch nearly all of its games, including FarmVille, FrontierVille, CityVille, Treasure Isle, CastleVille, and Hidden Chronicles, among others.

At the end of 2011, Poloney left Zynga to form a new startup with Illinois classmate and co-founder of MyMiniLife, Amitt Mahajan. Based in the Bay Area, Red Hot Labs builds fun mobile products. Occasionally, Poloney invests in promising seed-stage startup companies.

Luke Rajlich

In 2007, Luke Rajlich (BS CS '05) left a lucrative job in the financial services industry, where he worked in high frequency trading at Citadel Investment Group, to reunite with his Illinois classmates and help start, MyMiniLife, Inc.

At Zynga, Rajlich served as chief technology officer of FarmVille, where he was responsible for the game's engineering, operations, and scaling. Also at Zynga, he started a content management team to build tools that reduce the cost of producing new game content. These tools are widely adopted within Zynga and are the company's standard content management tools.

Today, Rajlich is a distinguished engineer at Zynga, and he is the studio's CTO of an unreleased mobile game. He was recently named as one of *Fortune Magazine's* "50 Smartest People in Technology."

Sizhao "Zao" Yang

After graduating from the University of Illinois, Zao Yang (BS CS '05) worked as an IT specialist at IBM for nearly a year before starting Mocha Soft LLC (eventually renamed to MyMiniLife, Inc.) with several Illinois classmates.

At Zynga, Yang continued to work on FarmVille, designed the FarmVille iPhone application, launched FarmVille.com, and worked on corporate development deals including Microsoft, Yahoo, Zynga Japan, and Zynga domestic, as well as international corporate strategy. Yang left Zynga in 2010 to start a new company, BetterWorks, which offered tools to help businesses manage discounts and rewards programs for employees.

Today, Yang is an advisor to SV Angel, a San Francisco-based firm that helps startups with business development, financing, M&A and other strategic advice.

DISTINGUISHED EDUCATOR AWARDS

David J. Kuck

CS Emeritus Professor David Kuck has made major contributions to parallel computing as a researcher, professor, software company founder, and product developer. His work has influenced architecture design and evaluation, compiler technology, programming languages, and algorithms, which has improved the cost-effectiveness of multiprocessor computing.

Kuck joined the University of Illinois computer science department in 1965 as the lone software researcher working on ILLIAC IV, the world's first supercomputer. Kuck restructured computer source code for parallelism, demonstrating that software could actually be written for the single-instruction, multiple-data machine (SIMD).

In 1979, he founded Kuck and Associates Inc., which created a line of industry-standard optimizing compilers to exploit parallelism. During the 1980s, he founded and led the Center for Supercomputing Research and Development, which produced Cedar, a high-performance, large-scale multiprocessing computer that brought supercomputing power to bear on fields such as meteorology, physics, astronomy, and the computer-aided design of computer circuits.

Kuck left the university in 1993, and he sold his company to Intel in 2000. Today, he is an Intel Fellow in the Software and Solutions Group (SSG). He is working on the HW/SW co-design of architectures and applications based on performance, energy, and cost. Under Kuck's

leadership, SSG produced industry-leading parallel tools including ThreadChecker, ThreadProfiler, and OpenMP

Kuck is a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) and the Association for Computing Machinery (ACM), and a Member of the American Association for the Advancement of Science and the National Academy of Engineering.



"It took me about 30 years to get out of this place, and 30 PhD students and 3,000–4,000 undergraduates to learn enough to leave the CS department and go out into the real world."

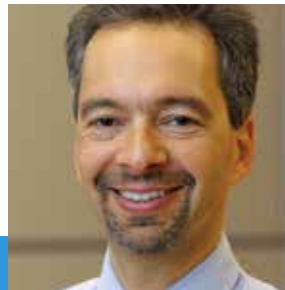
Ran Libeskind-Hadas

Ran Libeskind-Hadas (MS CS '89, PhD '93) is the department chair and the R. Michael Shanahan Professor of Computer Science at Harvey Mudd College (HMC) in Claremont, CA, where he has been a faculty member for the past 19 years. Known for his infectious enthusiasm in the classroom, Libeskind-Hadas has taught courses such as discrete mathematics, introduction to computer science, complexity theory, advanced algorithms, and computer graphics. HMC has recognized his teaching excellence with two separate honors. In 1996, he received the Iris and Howard Critchell Assistant Professorship, which recognizes a junior faculty who has exhibited unusual talent for mentoring and counseling students in all aspects of their lives, and, in 2005, he received the Joseph B. Platt Endowed Chair for effective teaching.

Admired and respected by his students, Libeskind-Hadas is known for being an excellent communicator with seemingly endless energy. His excitement for the material brings difficult concepts to life, while his clear explanations and extensive office hours help ensure that students master them. Always striving to innovate in the classroom, Libeskind-Hadas has helped to revamp HMC's introductory CS courses, including the creation of a cross disciplinary CS and Biology introductory course. In addition, he has worked even more broadly to improve education, publishing papers in education-focused engineering and computer science conferences.

An expert in the design and analysis of algorithms for computational biology, one focus for Libeskind-Hadas has been to provide students with rich research experiences, having successfully applied for several NSF grants for that purpose. In fact, he has supervised 44 summer research students, 17 senior theses, and 17 year-long undergraduate research projects sponsored by industry partners. In addition, Libeskind-Hadas's influence extends beyond HMC. He currently serves as co-chair of the Computing Research Association's Education Committee, and he is serving a term on the

Computing Community Consortium Council, a national committee that helps the computing community develop new research visions.



"Allow yourself to experiment with a lot of different things. Don't believe that you are predetermined to do one thing."

Xiaosong Ma

An associate professor of computer science at North Carolina State University, Xiaosong Ma (PhD CS '03) is conducting research in storage systems, parallel input/output (I/O), high-performance parallel applications, cloud computing, and self-configurable performance optimizations. Ma is also a faculty member at Oak Ridge National Laboratory, giving her access to supercomputing resources and allowing her to collaborate on projects that explore petascale supercomputer management, scalable parallel I/O, and high-end storage systems.

I/O is a weak link in the scientific computing cycle for many applications because of the widening performance gap between the I/O subsystem and other system components. Ma's group works to provide novel technology for improving applications' perceived I/O performance as well as for reducing parallel jobs' data movement cost in time, resource usage, and energy consumption. More recently her research is exploring the use of new storage devices such as SSDs in HPC settings for efficient out-of-core computation and in-situ data analytics using active-SSDs. Another recent focus is automatic parallel I/O benchmark extraction based on large-scale applications.

Another aspect of her research is focused on making cloud computing a cost-effective choice for HPC users.



Ma's group has recently investigated the cost comparison between using cloud instances and owning in-house clusters for executing tightly-coupled parallel applications. They are also examining new approaches such as establishing semi-elastic, cloud-based clusters and automated per-application parallel I/O configuration

on cloud platforms.

Ma has received a Department of Energy Early Career award, a National Science Foundation CAREER award, an IBM Faculty Award, and a Faculty Fellowship from NetApp.

"[Faculty at Illinois] gave such wonderful illustrations of excellent instruction and mentoring, which until this day still serve as inspirations and models for me in teaching and working with students."

Milos Prvulovic

An associate professor at Georgia Tech, Milos Prvulovic (MS CS '01, PhD '03) is exploring ways to design computer architectures that are more secure and reliable, easier to program, and have better tradeoffs between performance, complexity, and power. Specifically, his research involves hardware mechanisms to protect against physical attacks, untrusted system software, and untrusted system components; as well as perform runtime checks to improve software reliability and identify performance limiters in many-core execution.

One example of his work is a new hardware checkpointing accelerator that should enhance programmers' productivity and lead to more reliable computer systems. Developed in collaboration with one of his students, Euripas is the first hardware technique to provide consolidation-friendly undo-logs (for bidirectional debugging), to allow simultaneous construction of both undo and redo logs, and to support multi-level checkpointing for error recovery. Euripas may reduce the overall hardware cost, memory use, and performance overheads compared to other checkpointing techniques.

Prvulovic is a senior member of IEEE and ACM. In 2005, he received a prestigious NSF CAREER Award. In 2010, he received a Hesburgh Teaching Fellowship from Georgia Tech, which is awarded to promote innovative instruction. In December 2011, Prvulovic was program co-chair for IEEE/ACM MICRO, a top architecture conference.

He is a current member of ACM SIGMICRO's Executive Committee.



"In 10-20 years everything you learned here will be obsolete except the ability to quickly learn new things. That's what you want to hone as a skill."

DISTINGUISHED SERVICE AWARDS

“She was tough and practical, yet empathetic and generous with her time. She encouraged exploration, experimentation and creativity. She brought rigor and incisiveness to every discussion. She was an important catalyst in my career.”

—Thomas M. Siebel



Geneva Belford

CS Emeritus Professor Geneva Belford (PhD LAS Math '60) has positively influenced students at the University of Illinois for more than 48 years, first as a professor of Mathematics, next as a professor of Computer Science, and then as the CS Department's Graduate Program Coordinator, even after her official retirement in 2000.

With research interests in databases and distributed systems, Belford joined the CS faculty in 1977, and she quickly became one of the most popular faculty advisors. In addition to supervising the research of CS graduate students, she enthusiastically advised the work of students with little or no computer science background, who qualified for an MCS degree offered by the department at the time. In all, she supervised more than 40 PhD graduates and more than 100 CS master's degree graduates, many of whom were international students. Her students have fondly described her as encouraging, accessible, and able to dispense constructive advice.

Belford's positive impact on students extended beyond the CS department to the entire campus. In the early 1980s, she served as an associate dean in the Graduate College. Later, she devoted much time to improving the university as a member of the faculty senate. She also shared her expertise as a member of campus committees that addressed challenges such as the implementation of on-line registration, educational technologies, and administrative data processing.

An outstanding educational leader, teacher, and mentor, Belford has received several campus honors, including the 1986 College of Engineering Halliburton Educational Leadership Award, the 1991 Dad's Association Outstanding Faculty Award, the 2005 Graduate College Outstanding Mentor Award, and the 2007 Mom's Association Medallion of Honor.

“At every step throughout my journey, the U of I and ACM have played a role in how I got to where I am and who I'm doing things with.”



Ari Geshler

Ari Geshler is a senior software engineer and technology blogger at Palantir Technologies, which builds software platforms that allow organizations to make sense of massive amounts of disparate data. These platforms help non-technical users see critical connections, and ultimately, the answers to complex problems such as combating terrorism, prosecuting crimes, fighting fraud, and eliminating waste.

Geshler, who joined the Silicon Valley startup in 2006, has split his time between working as a backend engineer on Palantir's analysis platform; thinking and writing about Palantir's vision for human-driven information data systems; and moonlighting on Palantir's Philanthropic engineering team. In all, he has 15 years of experience in

the software industry, including a stint as lead website and infrastructure maintainer for the SourceForge.net open source software archive.

As a student at Illinois, Geshler (known then as Ari Gordon-Schlosberg) served as the chair of ACM, and he was the student manager for the CS team that competed in the ACM's International Collegiate Programming Contest (ICPC) in China.

Once in industry, Geshler continued to foster ties with CS students by meeting with ACM leaders several times each year on campus, by speaking at ACM's Reflections | Projections Conference, and by sharing his work experiences through the Engineer in Residence program. He has also helped the CS department find funding for the ACM Reflections | Projections job fair, CS 225 competitions, and the ICPC world finals. More recently, he was the keynote speaker at an Illinois alumni-sponsored entrepreneur speed pitch event on the West Coast.

DAVID J. KUCK OUTSTANDING THESIS AWARDS



Pooja Agarwal

As a graduate student, Pooja Agarwal (MS CS '11) was part of a research team that explored 3D tele-immersive technology—a form of interaction that enables users in different locations to perform real-time activities in a common virtual world. Potential uses for this technology include richer communications, improved

emergency first-response, enhanced education, as well as sports and entertainment applications.

Agarwal contributed fundamental research on identifying correlations across multiple video and audio data streams and proposed a new theory for thinking about streams generated in a 3D environment. She introduced the concept of a bundle of streams to represent a group of correlated streams that have origin in the same physical space (e.g., a room), and that

are spatio-temporally co-dependent. This concept allows for more accurate performance modeling. Agarwal also developed a practical Streaming-as-Service framework, a user-level kernel for hosting and serving distributed, multi-modal correlated streams with rich Quality-of-Service and Quality-of-Experience constraints. Agarwal's work, some of which is being patented, is significant because it improves the ability to manage complex 3D data exchanges in time-constrained systems.

Today, she is a software development engineer at Microsoft, working on a new release of the Active Directory Federation Service (ADFS), which allows for the secure sharing of identity information between trusted business partners across organizational boundaries. The new ADFS release will provide claims-based security token service and single sign-on capabilities for Office 365 and Azure Active Directory.

"The internship I had while here led to my first job."



Robert L. Bocchino Jr.

Robert L. Bocchino Jr. (PhD CS '10) is currently a Postdoctoral Associate at Carnegie Mellon University (CMU), supported in part by a Computing Innovation Fellowship from the Computing Research Association. At CMU, Bocchino is developing a combination of language features and logic proofs for ensuring that high-level parallel programming abstractions are correctly implemented and used. He has also contributed to the design of the type system in the Plaid language project.

For his doctoral thesis at the University of Illinois, Bocchino designed, implemented, and evaluated a Java-based language called Deterministic Parallel Java (DPJ) that enables disciplined and modular reasoning about the behavior of parallel programs. DPJ uses annotations called effects to guarantee that a parallel program behaves as if its tasks were executed in sequence, unless the programmer explicitly says otherwise. For this work, Bocchino received the 2010 ACM SIGPLAN Outstanding Dissertation Award.

Before enrolling at Illinois, Bocchino practiced law in Boston for several years, having earned his law degree from Harvard. Outside of computer science, Bocchino sings, plays the Baroque violin and recorder, and composes and performs original music in the Baroque style.

"When it comes time to invest your energy in something, it has to be something you really believe in and think is good."

SOHAIB Abbasi:



College of Engineering Hall of Fame

Sohaib Abbasi (BS CS '78, MS '80) was among the eight Illinois alumni recently inducted into the College of Engineering Hall of Fame. A technology pioneer and business leader, Abbasi is the president and CEO at Informatica Corp., a leading provider of data integration software that helps its customers solve the problem of having fragmented data across different systems.

Due to his visionary leadership, Informatica enjoyed 20 consecutive quarters of record revenue growth, making it one of the few software businesses to post positive revenue growth in every quarter during the recent recession. In 2010, Abbasi was recognized as Chairman of the Year at the American Business Awards for this achievement.

Before joining Informatica, Abbasi worked at Oracle for 20 years, starting in 1982 when the company was a 30-person startup. Abbasi played

a key role in growing Oracle's business from \$4 million to more than \$9 billion in annual revenues, and he launched the Oracle Tools business.

Abbasi came to the United States in 1974 from Karachi, Pakistan to study computer science at Illinois. After earning his bachelor's degree, he completed a master's degree on relational databases with Professor Geneva Belford. Grateful for the educational opportunities, Abbasi has established an endowed Professorship and Fellowship in CS.

Before the Hall of Fame induction ceremony, Jeff Holden (BS CS '90, MS '91), senior president for product management at Groupon, presented the Dean's Distinguished Leadership Lecture.

SCOTT Maxwell:



photo: NASA/JPL Caltech

Mars Rover Project

In media interviews, Scott Maxwell (MS CS '94) has described his job at NASA's Jet Propulsion Lab (JPL) as magical. "I come in to work, reach out my hand across a hundred million miles of emptiness, and move something on the surface of another world," said the enthusiastic 41 year old.

Maxwell is one of several drivers who guide Curiosity, NASA's \$2.6 billion rover and space lab that has been exploring Mars since August 2012. NASA scientists hope one day to use data gathered from Curiosity to determine whether Mars was capable of sustaining life.

It takes anywhere from four to twenty minutes for signals to travel between Earth and Mars, so Maxwell cannot operate the rover interactively. Instead, he and the other drivers take real photos and data from the rover each day to create a 3D simulated Martian landscape; they then write commands to operate a virtual rover in this 3D world. After checking their work, they upload the commands to the real rover with instructions for what to do the next day—things like where to move, what soil or rock samples to pick up, and what pictures to take.

Maxwell started at JPL in 1994 writing software programs to decode data from spacecraft and to help coordinate the way teams worldwide send commands to spacecraft. By the early 2000s, he was writing software that NASA drivers used to command the Mars exploration rovers Spirit and Opportunity.



WANMIN Wu: ACM SIGMM Award

Wanmin Wu (PhD CS '11) was presented with the ACM SIGMM Award for Outstanding PhD Thesis in Multimedia Computing, Communications, and Applications. Given annually, the award recognizes a researcher "whose thesis has the potential of very high impact in multimedia computing, communications and applications, or gives direct evidence of such impact." The recipient is granted a \$500 honorarium, plus travel expenses to attend the ACM International Conference on Multimedia, where the award is presented. Wu was honored for her PhD thesis, entitled "Human-Centric Control of Video Functions and Underlying Resources in 3D Tele-Immersive Systems."

Dr. Wu's research, advised by Ralph M. and Catherine V. Fisher Professor Klara Nahrstedt, proposes a novel, comprehensive, and human-centric framework for improving the quality of 3D tele-immersive environments. 3D tele-immersion takes place when two or more individuals at geographically separated sites collaborate in a 3D virtual world. Uses include richer communications, improved emergency first-response, enhanced education, as well as sports and entertainment applications. However, modeling and managing the large video and audio data streams generated by these systems presents a challenge in making this technology more widely available. By developing a theoretical frame work for modeling and measuring a user's Quality-of-Experience (QoE) and correlating it with the system's Quality-of-Service, Dr. Wu's work allows researchers to take a more user-centric approach when designing these environments. In fact, using her new framework, Wu was able to identify methods to reduce system overhead without negatively affecting the QoE.



CS Alumni Connect in Schaumburg

On September 12, 2012, nearly 40 CS alumni and friends gathered at Shaw's Crab House in Schaumburg, Illinois to connect back to the department and network with each other. CS Department Head Rob A. Rutenbar shared the latest news from campus—from higher than ever student applications to substantial faculty grants and awards. Charles Blatti, the current Debra and Ira Cohen Graduate Fellowship recipient, discussed his research in bioinformatics and computational biology. The reception was hosted by Ira Cohen (BS CS '80), and his wife, Debra, who remarked, "It was so nice to see such a diverse group of men and women, and graduates from as far back as 1972 to recent 2012 grads." Plans are already underway to make this Chicago alumni networking opportunity an annual event.



Charles Blatti



New Health Information to promote CS research

A new University of Illinois inter-campus initiative aims to develop research partnerships between CS faculty and physicians and researchers at the University of Illinois Hospital and Health Sciences System in Chicago, Carle Hospital in Urbana, and other health care providers. The Health Information Technology Center (HITC) will leverage the strengths of all the partners in an effort to help solve healthcare delivery and cost issues.

According to HITC director and CS Professor Carl Gunter, the center has four goals: generate publicity for existing health IT research, build community across the two Illinois campuses, provide access to large patient groups and data, and generate new funding and perhaps even commercial ventures.

Many peer CS departments have large medical schools and teaching hospitals on or near their campuses, giving them a potential advantage in securing health IT funding. According to Gunter, HITC will facilitate collaborations that can level the playing field. “There will be lots of funding opportunities coming down the line in health IT, and we want to be responsive to those opportunities,” said Gunter.

CS faculty look forward to the collaborations, in large part, because they may provide access to clinical research data and various

patient populations that could strengthen existing research projects. CS Professor Klara Nahrstedt is currently working on an NSF-funded project to determine whether 3D tele-immersion technology can improve healthcare delivery and control costs by having geographically separated people use a virtual environment to interact—as if they were in the same place. She and colleagues at the University of Texas-Dallas, University of California-Berkeley, and the Veteran’s Administration Hospital in Dallas are exploring whether this tele-immersive

The 3D cameras render digital pixels together, giving the patients the sensation that they are in the same room with the doctor or physical therapist. UT Dallas researchers have developed sensors and explored utility of existing haptic devices that provide force feedback and a measurement of the patient’s condition.

“The big question is how much can this technology help,” said Nahrstedt. One major challenge that Nahrstedt’s group addresses is how to synchronize the

said, referring to her group’s efforts to understand how doctors assess upper body and arm injuries so they could tailor the immersive rooms and the necessary multi-modal information accordingly. As the technology matures and is clinically tested, Nahrstedt envisions physicians and therapists at major hospitals working with patients at small town health clinics.

CS Professor Wai-Tat Fu is confident that HITC can help strengthen his research, which aims to improve the usability of

Technology Center



BY LAURA SCHMITT

technology is a cost-effective alternative to face-to-face or 2D teleconferencing used in physical therapy sessions for wounded veterans with arm and upper body injuries.

Through HITC, Nahrstedt would like to apply tele-immersion technology to Chicago-area stroke patients with arm paralysis. “I’m absolutely excited at the prospect of working with colleagues and patients in Chicago,” said Nahrstedt, who would like to establish a satellite immersion site there.

During the past two years, she and her Texas and Berkeley colleagues have established immersion spaces on their respective campuses where researchers emulate doctor-patient interactions. The spaces are equipped with several 3D cameras, microphones, and high-definition plasma displays.

massive amounts of disparate data transmitted between locations over the Internet 2, which experiences traffic congestion and may represent a bottleneck in delivery of real-time multi-modal data. In fact, the quantity of data is so large that current compression techniques are not sufficient.

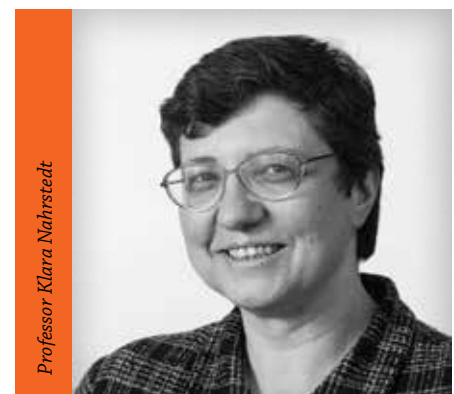
“We’re exploring which streams of data are more important than others, and what information can be withheld while still providing the doctor with enough information to make sound medical judgments,” she said. In order to know this, her group studied the physiotherapy process through consultation with doctors at the Dallas VA Hospital to understand how doctors absorb the visual, acoustic, haptic and sensory data. Due to speed-of-light limits, the end-to-end delay between geographically separate sites is unavoidable but the main challenge is how to keep this delay around 80-100 milliseconds or less over general purpose Internet networks.

“Our goal is to quantify the quality of experience and map it to the quality of service aspect in the computational and networking environments,” she

electronic health records and Internet patient portals. Fu’s research group is developing an interface system that enables patients to better understand information in their electronic health records.



Professor Carl Gunter



Professor Klara Nahrstedt



HITC GOALS:

- generate publicity for existing health IT research
- build community across the two Illinois campuses
- provide access to large patient groups and data
- generate new funding and perhaps even commercial ventures

One aspect of Fu’s research is to understand how patients process medical information and what sources they use to supplement their health data. As such, his team has conducted experiments that record people’s Internet research actions—which sites they visit, whether they read the data on the site, and whether they understand the information to the extent that it helps them to make better health-related decisions.

“Sometimes the interface doesn’t need to have the most advanced technology, but we need to understand how people with different education levels and socio-economic backgrounds use the data,” said Fu. “Arguably those who need the most help are usually the least experienced at using the technology.”

Fu’s system could be especially useful to patients with chronic illnesses like diabetes or hypertension—conditions that require

regular monitoring of patient data. In the future, Fu hopes Chicago patients can test his interface system and provide feedback on how it behaves and which issues are most important to them. “Chicago patients would be representative of the national population as a whole,” said Fu.

The potential for collaboration with the Chicago medical campus may benefit Gunter’s research, as well. As part of a \$15 million Health and Human Services Strategic Healthcare Information Technology Advanced Research Projects on Security (SHARPS) research grant, Gunter is using an experienced-based access management approach to develop new ways for hospital’s to provide employees’ access to electronic health records.

“We’re trying to develop a continuous quality improvement process for understanding the behavior of people in



Professor Wai-Tat Fu

the hospital so you can be confident in the security that you get without interfering with the work flows that could endanger lives,” explained Gunter.

One important aspect of Gunter’s approach is its ability to enhance security over existing access technology, which is somewhat limited in discovering abuses such as identity theft or privacy breaches. By implementing machine-learning techniques to understand how the records are used, his technique can then identify anomalous behaviors that may require additional attention.

A large percentage of the Chicago hospital’s patients receive medical care through Medicare and Medicaid, two government health care funding programs that are vulnerable to fraud.

In November, HITC sponsored a daylong workshop in Urbana for researchers to learn about existing projects and discuss possible collaborations. HITC is funded by the Vice President for Health Affairs and the Center for Clinical and Translational Science on the Chicago campus and by National Center for Supercomputing Applications, the College of Engineering, the Department of Computer Science, and the College of Medicine on the Urbana campus.



More information about the center is available at: <http://healthit.illinois.edu>



Imagine a future where a physician uses a blueprint of a patient's DNA and genes to design effective drug therapy for treating early-stage cancer. Although this may sound far fetched, it's an example of how individualized medicine will change health care in the future. A rapidly evolving field, individualized medicine refers to the practice of tailoring disease diagnosis, treatment, and prevention to each person's unique clinical, genetic, genomic, and environmental information.

Human genome sequencing, which identifies an individual's 23,000 genes and the order of his or her 3 billion units of DNA, was a key enabling technology that ushered in the promise of genomics-driven individualized medicine ten years ago. Today, researchers are translating that knowledge into diagnostic tests and targeted therapies, paving the way for individualized medicine to move from the laboratory into the doctor's office.



Mayo-Illinois
Alliance:

advancing individualized medicine

data-driven field relies
on CS expertise

BY LAURA SCHMITT

At the forefront of this work are scientists and physicians from the Mayo Clinic-University of Illinois Strategic Alliance for Technology Based Health Care. The Mayo Alliance brings the clinical and research expertise of the Mayo Clinic's Center for Individualized Medicine (CIM) together with University of Illinois' research strengths in genomic biology, tissue engineering, high-performance computing, software, imaging, and nanotechnology.

CS Professor Saurabh Sinha is collaborating with Mayo CIM researcher Liewei Wang on a project that explores how different individual's genetic background might influence the response to drug treatment. Ultimately, Wang wants to identify biomarkers that might be useful in predicting which drug will be most effective for a given individual. She has conducted experiments with 300 human cell lines, which were obtained from 300 ethnically defined people, by exposing the lines to a particular drug. Noting that the drug killed some individual's cells but not others, Wang has sequenced the DNA of all 300 patients to learn the genetic variations present in any given individual cell and to determine if any of these genetic variations might contribute to the variations in response to a given drug seen with these cell lines.



Professor Saurabh Sinha



“It’s very exciting for us to be able to access this kind of data, which is not easy to come by. Whoever has access to the richest data sets gets to lead.” —Professor Saurabh Sinha

“Now they want to connect what’s known about the cells with how they reacted to the drug,” explained Sinha, who will use genomic analysis tools he developed to interpret the data. “The challenge is to connect this cryptic sequence to the phenotype, which is the response to a cancer drug.”

According to Sinha, the Mayo Alliance has been very valuable to his research because the bioinformatics field is largely data driven. “It’s very exciting for us to be able to access this kind of data, which is not easy to come by,” said Sinha. “Whoever has access to the richest data sets gets to lead.”

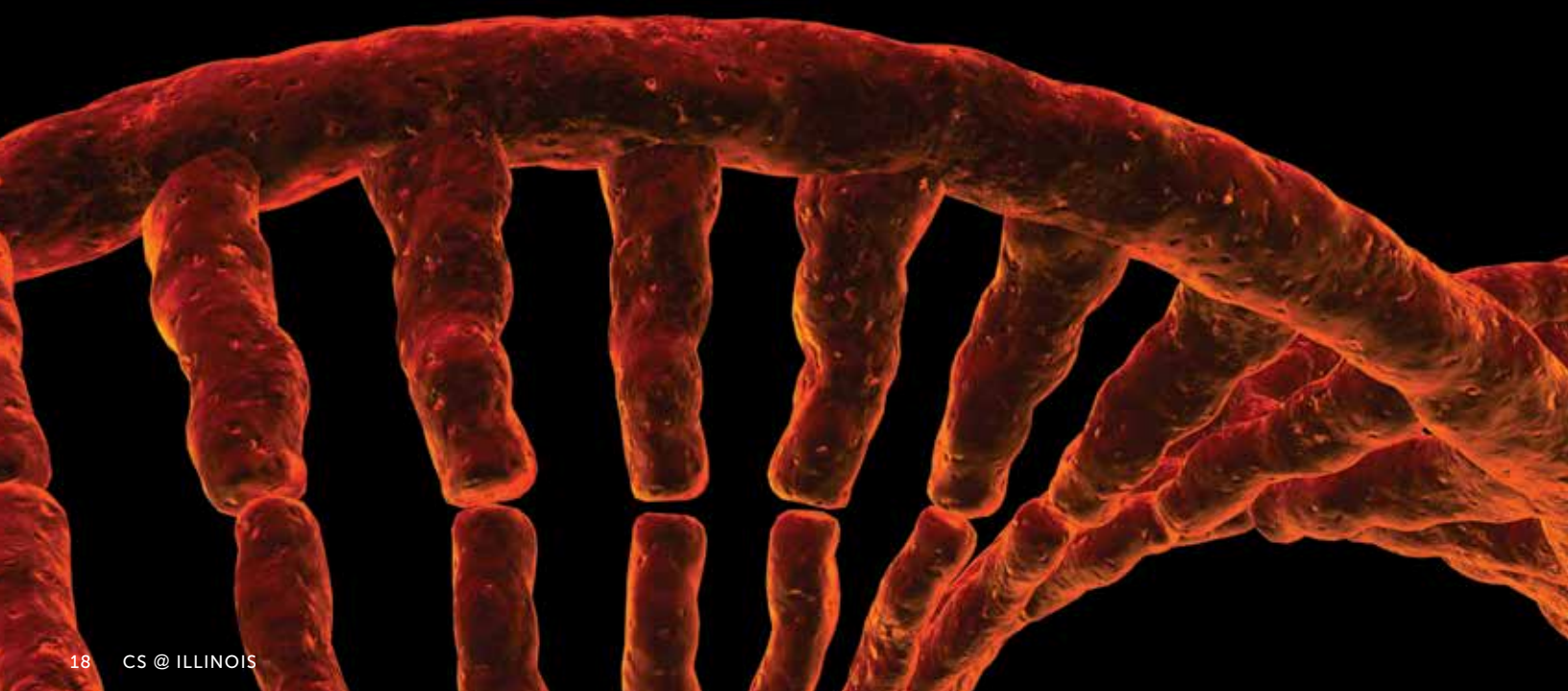
In addition to his research, Sinha is leading the Illinois education component for the Mayo Alliance. He and Bruce Horazdovsky at Mayo are developing a short course to teach Mayo medical faculty and students how to use the computational tools vital to advancing their research.

Animal Sciences Professor Bryan White, director of the Mayo Alliance on campus, believes there are many opportunities for further CS involvement in the Alliance. White, who works on biomarker discovery, is part of the Mayo-Illinois team

that recently discovered that intestinal microbial populations may be used as a biomarker for rheumatoid arthritis.

“There are huge computational challenges with this type of work,” White said. “We’re working with massive genome data sets because we’re sequencing the DNA of all the microbes in your body and then putting them together in network models for biomarker discovery.”

White is hosting several funding workshops on campus in 2013 to promote the Alliance, which supports research projects in four areas: microbiomes, pharmacogenomics, point-of-care diagnostics and epigenetics, and computational medicine and visualization. In addition, White said, there are also opportunities for CS faculty in the area of clinomics, or medical analytics— from integrating genomic data into electronic health records, designing user-friendly interfaces for physicians and patients to data storage, transfer, and security.





Coursera has seen over 2 million enrollments from hundreds of countries across its 200+ courses.

Coursera

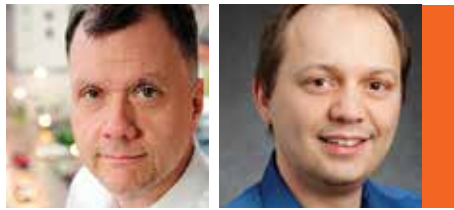
CS leads Illinois into MOOC partnership

BY MICHELLE WELLENS

The University of Illinois at Urbana-Champaign became the first public land-grant institution to join Coursera, and the nimbleness with which the university moved to be a part of a brand new model of education was nothing short of extraordinary.

This partnership puts Illinois, and the Department of Computer Science, at the leading edge of the massive open online course (MOOC) movement. Coursera describes itself as a social entrepreneurship company that collaborates with top universities to provide millions of students access to the world's best professors—for free. All students need is a computer and an Internet connection. The hope is to empower people with education that will improve their lives, the lives of their families, and the communities where they live. Coursera was founded by two Stanford computer science faculty members, Daphne Koller and Andrew Ng.

Illinois was part of the second cohort of universities to partner with Coursera, following the four universities announced at Coursera's launch: Stanford University, the University of Michigan, Princeton, and the University of Pennsylvania. At the behest of Chancellor Phyllis Wise and Provost Ilesanmi Adesida, CS Department Head Rob A. Rutenbar and College of Education Professor Nick Burbules co-chaired the University Senate Executive



CS Department Head Rob A. Rutenbar and Professor Lawrence Angrave

For more information on Illinois MOOCs, visit: www.coursera.org/illinois

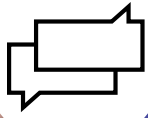


Committee ad hoc task force that worked through the essential academic and faculty issues connected with the partnership. Simultaneously, a parallel effort at the campus level explored the myriad logistical, financial and legal questions. Both tracks of investigation led quickly to a decision to finalize the contract and begin developing courses that will project Illinois' educational excellence at a planetary scale.

Among the ten courses initially being offered by Illinois through Coursera, three are from Department of Computer Science faculty and affiliate professors, covering topics like programming Android applications using Java, heterogeneous parallel programming using CUDA and MPI, and building computer-aided VLSI chip design tools. Professor Lawrence Angrave, who is developing the course on Android applications, is excited about the reach of this new effort. "To solve the problems of today and tomorrow, we need more people who can be technically creative," said Angrave. "This is an incredible opportunity to give thousands of people a programming lab on their laptops, and to introduce the next generation to computer science."



The Coursera story is incredible in itself. Explore Daphne Koller's vision for Coursera in her TED Talk at: <http://go.cs.illinois.edu/KollerTED>



Empathy via Technology

BY JENNIFER LAMONTAGNE

Even in science fiction novels, computers rarely emote, much less empathize. That didn't stop Josh Hailpern (PhD CS '12) from envisioning a computing system that could assist humans in empathizing with loved ones or patients who suffer from a communication disorder known as aphasia.

Individuals with aphasia, an acquired communication disorder, constantly struggle against a world that does not understand them. Aphasia most profoundly affects the ability to communicate with others, whose lack of understanding and empathy has the potential to “erode the social bonds that give life meaning,” according to an article published in the *Journal of Neuroscience Nursing*.

“While aphasic individuals may appear to have lost cognitive functioning, their impairment relates to receptive and expressive language, not to thinking processes,” explains Hailpern in a research paper on his work. “The impact of living in a world that does not understand your impairment can be frustrating and a daunting task. Consider how an individual would feel if their family, friends, or doctors did not understand or were not even empathetic to daily struggles brought on by an acquired language disorder.”

Hailpern's goal was to find a way to help promote empathy and understanding of aphasia in unimpaired individuals. To do so, he created a novel system and model, known as Aphasia Characteristics Emulation

of aphasia through distortion of written text. The ACES system distorts a user's Instant Messages (IMs) from the original message to one that appears like a message spoken by an individual with aphasia. Thus, the conversation that develops between the user and their IM partner has similar difficulties and hurdles to those experienced by an individual with aphasia.

Hailpern worked with Illinois Psychology and Linguistics Professor Gary Dell and Illinois Speech and Hearing Science Professor Julie Hengst to ensure that the system accurately modeled aphasic distortions in effect and frequency. To build the software, Hailpern collaborated with CS PhD students Marina Danilevsky and Andrew Harris, and CS Professor Karrie Karahalios.

The results of Hailpern's research experiments have shown that by experiencing these challenges firsthand, users are able to have increased empathy, knowledge, and understanding of aphasia. The system has the potential to help family and friends of individuals with aphasia, and to serve as a training tool for physicians, nurses, and speech-language pathologists.

“It is through empathy that we learn to understand each other,” explains Hailpern. “Our model and system demonstrate how technology can play a central role in increasing empathy, awareness, and understanding for individuals with a language disorder.”



View a video on this work at:
<http://www.youtube.com/watch?v=2qUQghDZTn4>

Projecting Hints on the Human Body

BY JANIE CHANG, MICROSOFT RESEARCH

Computer-aided instruction is nothing new; it has been a research focus for decades. Some approaches combine computer instruction with videos, while others opt for real-time feedback or augmented reality. *LightGuide: Projected Visualizations for Hand Movement Guidance*, by the Microsoft Research Redmond team of intern and computer science graduate student Rajinder Sodhi from the University of Illinois at Urbana-Champaign, Hrvoje Benko, and Andy Wilson, explores a new approach to guiding body movement by projecting visual hints directly onto the user's body. The LightGuide proof-of-concept implementation restricts the experiment to hand movements and the projection of hints to the back of the user's hand, but the impetus behind the paper began with the challenge of learning physical activities that require skilled instruction.

"Think of physiotherapy," Sodhi says. "The physical therapist prescribes certain exercises and corrects the patient's movements during the session. But then, the patient must go home and repeat those exercises, and if his positioning is wrong, his efforts could be ineffective. If we can track his movements and provide visual guidance, it's like having a virtual physiotherapist. The patient will make better progress."

The team had been interested in the combination of projection and motion-sensing technologies to use any surface—including the body—as a display-and-feedback mechanism. The main goal of LightGuide was to determine whether users were comfortable using projected visual cues on their hands to follow guided movements and how accurate those movements were compared with movements guided by conventional video instructions. The first challenge was to design a series of visual hints.

"We started out with perhaps 20 concepts," Sodhi recalls, "and, after some initial testing, settled

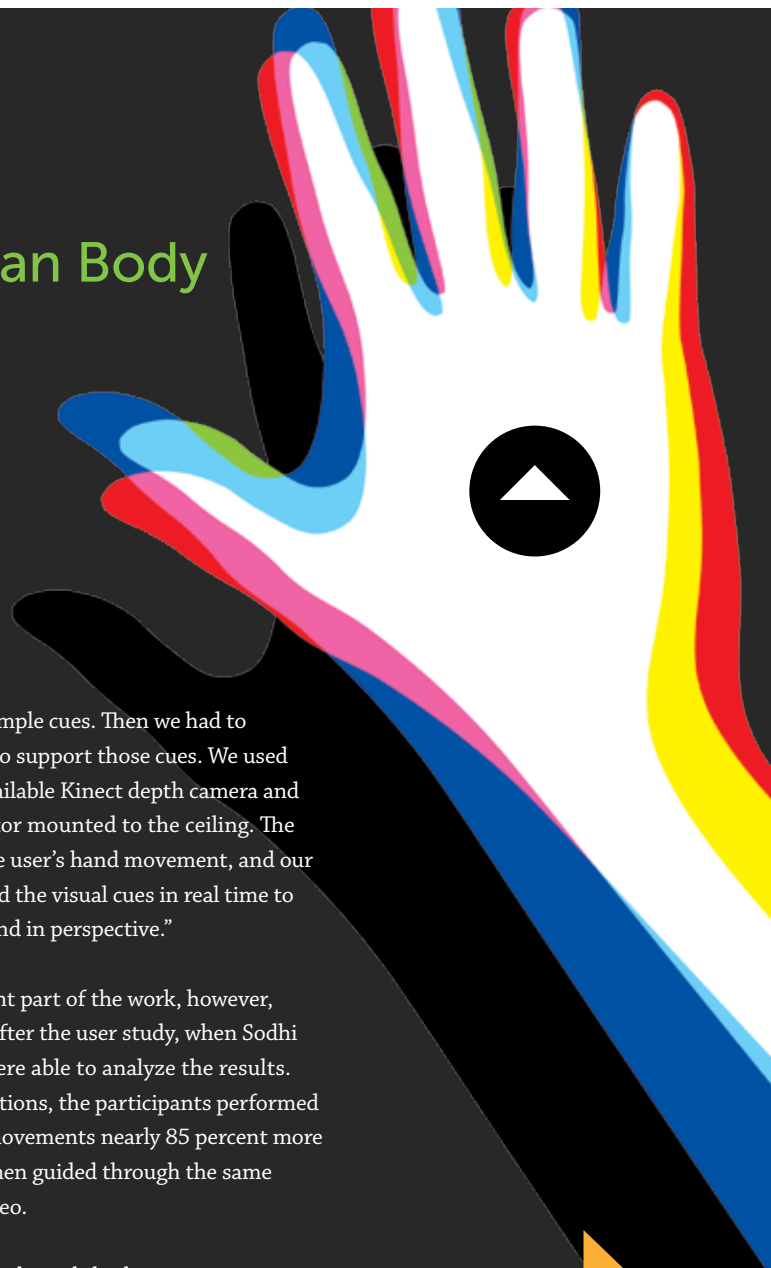
on four types of simple cues. Then we had to develop software to support those cues. We used a commercially available Kinect depth camera and a standard projector mounted to the ceiling. The camera tracked the user's hand movement, and our algorithms adapted the visual cues in real time to project correctly and in perspective."

The most important part of the work, however, came during and after the user study, when Sodhi and teammates were able to analyze the results. Exceeding expectations, the participants performed the simple hand movements nearly 85 percent more accurately than when guided through the same movements by video.

Sodhi emphasizes that while the next steps to expand the experiment include projection on other body parts and guiding wider ranges of motion, the team does not view its approach as a singular solution.

"We recognize that projected visual hints on the body are optimal for certain guided movements," he said, "but alternative forms of computer-aided movement and video work better in other situations. We see this approach being used very effectively in combination with other technologies."

View the full Microsoft Research article on this technology and others at <http://research.microsoft.com/en-us/news/features/chi2012-050712.aspx>



See LightGuide in action at:
<http://www.youtube.com/watch?v=vNaw9GpuVLQ>





grant announcements

BY HERBERT MORGAN



Professor Danny Dig

Dig's COPE Funded by NSF

NSF awarded Professor Danny Dig a four-year research grant titled "SHF: Large: Collaborative Research: Science and Tools for Software Evolution." The work is in collaboration with fellow Illinois CS Professors Ralph Johnson, Brian Bailey, and Darko Marinov, as well as Professor Don Batory of the University of Texas at Austin.

tools will allow programmers to manipulate, compose and use changes that have been previously scripted and automated.

"We are poised to completely revolutionize the way software developers do software development," says Dig.

COPE will integrate with version control systems to better support software evolution. Such integration will enable programmers to understand changes at higher levels of abstraction.

"Once we build up the high levels of COPE," says Dig, "we will be able to represent the whole evolution of history in terms of these high-level changes."

The researchers will disseminate their results through presentations, books, publications, open-source code, industrial collaborations, and educational activities. A version of COPE will be used to revamp the software engineering curriculum at the University of Illinois and the University of Texas.

"We are poised to completely revolutionize the way software developers do software development."

—Professor Danny Dig

With this \$2.2 million grant, Dig and his colleagues plan to develop a new programming environment—a change oriented programming environment (COPE). COPE will address a fundamental problem in how large software is developed.

Beginning with empirical studies, the researchers are investigating the current vocabulary that programmers use to communicate change. They are interviewing industry programmers to get a sense of common changes that are tedious, repetitive, and error-prone.

These studies will be used to develop new tools that help programmers write, customize and automate changes that they make frequently in their code. Additionally, COPE

Professor Roth Awarded a DARPA DEFT Grant

Professor Dan Roth received a grant of \$2.5 million from DARPA's Deep Exploration and Filtering of Text (DEFT) program. By building on existing natural language processing technologies, the researchers aim to build a semantic inference engine that goes deeper than a mere keyword search.

Google, a keyword search engine, can access information if you know the word in the text. But a keyword search engine doesn't possess ambiguity and variability.



Professor Dan Roth

An analyst can feed any text into Wikifier, which looks for text containing important concepts and entities, and links those bits of text to the appropriate entries in Wikipedia.

Roth's team wants to go deeper and actually understand what is being expressed in the text. To achieve this, the inference engine will incorporate co-referencing. For example, "Barack Obama," "President of the US," "commander in chief," are all the same thing. They co-refer. Every time one of those phrases occurs in a document, it is talking about the same entity.

Intelligence analysts have a vast number of documents to research, but they need to answer a specific question. For example, "Did China buy arms from Vendor A?" Analysts want to be able to send that query and have related documents returned. But in a keyword search for "China," "arms," and "sale," many returned documents will not be relevant.

Additionally, analysts are interested in smart filtering, an additional layer on top of the initial keyword search, which can throw out all the places where "arms" and "sale" just happen to match.

The current state of the art can be seen in a tool the researchers developed called Wikifier. An analyst can feed any text into Wikifier, which looks for text containing important concepts and entities, and links those bits of text to the appropriate entries in Wikipedia. This tool represents the first step in their 4.5-year project.

For a demo of Wikifier, see: http://cogcomp.cs.illinois.edu/page/demo_view/Wikifier



Professor Josep Torrellas

Torrellas Receives a PERFECT Grant to Improve Power Efficiency

Professor Josep Torrellas leads a project that has received a \$2.8 million grant from DARPA to explore ways to improve power efficiency in embedded computer systems. Funded under DARPA's Power Efficiency Revolution For Embedded Computing Technologies (PERFECT) program, the 5.5-year, 3-phase project seeks to increase efficiency from the current 5 GFLOPS/w to the program's targeted 75 GFLOPS/w.

Energy efficiency gains would provide longer battery life, lower operating costs, and higher clock speeds without having to use a sophisticated cooling system. Greater power efficiency would mean that more devices or computations could be run simultaneously in situations where the peak available electrical power is capped.

Torrellas' project, "Parameter Variation at Near Threshold Voltage: The Power Efficiency Versus Resilience Tradeoff," includes team members Nam Sung Kim of the University of Wisconsin and

Radu Teodorescu (PhD CS '08) of Ohio State University. Together they will investigate an integrated approach to boost energy efficiency by mitigating and tolerating parameter variations at near threshold voltage (NTV), a region where supply voltage is only slightly higher than threshold voltage.

Lowering a chip's supply voltage will significantly increase power efficiency, but requires addressing the challenges of lower frequencies and parameter variations—deviations of process, voltage, and temperature values from nominal specifications.

The researchers' advancements will provide for technologies beyond the military ones. In the first year alone, at Illinois, Torrellas intends to develop a novel variation-tolerant architecture of a highly power-efficient clustered many-core chip. Intel Corporation intends to use the researchers' new models and architectures when it is beneficial.

Torrellas calls this project "practical" and says that students who work on it are "exposed to very practical matters." "Many of them interact with companies such as Intel, AMD and IBM. So it is a great experience for them."

Energy efficiency gains would provide longer battery life, lower operating costs, and higher clock speeds without having to use a sophisticated cooling system.

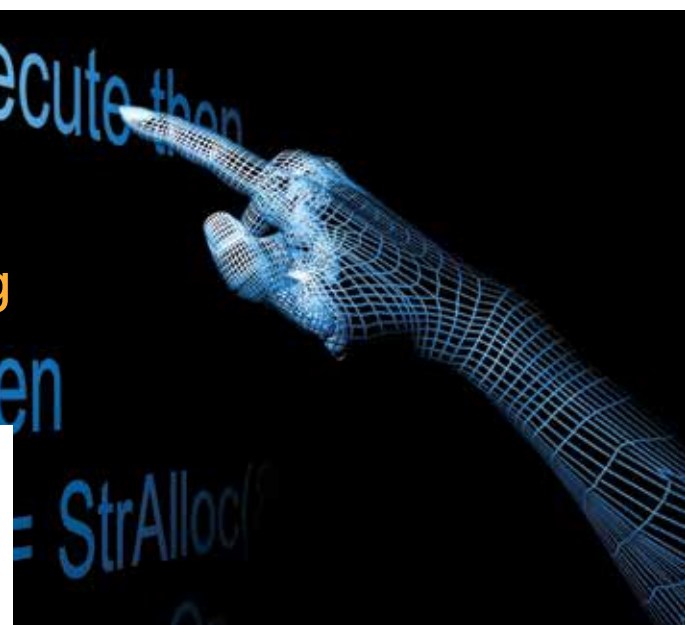
Computer-Assisted Programming

Professor Madhu Parthasarathy is part of a 5-year \$10 million effort to make computer programming faster, easier, and more intuitive. Parthasarathy is an expert in techniques and tools for verifying the correctness of software programs. The project, called ExCAPE, aims to change computer programming from the tedious, error-prone, manual task it has always been, to one in which a programmer and an “automated program synthesis tool” collaborate to generate software that meets the tool’s specifications.

Led by the University of Pennsylvania, the project is a highly collaborative effort that will involve multiple research institutions, partners in industry, and educational outreach to the next generation of computer scientists. The ExCAPE team brings together expertise in theoretical foundations (computer-aided verification, control theory, program analysis), design methodology (human-computer interaction, model-based design, programming environments), and applications (concurrent programming, network protocols, robotics, system architecture) to pursue research focused on developing new computational engines for transformation and integration of synthesis artifacts, and effective methods for programmer interaction and feedback.

“Computers have evolved at a dramatic pace, but the technology that’s used to develop programs and software is evolving comparatively slowly,” said Professor Rajeev Alur, director of the project. “What it means to ‘code’ hasn’t changed much in the last 20 to 30 years. It’s still done by expert programmers and is quite time-consuming, expensive and error-prone.”

In today’s programming languages, programmers must write out explicit instructions for what they want the program to do. For large projects, this kind



Professor Madhu Parthasarathy

of coding is so complicated that programmers need separate “verification” teams to weed out errors.

During the last two decades, this verification technology has matured, leading to powerful analysis tools that can find subtle mistakes in real-world systems. The ExCAPE approach will leverage these advances to help programmers avoid such mistakes in the first place.

“I am particularly excited on how such computer-assisted methods will help people who traditionally do not write programs—e.g., kids and end-users—to write programs,” says Parthasarathy. “These techniques have great potential to have a huge impact in this domain, extending the class of programmers for new devices.”

The researchers are proposing an integrated tool kit for automated program synthesis. Such a toolkit would allow a programmer to essentially collaborate with a computer on writing a program, contributing the parts they are most suited to. With more powerful and integrated verification systems, the computer would be able to give feedback to the programmer about errors in the program and even propose corrections.

Searching for Prime Security in a Browser? Look No Further

BY HERBERT MORGAN

In real estate, it's Location. Location. Location. But in a web browser, it's Security! Security! Security!

The computer security software company Symantec issued an Internet security threat report in 2011 warning that Internet Explorer, Chrome, Safari, Opera, and Firefox had more than 500 new security vulnerabilities combined in 2010.

That's the bad news. The good news: Professors José Meseguer and Sam King are designing and building a correct-by-construction modular web browser called the Illinois Browser Operating System (IBOS). Actually, it is designed as a browser and an operating system.

IBOS utilizes a small browser kernel, which is separated from all other processes, to validate every browser-related message and ensures that all messages pass through the kernel. By doing so, IBOS is able to enforce security policies, such as the same-origin policy and a trusted user interface that prevents address bar spoofing—it will always show the true URL for the content on the page.

Beefing up security doesn't mean eliminating traditional OS and browser components. The system includes them all, such as device drivers, browser engines used for rendering web apps, and a storage subsystem for remembering cookies.

The researchers, who include recent graduates Ralf Sasse (PhD CS '12) and Shuo Tang (PhD CS '11), formally verified the IBOS secure browser design using Maude, a high-performance implementation of rewriting logic. By expressing IBOS in Maude's

“To the best of my knowledge, this is the first time ever that a real browser design has been fully verified.”

—Professor José Meseguer

precise formal logic, researchers were able to prove its security properties, including the address bar correctness and the same-origin policy.

“Unlike the standard browsers, IBOS has a trusted code base that is orders of magnitude smaller and this has made it possible to fully verify its design,” says Meseguer. “And to the best of my knowledge, this is the first time ever that a real browser design has been fully verified.”



Professors José Meseguer and Sam King

Election Analytics: The Forecast Calls Campaign

You may have heard of the statistical analyst Nate Silver, whom NPR's Terry Gross described as "something of a celebrity." In the 2008 presidential election Silver correctly identified the presidential winner in 49 of the 50 states.

He wasn't the only one:
Professor Sheldon H. Jacobson did too.

To see his results:
<http://electionanalytics.cs.illinois.edu>



BY HERBERT MORGAN

For the 2012 presidential election, Jacobson implemented the mathematical model that made his 2008 prediction so successful. His project, Election Analytics, employs Bayesian estimators that use state polling data to determine the probability of which presidential candidate will win each of the states. The state polling data that Jacobson collected came from realclearpolitics.com and other polling centers.

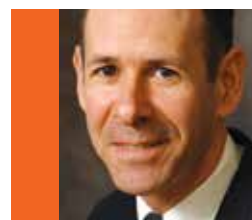
These state-by-state probabilities are then used in a programming algorithm, developed with Edward C. Sewell of Southern Illinois University Edwardsville, to determine a probability distribution for the number of Electoral College votes that each candidate will win.

In the 2012 presidential election, the Election Analytics team's model correctly predicted 49 of the 50 states: all 39 "non-battleground" states (and the District of Columbia) and 10 battleground states. Only the battleground state of Florida was not predicted correctly.

In addition to the presidential election, Jacobson extended the 2012 model to evaluate U.S. Senate and House races. In those Congressional elections, the individual candidate probabilities were used to determine the number of seats controlled by each party.

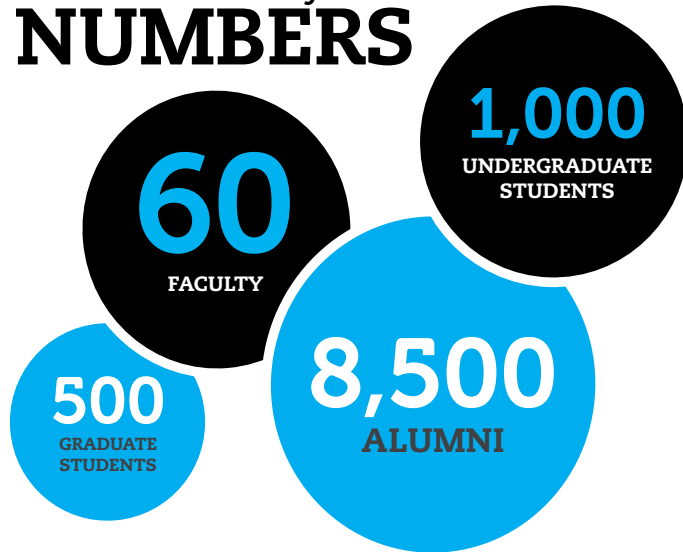
The team's model correctly predicted 31 of the 33 Senate races: all 19 "non-battleground" states and 12 battleground states. Only the battleground states of Montana and North Dakota were not correctly predicted. In the House election, 408 of the 435 races were correctly predicted.

With winning numbers such as these, is Jacobson's celebrity probable?



Professor
Sheldon H. Jacobson

CS @ ILLINOIS by the NUMBERS



Demand for a computer science degree in the marketplace is **extraordinary**.



CS @ ILLINOIS degree applications are **soaring**. For students entering Fall 2012, we received:



According to *U.S. News*, computer science captured 5 of the 10 Best Jobs of 2012:

Courtesy of *U.S. News*

1. Registered Nurse
2. SOFTWARE DEVELOPER
3. Pharmacist
4. Medical Assistant
5. DATABASE ADMINISTRATOR
6. WEB DEVELOPER
7. COMPUTER SYSTEMS ANALYST
8. Physical Therapist
9. COMPUTER PROGRAMMER
10. Occupational Therapist



L to R: Director of Advancement Michelle Wellens, Associate Director of Communications Tom Moone, Associate Director of External Relations Cynthia "CJ" Coleman, Office Support Associate Erin Kelley, Program Specialist Colin Robertson, and Special Events Coordinator Julie Gustafson

Meet the CS Advancement Team

Ever wonder who is behind putting together this *click!* Magazine? Or organizing the corporate recruiting visits or regional alumni events? Or highlighting opportunities for you to contribute your resources and knowledge to help the department?

Meet the CS Advancement Team. This dedicated group coordinates all the communications, alumni relations, and fundraising efforts for the department. They also manage our corporate relations programs, special events, and outreach activities in collaboration with the academic offices and student groups.

They are here to be of service to you—our alumni, faculty, and students—to keep you connected to the CS @ ILLINOIS network and to be good stewards of your gifts of time, advice, expertise, and financial support. Working closely with the CS Alumni Advisory Board, they develop programs and set fundraising priorities, such as increasing the Annual Fund to support more scholarships, technology innovation, and outreach.

For more information on giving back visit: www.cs.illinois.edu/giving





graduate fellowships

Singla and Wang Receive 2012 Google PhD Fellowships

BY LEANNE LUCAS

Ankit Singla and Hongning Wang, CS doctoral students, have each been awarded a Google PhD Fellowship.

Singla received the fellowship to support his work in datacenter networking. "I work on networks research with CS Professor Brighten Godfrey focusing on the design of large networks," said Singla. "My most visible recent work is in the area of data center network topology design. We are working to find network topologies (i.e. patterns of interconnections of computing devices) which have the highest capacity to move

information around in these networks."

Wang specializes in search and information retrieval. "My major research interests include text mining, machine learning and information retrieval. I want to help users gather knowledge and personalize information retrieval." Wang has interned with Yahoo and Microsoft, and said he is excited to have the opportunity to learn from Google as well, a name that is synonymous with the word "search."

Google's global fellowship program awarded 40 fellowships worldwide. This year, 14 were awarded in the United States and Canada. The program recognizes outstanding graduate students doing exceptional work in computer science, related disciplines, or promising research areas. These prestigious two-year fellowships come with a stipend of \$32,000 per year and coverage of tuition and fees. They also have the additional benefit of pairing fellows with a Google research mentor. These mentors provide a different point of view beyond academic training, and introduce fellows to a professional network which will last throughout their careers.

Sidelnik and Dalton Receive NVIDIA Graduate Fellowships

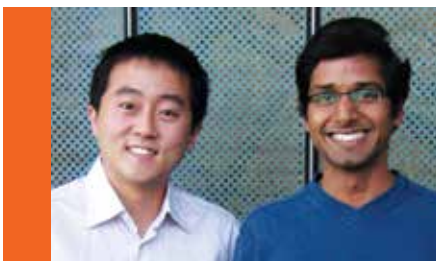
BY LEANNE LUCAS

Albert Sidelnik and Steven Dalton, CS PhD candidates, have each been awarded an NVIDIA Graduate Fellowship for 2012-2013.

Sidelnik works with CS Professor David Padua, a Donald Biggar Willett Professor, in the area of language and compilers for parallel architecture. "Primarily, I am developing compilation techniques and language extensions to support next-generation exascale computing architectures," said Sidelnik, "including dependence-driven runtime systems and GPU-based accelerators." Much of Sidelnik's research has been in collaboration with Intel, NVIDIA, and Cray.

This is not the first NVIDIA fellowship for Sidelnik; remarkably, he has received it twice before. He is also the recipient of the inaugural Kenichi Miura Award, given by the Department of Computer Science for excellence in high performance computing. Before coming to Illinois, Sidelnik worked at IBM on the development of compilers,

Ankit Singla and Hongning Wang





Albert Sidelnik and Steven Dalton

runtime systems, and operating systems to support the BlueGene/L and /P supercomputers.

Sidelnik has accepted a position as a research scientist with NVIDIA and will begin in the fall of 2013, doing research on new parallel programming models.

Steven Dalton works in the area of scientific computing under the advisement of CS Professor Luke Olson. "My research focuses on mapping sparse linear algebra and graph operations associated with algebraic multigrid solvers to many-core architectures," he said, "predominantly graphics process units (GPUs)." Dalton is a contributor to the CUSP project, a GPU sparse graph and iterative solver package designed using the Thrust template library.

Dalton gained an interest in computational physics simulation while an undergraduate physics major at the Georgia Institute of Technology, eventually leading to an additional degree in computer science. Dalton's PhD studies at Illinois combine his interests in both areas.

In addition to the NVIDIA fellowship, Dalton has received the Graduate College Fellowship, the SURGE Fellowship from the College of Engineering, and an honorable

mention for the NSF Graduate Research Fellowship in 2010.

The NVIDIA Graduate Fellowship Program provides funding to PhD students who are researching topics that will lead to major advances in the graphics and digital media industry, and are investigating innovative ways of leveraging the power of the GPU. Recipients receive crucial funding for their research, and are able to conduct groundbreaking work with access to NVIDIA products, technology and some of the most gifted minds in the field.

Komuravelli and Sinclair Win Qualcomm Innovation Fellowship

BY COLIN ROBERTSON
AND JENNIFER LAMONTAGNE

CS PhD students Rakesh Komuravelli and Matthew Sinclair received one of only eight \$100,000 Qualcomm Innovation Fellowships for 2012. The funding will support their work to address various hardware challenges in heterogeneous architectures. Qualcomm Innovation Fellowships help students pursue futuristic innovative ideas, while promoting Qualcomm Incorporated's core values of innovation, execution, and teamwork.

Power issues in hardware architectures have become a major impediment to chip manufacturers' ability to increase performance in new generations of processors. While multicore architectures offer one model towards addressing the rising power consumption problem, such architectures are still unable to utilize the entire chip area within a reasonable power budget.

In contrast, heterogeneous systems, where components are specialized for various problem domains, offer a more power-efficient solution. Because the individual components are optimized for performing their domain-specific computations, they offer the promise to alleviate today's power dissipation problems.

These systems also offer the ability to run different parts of an application on different optimized parts of the architecture, resulting in faster performance.

Komuravelli and Sinclair view heterogeneous environments as critical to moving forward the state-of-the-art, especially for applications in areas like voice and image recognition, vision, image processing, and machine learning, among others. The students are targeting memory hierarchies in heterogeneous systems, aiming to improve data transfer, data organization, coherence, and reconfigurability of the memory hierarchy. Their work builds on prior work on the DeNovo memory model, which used program-level annotations to allow flexible data movement that resulted in better power and performance. The team hopes to apply similar software-aware techniques through abstractions for heterogeneous architectures.

Initially, Komuravelli and Sinclair will be integrating CPUs, GPUs, and DSPs into a tightly coupled architecture, though they hope to extend their architecture to include FPGAs and more domain-specific accelerators in the future.

Komuravelli, an expert in hardware-software co-design and cache coherence protocols, and Sinclair, an expert in GPUs and memory systems, will collaborate on the project with their advisors, CS Professors Sarita Adve and Vikram Adve, and Pablo Montesinos (PhD CS '09), their Qualcomm mentor.



Matthew Sinclair and Rakesh Komuravelli

Chicago After Hours

Brings City's Tech Leaders, Mayor to Campus

BY COLIN ROBERTSON

A little slice of the Windy City came to Urbana in early October, as the Department of Computer Science and the University of Illinois hosted Chicago After Hours, where nearly 500 students met with 33 Chicago-based technology companies inside the friendly confines of the Thomas M. Siebel Center for Computer Science. The intent was to showcase the many technology related opportunities available in Illinois.



Brad Keywell, Professor Rob A. Rutenbar, Mayor Rahm Emanuel, Mike Evans, and Eric Lunt

Presented with World Business Chicago, the Chicago Mayor's Office, and several Illinois-based entrepreneurial organizations, the recruiting event featured Chicago sights, food, and people, as students rocked to a deejay, ate Chicago-style hotdogs, and were visited by Chicago Mayor Rahm Emanuel. During his visit, Emanuel headlined a panel discussion about Chicago's technology start up scene, toured NCSA's Blue Waters supercomputer, and met with university leaders, including President Robert Easter and Chancellor Phyllis Wise, all while sporting an orange and blue tie.

The technology panel, introduced by Chancellor Wise and moderated by CS Department Head Rob A. Rutenbar, also included insights from Chicago entrepreneurs Brad Keywell, co-founder of Lightbank, Groupon and Chicago Ideas Week; Mike Evans, co-

Watch the Tech Panel Video:
<http://www.youtube.com/watch?v=qy8kE7pGH68>



founder of GrubHub; and Eric Lunt, CTO of BrightTag. The topic was “Why Chicago,” and the discussion focused on the emerging technology and start up scene in Chicago. “I want you to see the opportunities in Chicago as part of your future, both the businesses and the quality of life,” said Mayor Emanuel, speaking to students. “The Chicago you knew when you left four years ago, the tech scene is totally different.”

“There’s capital, there’s talent, and there’s demand for great technologists, there’s demand for risk-taking entrepreneurs,” noted Keywell. “People like me are putting capital that we’ve made back into the system and backing other companies right down the street.”

“There are some amazing opportunities available in Chicago,” said Rutenbar. “One way to raise awareness in the student body is to get these companies onto campus. This kind of an event is a fantastic way to do that.” Even though 35% of computer science undergraduates hail from the Chicago area, the experience was an eye-opening one. “I grew up in the city, but I had never heard of most of these companies. It’s been great to learn about Chicago’s non-finance tech sector,” said Dylan Nugent, a computer science junior. “And the panel was a nice way to hear what the city’s leaders are planning.” “In the tech world, Silicon Valley gets talked about a lot, but there are a lot of people doing fantastic things right here in Illinois,” said CS Director of Advancement Michelle Wellens. “Over 25% of our CS alumni call Chicagoland home.”

While the Computer Science and Electrical and Computer Engineering departments have been hosting similar style recruiting events each semester for over three years, this was the first with a Chicago flavor. “After Hours differs from typical career fairs, in that the atmosphere is more relaxed, and company representatives and students are encouraged to mingle,” said CS Associate Director of External Relations Cynthia Coleman.

Companies attending Chicago Afterhours ranged the gamut in size and focus, from global firms like Boeing and Google and Groupon, to smaller firms like Belly and LexTech Global Services. “It was outstanding exposure for our start-up. We got a lot of good leads and quality resumes,” said Braintree’s Aunkur Arya, who was delighted with the event. “It was a fantastic way to get in front of talent, both those who are about to enter the workforce, and undergraduates still



deciding how to fine-tune their studies.”

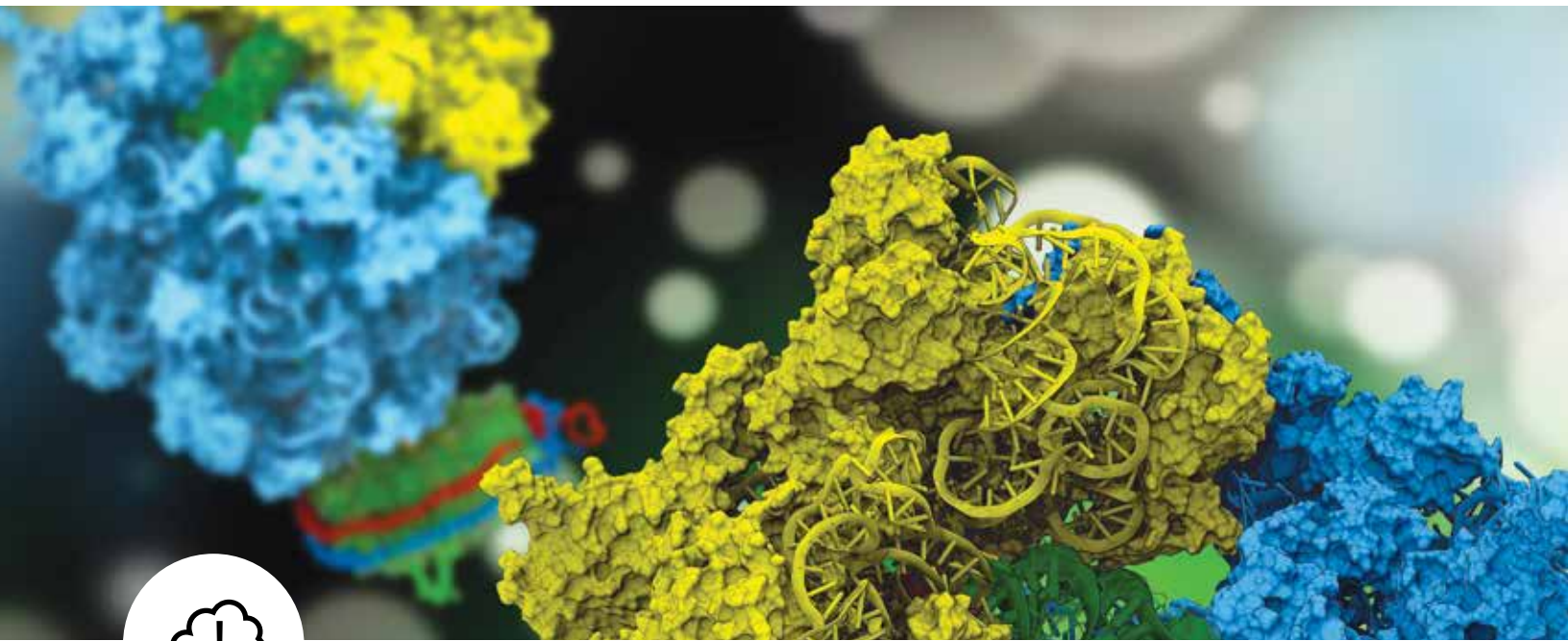
Students who attended After Hours expressed similar sentiments about leads and offers from new companies. In response to a post-event survey, students indicated that they have kept in touch with many of the companies that they met, with some students getting interviews and even job or internship offers. And the theme was a hit. “The ambiance of the event managed to capture a feel similar to that of an event in a downtown skyscraper, so excellent job with that,” commented one student.

After Hours complements other engagement opportunities offered by the College of Engineering. “The Corporate Connection and Startup Kit provide great ways for companies to recruit on campus, while Engineer-In-Residence allows our friends and alumni to give our students advice and mentoring,” said Coleman. Other initiatives and resources on campus, like the Technology Entrepreneur Center (TEC), provide skills and knowledge to help students and faculty become successful innovators.

Jeff Holden (BS CS '91, MS '92), Senior Vice President of Product Management at Groupon, talks to students at the Chicago After Hours.

Learn more about The Corporate Connection at: <http://corporateconnection.cs.illinois.edu>





A 20-Year Collaboration + 2 Professors = The 2012 Fernbach Award

BY HERBERT MORGAN

Computer scientist Laxmikant “Sanjay” Kalé and physicist Klaus Schulten received the 2012 IEEE Computer Society Sidney Fernbach Award “for outstanding contributions to the development of widely used parallel software for large biomolecular systems simulation.” This recognition was a tribute not only to the scientific contributions of these two professors but also to their ongoing and successful collaboration.

Established in 1992 in memory of high-performance computing pioneer Sidney Fernbach, the Fernbach Award recognizes diverse applications of high-performance computers using innovative approaches. In the case of professors Kalé and Schulten, the innovative approach for which they were recognized is nanoscale molecular dynamics (NAMD).

The same year that the Fernbach Award was established, the two University of Illinois professors began their collaborative work on what became NAMD. “In 1992, we wanted to go to multi-processor computers. In taking that step, I wanted to use the C programming language and modern computer science principles,”



Professors Laxmikant Kalé and Klaus Schulten

says Schulten. Prior to that, he relied on his physics students to do the programming. But if his research was going to advance at the pace he required, Schulten determined that he would need the help of computer scientists.

Concurrently, Schulten needed to write a strong renewal proposal for a five-year grant instead of the two-year grant he was awarded in 1990. Here was yet another reason to bring computer scientists on board because their expertise could strengthen the proposal.

In her brief, lucid history of the project, “Fashioning NAMD,” Lisa Pollack quotes Professor Kalé: “In my opinion that was some foresight on his part to actually look for computer scientist expertise.”

Above:
Creation of a nascent membrane protein by the ribosome. Bo Liu, Theoretical and Computational Biophysics Group

Image courtesy of the Theoretical and Computational Biophysics Group, NIH Center for Macromolecular Modeling and Bioinformatics, at the Beckman Institute, University of Illinois at Urbana-Champaign.

An expert in parallel programming, Professor Kalé had recently received tenure when Schulten approached him. “He came to my office in the DCL building and discussed with me what he was doing and invited me to join him in writing a proposal to NIH that he was working on,” says Kalé. “So that’s where this collaboration began.”

That year Schulten was awarded his sought-after five-year grant from the National Institutes of Health (NIH), from which NAMD was developed.

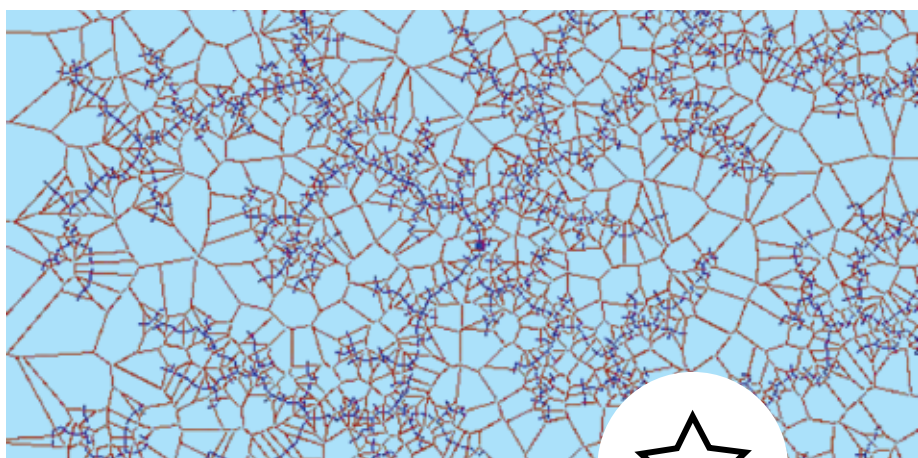
At that time Schulten’s group had other programs. Kalé took a sabbatical to learn “a little biology” and then worked with his students and Schulten’s students to understand those existing programs, and worked to improve them.

“After that, we got into the design of a new program. This was called NAMD,” says Kalé. Eventually, NAMD, based on Charm++, would grow to have more than 40,000 registered users. Charm++, Kalé’s parallel programming system based on migratable objects and an adaptive runtime system, also grew in synergy with NAMD, and today supports several other scalable applications in computational science and engineering.

Schulten suggests that Kalé’s move from working purely within computer science to involvement in a major application of parallel computing might have been a difficult path for the computer scientist to take because it was so unusual.

“But in the long run, as the Fernbach Award shows and the earlier Gordon Bell Award for NAMD with Sanjay Kalé as the leader proved, he was taking the right step,” says Schulten.

About the Fernbach Award and what it means to him, Kalé hopes that other researchers will realize that “a collaborative development of a science application between a computer scientist and a scientist is fruitful because both have important things to contribute. So if it fosters more interest, more use of interdisciplinary research, that is what I would hope for.”



LaValle Named University Scholar

BY COLIN ROBERTSON

CS Professor Steven LaValle was among seven Urbana campus faculty members recognized as University Scholars in September. The program recognizes excellence while helping to identify and retain the university’s most talented teachers, scholars, and researchers.



Professor Steven LaValle

Photo by Jukka Kontinen, Department of Electrical Engineering, University of Oulu, Finland

LaValle is a world leader in motion planning, a fundamental research area in robotics that also has other research and commercial applications, ranging from computational biology to virtual prototyping, architectural planning, and video-game design. His Rapidly-exploring Random Tree (RRT) motion planning algorithm has seen wide adoption, including implementations in the top robotic software

libraries. LaValle’s most recent work is focused on determining the minimal sensing requirements needed to solve tasks, by using machines that combine sensing, actuation, and computation.

Planning Algorithms, LaValle’s highly-cited textbook, has helped to reshape the robotics landscape by mathematically unifying subjects that had been traditionally separated within robotics, control theory, artificial intelligence, and computational geometry. The free version of the textbook is in use worldwide and has been downloaded over one million times.

First initiated in 1985, the University Scholars Program recognizes faculty excellence in teaching, scholarship, and service on the three University of Illinois campuses. Each scholar is provided with \$10,000 per year for three years to use to enhance his or her academic career. The money may be used for travel, equipment, research assistants, books or other purposes.

A Lifetime of Achievement in Real Time

BY HERBERT MORGAN

Joining the founders and eminent leaders of his research community, CS Professor Tarek Abdelzaher, a Donald Biggar Willett Scholar in the College of Engineering, was named the winner of the 2012 Outstanding Technical Achievement and Leadership Award by the IEEE Technical Committee on Real-Time Systems in December. The award is given for long-term technical achievement and leadership in the field of Real-Time Computing.

Professor Abdelzaher earned BS and MS degrees from Ain Shams University in Cairo, Egypt,

“Technologies that network devices to better link humans with physical systems will revolutionize our future the way the Internet revolutionized our past!”

—Professor Tarek Abdelzaher

before completing a PhD from the University of Michigan in 1999. After serving on the faculty at the University of Virginia, he joined the University of Illinois in 2005. At Illinois, Abdelzaher’s research is focused on cyber-physical computing, wireless sensor networks, and embedded and real-time systems. His work has applications almost anywhere computer-driven devices interact with unpredictable, dynamic environments or remote ecosystems.

“Our ability to understand and control the physical world around us is at the heart of all major scientific breakthroughs and advances in quality of life,” says Abdelzaher. “Technologies that network devices to better link humans with physical systems will revolutionize our future the way the Internet revolutionized our past!”

Abdelzaher has made significant contributions to three areas: 1) study of component interaction to infer system properties in embedded and real-time

computing, 2) analysis of timing behavior and dynamics of distributed software that interacts with the physical world, and 3) theory and tools for understanding systems that feature collaboration of humans and sensors.

He may be best known for the exploration of temporal interactions between software system components in embedded and real-time computing. Abdelzaher invented delay composition algebra, a compositional theoretical framework that describes how worst-case end-to-end delays compose from worst-case component delays in distributed priority-driven systems. Prior to his work, it was assumed that delays compose additively.



Professor Tarek Abdelzaher

Professor Abdelzaher has mentored graduate students who have gone on to succeed in both industry and academia. He created the Embedded

Everywhere Lab, a research and education laboratory used for class projects. The lab is designed to encourage creative thinking and allow students to pursue individual projects and ideas on embedded systems topics.

Abdelzaher serves as Editor-in-Chief of the *Journal of Real-Time Systems* and has served as Associate Editor of five other journals. He has also been engaged in outreach to under-represented students in engineering education, securing funding for travel grants that have enabled such students to attend a number of conferences in the field.

With this recent award, the University of Illinois becomes the leading institution in the number of awardees. "It is a great honor to join such eminent researchers as Professor Dave Liu, the founder of real-time computing, and Professor Lui Sha, the director of the Embedded Systems Lab," Abdelzaher says, reflecting on past CS @ Illinois awardees. "It was unexpected. I am deeply humbled."



Torrellas Receives High-Impact Paper Award

BY MEGAN OSFAR

Computer science professor Josep Torrellas has received a High-Impact Paper Award for the paper "FlexRAM: Toward an Intelligent Memory System." The award was given in recognition of the work being one of the five most-cited papers in the 30-year history of the IEEE's International Conference on Computer Design (ICCD).

The paper proposed a Processing-in-Memory (PIM; also known as Intelligent Memory) chip and a PIM-based architecture that places many tiny cores in the memory system of an otherwise commodity machine. The memory cores are small, to minimize losses in memory integration, and numerous, to extract high bandwidth. The FlexRAM design was also meant to be general purpose and widely usable: it doesn't pattern-match any particular algorithm, and the main processor of the machine is left unmodified, which works well for legacy applications.

The paper, published at ICCD 1999, was co-authored with then graduate students Yi Kang (PhD CS '99), Wei Huang (MCS '00), Seung-Moon Yoo (PhD EE '01), Diana Keen (MCS '99), Zhenzhou ("Bruce") Ge (MS CS '99), and Vinh Lam (BS CS '98, MS '00, PhD '11). Pratap Pattaik, an IBM Fellow, was also a co-author on the paper.

Although the FlexRAM Project at Illinois has ended, the ideas behind it continue to influence other work. With high chip integration and an emphasis on reducing latency and energy losses due to communication, Intelligent Memory has remained a desirable memory system within the supercomputing research and development community.

While initially hindered in the commercial sector by high production costs, thanks to the compelling ideas behind PIMs and advances in technology, there has been a resurgence of interest in the past two years. Notably, both Micron and Samsung have announced 3-D integrated circuits that stack multiple memory dies over a logic die, effectively enabling PIM. In particular, Micron's Hybrid Memory Cube (HMC) chip, announced in 2011, has received considerable publicity. In fact, Intel has stated that it is collaborating with Micron on furthering the development of HMC technology.

Nahrstedt Named ACM Fellow for 2012

BY COLIN ROBERTSON

University of Illinois computer science professor Klara Nahrstedt has been named to the 2012 class of ACM Fellows for her “contributions to quality-of-service management for distributed multimedia systems.” The ACM Fellows Program celebrates the exceptional contributions of those in the computing field.

Nahrstedt is a leading researcher in multimedia systems, with seminal contributions to quality-of-service (QoS) management for distributed multimedia systems. QoS is the ability to differentiate between and guarantee different levels of performance across a network for applications, users, or flows of data. Such guarantees are especially important for streaming multimedia applications, and for when network capacity is limited.

Professor Klara Nahrstedt



Nahrstedt was the first to address the issue of QoS-based routing in ad-hoc networks, opening a new area of work for multimedia researchers.

By introducing the concept of QoS brokerage, Nahrstedt’s early work changed how multimedia end-system architectures are designed and built, allowing network peers to negotiate end-to-end QoS “contracts” to guarantee streaming performance. Her novel QoS adaptation modeled the end-to-end QoS problem based on a control-theoretical approach – the first applications of control theory to multimedia systems – receiving the Leonard C. Abraham Paper Award from the IEEE Communication Society.

Later, Nahrstedt made fundamental contributions to QoS-based routing. In 1999, she derived a distributed time and bandwidth sensitive routing scheme that is able to select the network path which has sufficient resources to handle an application’s performance requirements. She was the first to address the issue of

QoS-based routing in ad-hoc networks, opening a new area of work for multimedia researchers. Her tutorial paper on QoS-based routing in wired networks provided an indispensable overview of that topic, winning the 1999 Best Tutorial Paper Award from the IEEE Communications Society. Nahrstedt has also made major contributions to QoS in wireless networks, which can be much more unpredictable than wired networks due to changing conditions and interference in the physical environment.

Currently, Nahrstedt is studying ways to provide QoS guarantees in the challenging context of 3D tele-immersion. In 3D tele-immersion, geographically separated people interact with each other within a virtual environment that strives to replicate the experience of a face-to-face physical interaction. Naturally, such interaction involves stringent real-time guarantees. In fact, Nahrstedt and her students have been the first to develop many of the metrics and protocols necessary to manage the large video and audio data streams generated by such environments, including the first adaptive real-time 3D multi-stream protocol, view-casting protocols for multi-viewpoint 3D video, and metrics to define the user’s Quality of Experience.

Nahrstedt, a Ralph M. and Catherine V. Fisher Professor, has been on the faculty of the Department of Computer Science at Illinois since 1995 and has received numerous honors, including the IEEE Communications Society Leonard G. Abraham Prize, the IEEE Computer Society’s Technical Achievement Award, the University Scholar Award, and the Humboldt Research Award, among others. She is also a Fellow of the IEEE. Since 2009, she has chaired the ACM Special Interest Group on Multimedia. Her two textbooks are among the most widely used textbooks on multimedia technology.



Encouraging Young Women to Pursue a Career in Computer Science

In a time when the word 'computer' is often followed by the word 'geek,' Women in Computer Science (WCS) at the University of Illinois are taking the initiative and reaching out to girls of all ages with the message that computer science is challenging, creative, and fun. It's also a career path that is wide open to women.

BY LEANNE LUCAS

"Women who are actively pursuing a career in computer science make up only 10 to 12 percent of the student population in our department and in the whole college system overall," said Lavanya Iyer, president of WCS and a junior in computer science. Iyer and other members of the organization would

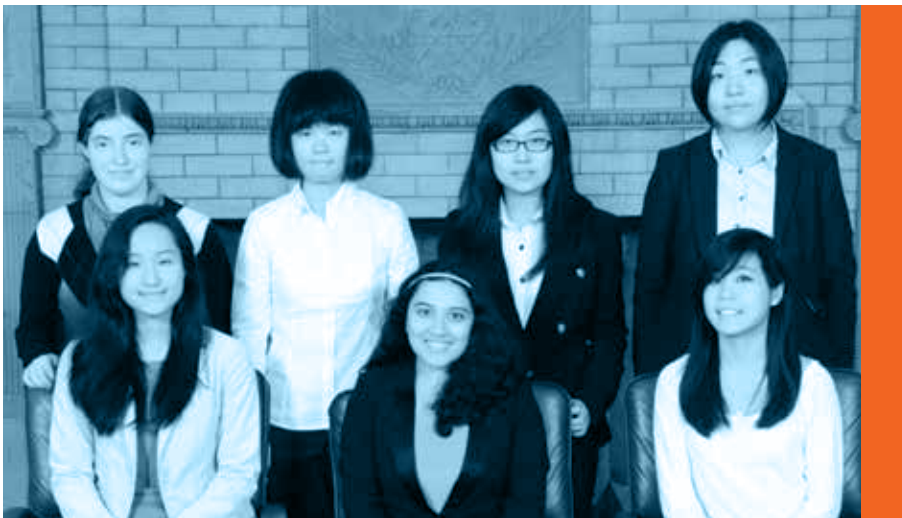
like to see that number grow, and they are putting in personal time and effort to make it happen. ChicTech, TechTeam, and Mentoring are three outreach programs coordinated by WCS to generate an interest in computer science in girls ranging in age from middle school through college.

The all-volunteer ChicTech team (pronounced "sheek-tech") travels to local high schools to "get the word out" about careers in computer science. For example, this year club members gave an hour-long presentation to more than 30 members of the Math Club at Urbana High School. This allowed them to promote one of their activities, TechJunket. TechJunket is a free workshop focused on specific computer science topics. Last fall,

volunteers in WCS presented two TechJunket workshops. The first allowed middle and high school students to build their own Rubik's cube from a kit; the second used basic software programming to teach students how to design an electronic holiday card.

ChicTech also works with the Tap In Leadership Academy, an after school program supported by the Champaign Public School District, to provide content for after-school sessions held for middle school students. Along with several WCS volunteers, Andrea Fitzpatrick, the ChicTech director, taught four Tap In sessions, with topics ranging from programming in Scratch to exploring the concept of pixels.

Front (l to r): Julia Syi, Lavanya Iyer, Emily Tran
Back (l to r): Andrea Fitzpatrick, Si Chen, Yalan Meng, Kay Byun



Iyer said a ChicTech goal is to reintroduce the Technical Ambassador Competition (TAC). TAC invites high school girls to form a team that works with a local non-profit organization or government agency that needs volunteers to do computer work. Teams are encouraged to find a project that exercises their creativity and teamwork skills, and is useful to the organization. Finalists are invited to a weekend retreat on campus, and cash prizes are awarded to the first-, second-, and third-place teams. The competition was discontinued in 2010 due

to lack of funding, but Iyer hopes to begin the competition again on a small scale next semester, with plans to grow slowly.

A second program, the WCS TechTeam, will bring together women in the department to design a project for the 2013 Engineering Open House. "The project this year is going to be a web app for phone interviews," said Iyer. "We felt there was something missing in the current apps, such as the ability to video chat or draw diagrams illustrating thought processes. We're going to create an application that will support the different utilities we want to introduce."

The WCS Mentoring program has two separate components. The first component pairs students from the computer science department with people from the corporate world and/or graduate students. The program is not restricted to members of WCS, and is open to males and females. The purpose is to provide students the opportunity to look at the "real" world and learn how best to prepare for their future. The second is a program that pairs female freshman students with upper-class undergraduate mentors to help them get familiar with the campus and the department.

Cynthia Coleman, associate director of external relations, is a departmental mentor to CS-related student groups like WCS. "These programs were started when we had a four-year NSF [National Science Foundation] grant that focused on outreach to young women. It was a non-renewable grant, so when it was up, we had to scale back quite a bit," she said. "The leaders of WCS are continuing some of the key programs we had on very little budget."

Coleman said the work WCS is doing, particularly in the middle schools, is crucial to attracting young women to the field



In November, Google Chicago hosted students from the Women in Computer Science (WCS) organization for a tour of the office space and a panel discussion on career opportunities with Google.

of computer science. “Studies show that middle school girls are a perfect target audience for these activities. They are actually more engaged because they don’t have the distractions that come in teenage years.” Coleman believes the activities also show young girls that “you can be artistic and creative and still do computer science. That’s a very desirable quality; if you can add a second element to the computer science element, it makes you even more valuable to an employer.”

In addition to outreach, WCS has also reconnected with CS graduates, holding its first alumni dinner in October, co-hosted with the Engineering Student Ambassador Association. Approximately fifty students, nine alumni and seven computer science faculty and staff attended the dinner. CS Professor Lenny Pitt, known for his outreach efforts to area schools, was the keynote speaker.

“Professor Pitt spoke on the outreach efforts to young women to engage them in the field of computer science, and the impact and importance of promoting this field to women and the under-represented,” said

Coleman. “He also did some really interesting magic tricks that use math to pull off the tricks.”

“The event was a huge success in reconnecting alumni with students and faculty,” she continued. “The passion for outreach expressed by everyone was evident throughout the entire night, and we’re looking forward to an even bigger turnout at the next one.”

“I’m very proud of all the work that WCS is doing,” Coleman concluded. “These young women are all working hard to get their degrees, yet they go above and beyond to reach out to others and show them that computer science is a wonderful field for women.”

Help CS Increase its Outreach Efforts

Outreach activities, student scholarships and fellowships, student-alumni networking, and recruitment opportunities are all underwritten, in part, by gifts to the CS Annual Fund. That’s why your gift makes such a difference—it is pooled together with gifts from other friends and alumni, leveraging the strength of our network to make a real impact on these high-priority areas.

Please support the CS Annual Fund today. Visit: <http://cs.illinois.edu/giving>





school outreach

BY HERBERT MORGAN

CS4HS: Where Teachers and Computer Science Meet

Three years ago CS Professor Lenny Pitt wanted to find a way to get more computer science into high-school classrooms. He found a symbiotic partner in Google, who was eager to promote and support programs for K-12 teachers, particularly workshops.

CS4HS is the product of that partnership. The annual summer workshops, conducted in conjunction with the University's Office of Mathematics, Science, and Technology Education, are designed to give teachers new concepts and tools that they can use in their classrooms.

The workshops concentrate on giving the teachers a crash course on two introductory computing tools: Etoys programming and CS Unplugged. Etoys is a simple but powerful programming tool designed to teach K-12 students computer science at an introductory level.

CS Unplugged ("unplugged" meaning without using a computer) consists of kinesthetic activities that focus on underlying concepts of computer science, such as binary numbers, algorithms, and networking. Its games and puzzles serve to



Professor Lenny Pitt and CS4HS participants engage in a CS Unplugged Sorting Networks activity.

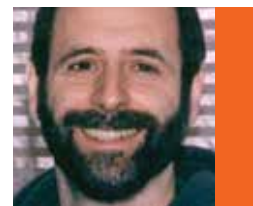
CS Unplugged consists of kinesthetic activities that focus on underlying concepts of computer science, such as binary numbers, algorithms, and networking.

expose teachers to classroom activities that can excite students about computer science.

The 2012 workshop, the third to be held, drew about 20 teachers. Unlike the first workshop, which was offered for computer science teachers only, it welcomed teachers from other disciplines. "We had a French teacher this past summer who wanted to integrate computing in the class curriculum," says Pitt.

He surmises that only about one-third of the teachers from the workshop have started incorporating their newfound knowledge in their classes. He suspects that more don't for a variety of reasons, but specifies one—an already cramped high-school curriculum.

"You need a very determined teacher who has the time to integrate these materials with their current lessons," says Pitt. And that's one more thing he hopes the workshops inspire.



Professor Lenny Pitt

Etoys: Students Get with the Programming

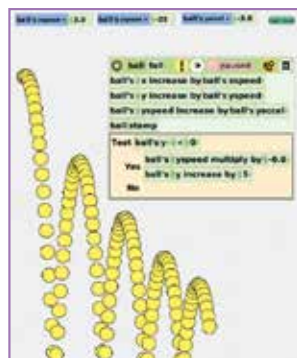
A new initiative is bringing computer science to all students in Champaign Unit 4 Schools. Computer science professor Lenny Pitt and others involved with the University's Office of Mathematics, Science, and Technology Education (MSTE) worked with Unit 4 schools to create a pilot program, which was implemented at the beginning of this school year.

A couple of middle-school teachers signed up to teach students for two weeks at a time, through separate rotations. During those two weeks, students learn Etoys programming.

Etoys has been an excellent introductory programming tool because it allows students to do a lot without requiring much knowledge. Pitt says, "It is a wonderful way to program. A lot of drag and drop. You don't have to worry about syntax errors. And, you immediately see the results of your programming on the screen." MSTE has had great success introducing it at the elementary level and at Etoys summer camps for middle-school girls.

Etoys software provides programming opportunities in various curricula, even in the language arts and the humanities. A drama teacher and a dance instructor in one Champaign middle school will be using it to augment some of the activities in their classes. Students can create video games and animation based on the programming concepts learned with Etoys.

With this success, Pitt says that Champaign schools seem very enthused about bringing computer science into their classrooms. He and others are brainstorming to find ways to make this happen. "To some extent, they are looking to us to provide some leadership in helping them define a computing curriculum that is appropriate at various levels of education."



Watch local news coverage of the Etoys Unit 4 schools outreach at: <http://bit.ly/UlIXVg>



ACM Outreach: Mentoring the Future

In his senior year of high school, Cole Gleason pushed for a computer science class to be added to the school's curriculum. It didn't happen while he was there. But he learned some programming anyway. "It was just something I picked up on my own," he says, "because I knew I wanted to do computer science."

Now, Gleason is a computer science undergraduate and chair of the Association for Computing Machinery (ACM) Outreach Committee. The committee's overarching goal is to increase ACM's involvement in the local community, as well as in the university community.

In the spring semester of 2012, the committee decided to explore ways to advance computer science education in local high schools. They presented a three-hour session on basic computer science concepts to a dozen middle-school students and a few high-school students.

That session went so well that the committee initiated a weekly program this past fall. They partnered with the Tap In Academy, an after-school program, and attracted students from Arcola and Centennial high schools. Each hourly session was split in two halves: the first was devoted to computer science theory and the second focused on hands-on exercises, doing simple

drawing exercises and animation in order to learn basic programming concepts.

Finding the right curriculum that engages the students has been a challenge. To keep them engaged, the committee is adopting a more programming-centric curriculum. Students will build video games or web applications and have a finished project at the end of the semester.

The short-term goal is to imbue the students with sufficient programming experience so they can build a project. But for the long term, it's so much more. "We want them to be able to think like computer scientists," says Gleason.



2013 Siebel Scholars

Five exceptional Computer Science graduate students have been named to the Siebel Scholars Class of 2013.

Arpit Agarwal, Harshit Kharbanda, Manoj Krishnan, Jonathan Tedesco, and Ali Vakilian have been recognized for their outstanding academic excellence and demonstrated qualities of leadership; each will receive a \$35,000 award established by the Siebel Foundation.

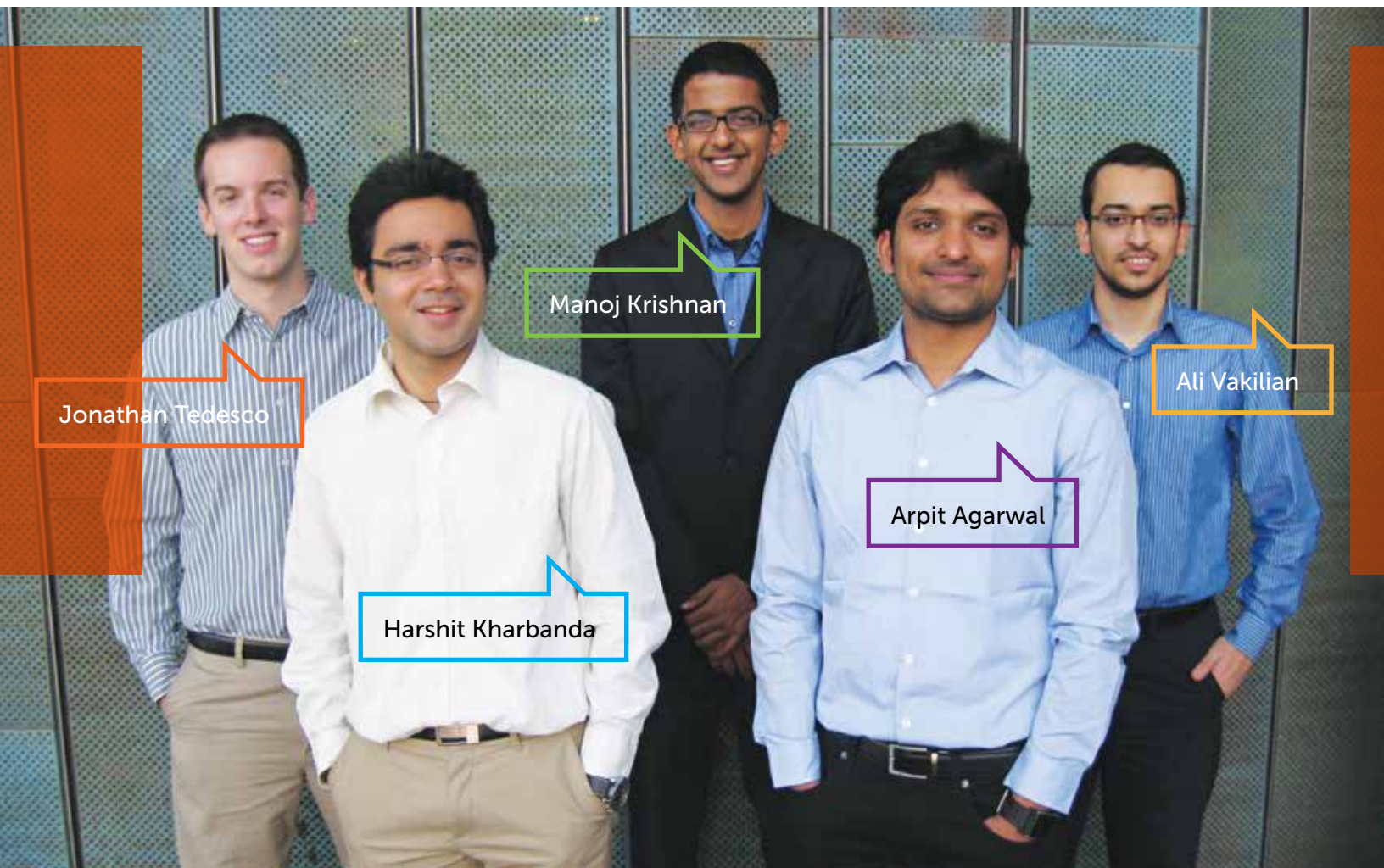
BY LEANNE LUCAS AND RICK KUBETZ

The Siebel Scholars Program honors exceptional students at the world's leading graduate schools of business, computer science, and bioengineering. Students join an active community of nearly 800 scholars who directly influence the technologies, policies, and economic and social decisions that shape the future.

An example of this influence is seen every year at the annual Siebel Scholars Conference. The 2012 conference tackled the timely and provocative topic of class warfare in America, introducing Siebel Scholars to a broad array of perspectives about the widening gap between the rich and poor. Former Secretary of State Condoleezza Rice opened the conference with a keynote address on opportunity, freedom, and democracy in America. Distinguished speakers Robert

Reich, former U.S. Secretary of Labor; David Brooks, New York Times columnist; Charles Murray, author and American Enterprise Institute scholar; and William Galston of the Brookings Institution provided the historical, economic, and social context for the current state of the classes in America. Harvard professor Niall Ferguson, editor Lewis Lapham, Charles Murray, and activist Ralph Nader debated the implications of class and power and potential interventions.

Michael Bragg, interim dean of the College of Engineering, said, "We are very proud to be part of the Siebel Scholars Program in our efforts to create informed scholars and leaders, and we are proud to be considered among the top institutions in providing this interdisciplinary training."



Jonathan Tedesco

Harshit Kharbanda

Manoj Krishnan

Arpit Agarwal

Ali Vakilian

Arpit Agarwal

Agarwal's area of research is multimedia and distributed systems, with a special focus on media content distribution across different platforms. He currently works with CS Professor Klara Nahrstedt, to optimize network bandwidth usage for video conferencing applications, using 3D Kinect cameras.

Agarwal is a co-founder of VTtouch, a mobile application development company. He has three patents filed under his name, and has worked on technologies to aid disabled individuals in communicating their thoughts. In 2010, he was part of the team that developed the Driver Drowsiness Detection System, winning the Innovation Award given by General Electric. He and his teammates (including fellow Siebel Scholar Manoj Krishnan) represented the University of Illinois at the Facebook Hackathon national finals. He has also been an active volunteer, working with SG Cares in Singapore,

doing home repairs for the elderly, and teaching underprivileged children with Nirmaan, a non-governmental, non-profit organization in India.

Harshit Kharbanda

Low power, high performance computing systems are the focus of Kharbanda's research. He currently works with Roy Campbell, the Sohaib and Sara Abbasi Professor in Computer Science, on edit-distance algorithms that allow for faster and cheaper gene alignment. This work has the potential to help solve problems such as hereditary disease detection and has resulted in a patent application. He is also exploring methods to reduce the power consumption of a chip by designing software architectures for low-power hardware.

Kharbanda founded and led several computer science clubs in high school and college in order

to teach students beyond the classroom. He was twice awarded a scholarship for excellent academic performance as an undergraduate. He designed AVIS (Artificial Virtual Intelligence Simulator), an information bot that makes knowledge and information ubiquitous, acting as a link between the mobile network and the internet. He also developed Cellinux, a Linux-based mobile operating system which can be used by any mobile user (irrespective of the mobile phone) through hardware virtualization. In countries where smart phones with powerful operating systems are uncommon, Cellinux provides every user an opportunity to leverage the capability of a full-fledged operating system. For its contribution to society, Cellinux has won several awards in some of the top universities in India.

Manoj Krishnan

Krishnan's research endeavors began as a college junior, when he helped build one of the world's first and few tangible liquid interfaces. Today he works with CS Professor Karrie Kraahalos; their research spans social networks, visualization and sentiment analysis.

Krishnan (along with fellow Siebel Scholar Arpit Agarwal) was part of the 2011 team that competed in the national finals of the Facebook Hackathon. He is launching his first start-up—a social networking and broadcasting product for local businesses—with a fellow student at Illinois. He is also a violinist and a keyboardist with over a decade of training in eastern and western styles of music. While still in high school Krishnan taught music to other high school and middle school students; he uses many of those same skills as a teaching assistant for advanced computer science courses today.

Most recently, Krishnan worked as an intern at Qualcomm's Corporate Research and Development Center. There he helped develop a visualization framework to monitor performance metrics of communication protocols.

Jonathan (Jon) Tedesco

Tedesco began his involvement with research as a sophomore, working with CS Professor Kevin Chang, first studying vertical Web search, then completing a senior thesis on entity search. In his junior year, Tedesco joined the Collaboration Modeling Toolkit (CoMoTo) project. This project monitors and studies collaboration of students in undergraduate classes to help to deter plagiarism. His master's thesis will focus on mining the heterogeneous temporal graph of CoMoTo. Tedesco recently completed his fourth year of the five-year BS/MS Program in CS and is a Jump Trading scholar.

Tedesco has maintained a central role in PURE, a student-run organization that encourages early undergraduate involvement with research and spearheaded its expansion into the Department of Computer Science. He has taught several computer science classes and held internships in both the finance and technology industries.

Ali Vakilian

Vakilian's primary research interest is algorithm design and analysis; in particular, approximation algorithms and combinatorial optimization. Vakilian works with CS Professor Chandra Chekuri. His thesis work will study survivable network design, a well-studied problem in combinatorial optimization.

As an undergraduate, Vakilian organized a study group on algorithmic graph theory, and he taught a 10-session workshop series to enhance the algorithmic thinking and programming ability of high school students. He also served an internship at ADSC, the joint research center between Illinois and A*STAR in Singapore. He was involved in a computer vision project—pill identification—that has received attention in Singapore and will be commercialized soon. He continues to work with ADSC director Marianne Winslett as a research assistant on the structured search evaluation.

Former Torrellas Student Gives Back

BY LAURA SCHMITT

In January 1997, Bruce Ge attended a lecture at Tsinghua University in Beijing that would change the course of his life. Ge had come to hear Illinois CS Professor Josep Torrellas give an invited talk on how to design a highly programmable, high-performance multiprocessor. Having recently completed his bachelor's degree at Tsinghua, Ge interviewed with Torrellas after the presentation and was offered a graduate research assistant position.

"It was an easy decision to take the offer because it was the University of Illinois at Urbana-Champaign," said Ge, who spent the next 18 months writing database applications that leveraged the parallel nature of Torrellas' computer architecture.

When he graduated with his master's degree in 1999, Ge took a job with Siebel Systems, where he worked for eight years as a software engineer before deciding to strike out on his own.

"I was bored of being one of a million engineers," said Ge, referring to his desire to become an entrepreneur.

In 2007, Ge founded Jobirn, a referral-based recruiting web site that he developed with the idea that if he built it, the money would come. People certainly visited the site, Ge explained, but the endeavor failed to generate the expected revenue.

Ge revised the product, and a few years later, launched Jobs2Careers.com, an online job search engine that is sometimes referred to as the Google or Kayak of Internet career sites. More than six million job seekers visit the site each month in search of their next employment opportunity.

Although he lost touch with his advisor for more than a decade, Ge certainly did not forget Torrellas and the kindness he extended to him as a graduate student. "He was very friendly and forgiving," said Ge. "He had a lot of international students and we all got along well."

Ge also realized that had Torrellas not given him the opportunity to study at Illinois, his life may have turned out quite differently. "He gave me an opportunity that changed my life," said Ge, referring to the fact that Siebel Systems recruited engineers exclusively from top 10-level schools. "Without the University of Illinois brand, I would probably not have gotten an offer from them."



Professor Josep Torrellas

Although he lost touch with his advisor for more than a decade, Ge certainly did not forget Torrellas and the kindness he extended to him as a graduate student.

In the summer of 2012, Ge contacted Torrellas and told him that he was giving him a \$100,000 gift to support his research group. Torrellas was pleasantly surprised by the news.

"Obviously this gift was from his heart," Torrellas said. "It gives me a lot of satisfaction to know that he was happy here and that he found his experiences here were opportunities that have helped him in the rest of his career."

Torrellas is using Ge's gift to support his students and their research, and he may use some of the money to help with the administration of the two centers that he directs—the Center for Programmable Extreme Scale Computing and the Illinois-Intel Parallelism Center (I2PC).

"It always impresses me that people start companies and do well even though they may be alone in this country," Torrellas said. "Very impressive."

Jobs2Careers
WHERE YOUR JOB SEARCH BEGINS!

Computer Science Announces Jump Trading Scholars

BY LEANNE LUCAS

Two students with a passion for tackling the evolving challenges of computer science head-on have been named the Jump Trading Scholars, starting in fall 2012. Justin Thorsen and Thomas Zhang, both students in their fourth year of the five-year BS/MS Program in CS, will receive a \$15,000 scholarship this academic year and a \$30,000 fellowship in the following year. In addition, both will intern with Jump Trading this summer.

Thorsen is a co-founder and lead programmer for Oora! Games LLC, a small indie game company based out of Wisconsin. As a programmer, Thorsen develops applications and games for the Android platform using Java and XML, and manages projects with Eclipse and the Android plug-in.

"I've found that the value of real industry experience is worth all the struggles and long nights," said Thorsen. "The way it shapes and hones skills is truly remarkable.

That said, I view research as a partner of industry experience. It has all the ingredients for refining the raw skill and knowledge that education builds."

Zhang said that his previous internships will help prepare him for his upcoming internship with Jump Trading. "My work at Chopper Trading allowed me to gain experience in developing high performance software that focuses on speed and efficiency, attributes that all high frequency trading firms are concerned with. At LinkedIn, I gained experience reverse engineering and developing new features on an existing large-scale system, skills that are absolutely critical for any engineer starting work in a new company."

Jon Russell, Learning & Development Manager with Jump Trading, has worked closely with CS to promote the scholarship program. "We started the Jump Trading Scholars program in 2010 to strengthen

"We are able to give Jump Scholars exposure to the technical challenges we face on a daily basis in the high frequency trading industry."

—Jon Russell, Jump Trading



Stephen Yi (BS MCB '96) and Alex Kravchenko (BS CS '12, MS '12) recognized Jump Trading Scholars Justin Thorsen and Thomas Zhang at the Student Awards Ceremony on October 25, 2012.

our relationship with the CS Department at Illinois and to attract highly qualified students like Justin and Thomas to Jump Trading," said Russell. "By offering a summer internship in addition to the scholarship and fellowship awards, we are able to give Jump Scholars exposure to the technical challenges we face on a daily basis in the high frequency trading industry."

Jump Trading was established in 1999 by Bill DiSomma (BS Fin '86) and Paul Gurinas (BA LAS Econ '90). The company has offices in Chicago, New York, London and Singapore, and is a member of The Corporate Connection, an Illinois Computer Science-Electrical and Computer Engineering-Industry partnership program.

State Farm Supports Fellowships and Scholarships for CS Students

The State Farm Companies Foundation Doctoral Scholar Program has begun sponsoring fellowships for doctoral students at the University of Illinois. CS students Yunliang Jiang, Yanglei Song, and Rajhans Samdani are among the first recipients.

Yunliang Jiang's (MS CS '11, Phd '12) research focused on medical informatics, which analyzes patients' comments about drugs, diseases, and treatments, in order to help people better understand their medical issues and make better medical decisions. "I knew Illinois had one of the best CS programs in the world, and I learned it was a great place to live and study," said Jiang. He completed his studies in December and now lives in California, where he is a software engineer for Twitter, focusing on relevance analysis and recommendation systems.

Yanglei Song's research is focused on truth analysis. "On the web we can find facts about a subject, but not all facts are trustworthy," he said. "Different sources may provide conflicting information about the same subject. My work is to try to resolve this inconsistency and find the 'truth.'" Song received his bachelor's degree from Tsinghua University, where he was the recipient of the National Scholarship of China.

Rajhans Samdani (MS CS '09) works on applying machine learning techniques to natural language processing and text categorization. "These techniques involve making computers understand 'natural' human language in order to perform tasks," he said. "For instance, you could use computers to automatically translate from one language to another; or given an email, figure out whether it is spam or not spam. The applications are endless. In order to efficiently automate these tasks, I use computational and statistical techniques." Samdani is a past recipient of the David J. Kuck Outstanding M.S. Thesis Award and was a 2009 Siebel Scholar.

Freshmen Raymond Farias and Lucas Rosario have each been awarded a \$5,000 scholarship from the State Farm Computer Science Scholarship program. This program supports outstanding students from underrepresented backgrounds, who have strong academic achievement and show exceptional promise.

Raymond Farias's interest in CS began in high school, when his mother "urged" him to join several extracurricular clubs. "I only wanted to play football," said Farias, "but when my geometry honors teacher wanted me to join the math team, my computer science teacher wanted me to join the robotics team, and my friends asked me to join scholastic bowl, my mom knew I could be doing more and she urged me to join all of them. Balancing so much really prepared me for college. Now I don't blink an eye at the idea of taking on more."

Farias is a member of the Society of Hispanic Professional Engineers, the Association of Computing Machinery, and has tutored in CS 125. He still plays football, and also enjoys playing guitar and writing.

Lucas Rosario knew his decision to attend Illinois was the right one on his first day in CS 125. "Professor Angrave came into class with all the lights turned off, blasting "Carmina Burana," and gave a speech on computer science and the university in general. It got me pretty excited for what was in store."

Rosario credits a high school class in video game programming and design for his preparation for college because "it focused on teaching yourself, and that's an invaluable skill in computer science." An Illinois State Scholar, Rosario has also received a scholarship through the President's Award Program. Outside the classroom, he plays the saxophone and enjoys studying jazz.

IBM Executive's Gift Encourages Women Students to Excel

A member of the first University of Illinois computer science class, Sandra Rankin (BS CS '74) appreciates her experience so much that she decided to share her good fortune. "A lot of what I accomplished in my career I attribute to the great education I received at Illinois," said Rankin, a retired IBM executive. "I had such a good fundamental education that I was able to understand new things in industry quickly."

Rankin and her husband, John (BS LAS Math & CS '72), recently established an undergraduate scholarship to help students afford a world-class education at their alma mater. The Sandra and John Rankin Engineering Scholarships provide two freshman CS students—preferably women from Illinois—with \$5,000 each.

According to Rankin, when she started at Illinois tuition was an affordable \$600 (equivalent to \$3,500 today). She recalled that John worked during the

(TS4NP), which helps small- and mid-size nonprofit organizations in Western Connecticut with their IT needs. Among TS4NP's 19 clients is Newtown Youth and Family Services, which provides important counseling to community members affected by the tragic elementary school shooting in December.

The first Rankin Scholarships were awarded in September to CS freshmen Sri Vasamsetti and Shilpa Subrahmanyam. Both women hope to use their education to start their own businesses someday. "It feels nice to know that there are people who actually care and who are willing to go above and beyond just to help," Vasamsetti said. "The scholarship means a lot. I can put aside some of my worries." Added Subrahmanyam: "The scholarship was an immense confidence booster for me upon entering such a great CS program. I am very grateful to have received it."

Sandra Rankin (BS CS '74)



A lot of what I accomplished in my career I attribute to the great education I received at Illinois. I had such a good fundamental education that I was able to understand new things in industry quickly.

—Sandra Rankin

summers and the school year to earn enough money to pay for his own tuition—something that is nearly impossible for current students to do. "It's so expensive and kids have to go into such debt that it really concerned us," Rankin said.

Rankin spent most of her 30-year IBM career in New York, rising in the ranks until she eventually became an executive working with fellow computing vendors like Apple, Sun, HP, and Oracle to develop the industry standards for the emerging Internet. She served as director in charge of all IBM software support, revamping the operations worldwide. In her final assignment, Rankin served as vice president of Mainframe, Software, and Firmware Development, managing 3,000 people working in 11 different labs across the globe. "I loved my IBM career...but there were challenges," she said, referring to the resistance some male engineers in other countries had to working with women 20-30 years ago.

Since retiring in 2007, Rankin has devoted much of her time to volunteer efforts. She is the chairperson of Technology Solutions for Non Profits

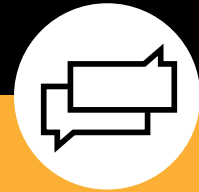
Reflecting on her own career, Rankin hopes the scholarship will encourage women engineers to pursue leadership roles. "If you want to be a successful engineer, you'd better have phenomenal communication skills and be able to work in a team," she said. "I really applaud Illinois for promoting team-based work early on in the students' careers because that's what the real world is. I just want to do whatever I can to encourage women to take the same path [as me] because I had a blast."



Shilpa Subrahmanyam and Sri Vasamsetti

the #lastword

CS @ ILLINOIS is using its social networks to enhance its connection to students, faculty and alumni. Are YOU Linked, Liking, and Following? Here are some excerpts of notable posts:



@IllinoisCS



@TechCrunch covers Spindle, a start-up co-founded by CS alum @alambert. Their new social discovery app just launched!

2012 Distinguished Alumni r n the Siebel house today&tomorrow! TODAY-AlumPanel Noon 2405 Siebel Lunch (Manolo's). See you there!

TechTalk tonightJumpTrading! 6pm 2405 Siebel. CS Alum and VP of Core Dev Stephen Yi in the house along with CTO, Albert Saplitski!

Groupon VP & CS alum offers inspiration in Dean's Distinguished Lecture: "Go after the hard, messy challenges..."

Neustar Tech Talk tonight! 6pm 1404 Siebel, Pizza too! CTO Mark Bregman discusses big data and learning machines at Neustar! A def must see!

Google: Giant startup Talk 1404 Siebel 7-8pm. Michael Munie, founder of Katango, now at Google+.

We're hiring! Faculty positions in CS @ Illinois.

University of Illinois Computer Science



UNIVERSITY HACK OLYMPICS! The winners of this code challenge will win big! A FREE trip to San Francisco. Prizes! Winning team at the hack goes to a VIP dinner and party with Silicon Valley Startup rock stars. Are you up for the challenge?

Want to learn how CS plays an integral part in reconstructive, medical and surgical, and neurotechnology and spine products to help people lead more active and more satisfying lives? Come to the Stryker tech talk!

A group of Illinois graduate students and professors, including CS PhD student Reza Shiftehfar and CS professor Gul Agha, has developed an app that can assess your condition, triangulate your location, and send for emergency personnel in the event of an emergency.

FACEBOOK talk in Siebel! HipHop Compiler for PHP! Oh, and did we forget to mention Black Dog BBQ is on the menu? Holla!

CS @ ILLINOIS



Posted by Marty Acks on the CS Alumni Networking Event in Schaumburg, IL

This was an excellent event. Dr. Rutenbar is a captivating speaker. The Ira Cohen graduate scholar, Charles Blatti, gave a wonderful, enthusiastic talk about his research. Nice to see the department is in great hands.

@alexbratton



Will be awesome to see brainpower of @Lightbank @Grubhub @BrightTag @ChicagosMayor moderated by @illinoisCs #AftrHrs today

Department of Computer Science
College of Engineering, College of Liberal Arts & Sciences
University of Illinois at Urbana-Champaign
Thomas M. Siebel Center for Computer Science
201 N. Goodwin Avenue
Urbana, IL 61801

printer
to
update
non-profit
indicia

Keep in touch!



We want to stay connected with our alumni and friends. To share your latest career news and update your contact information, please email us at: click@cs.illinois.edu or scan the QR code to use our online form.

click!



cs.illinois.edu