CS @ ILLINOIS
COMPUTER SCIENCE

2017 | VOLUME 1

CLICK!
MAGAZINE

THE FEMALE PERSPECTIVE:
THE CHALLENGES AND TRIUMPHS OF BEING A CS UNDERGRADUATE

ALSO IN THIS ISSUE:

CS @ ILLINOIS

Department of Computer Science
College of Engineering, College of Liberal Arts & Sciences
University of Illinois at Urbana-Champaign

WE DO THE IMPOSSIBLE EVERY DAY.

Department Head: Rob A. Rutenbar

CS @ ILLINOIS continues to celebrate alumni accomplishments at the highest levels, from departmental recognition to induction into the College of Engineering Hall of Fame. Our faculty continue their academic leadership by earning their best paper awards, landing large grants, and establishing new interdisciplinary centers. Four of our distinguished faculty were just invested with new endowed faculty positons—the highest honor in the academy. This issue's feature celebrates our commitment to supporting women in computer science. Other stories examine our outreach programs and expanding CS+X degree programs to continue to grow the pipeline and support for talented students from traditionally underrepresented demographics.

We welcome our alumni and friends to partner with us on recruiting, research collaborations, and philanthropy to uphold our rankings and global reputation as a leader in computer science education and research.

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. Previous issues of *CLICK! Magazine* and the monthly E-News can be found online at **cs.illinois.edu/news**.

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MAGAZINE 2017, VOLUME I

JOIN THE DATA SCIENCE REVOLUTION

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COMPUTER SCIENCE

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Tuition of only $19,200, plus fees

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ENGAGING
Same educational rigor as Illinois on-campus program

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Blue Waters Supercomputer, University of Illinois at Urbana-Champaign

MASTER OF COMPUTER SCIENCE IN DATA SCIENCE

This fully online professional master's degree equips learners with knowledge from Illinois faculty who have produced seminal research in data science.

The MCS-DS combines real assessments by Illinois faculty with Coursera's MOOC approach to learning, which breaks up long classroom lectures into shorter, focused video lessons. Each MCS-DS semester-long course consists of lecture content delivered through MOOCs, along with an exclusive high-engagement component that provides students with guidance on assignments, exams, and projects from Illinois faculty and teaching assistants from Computer Science, Information Science, and Statistics. Students can complete the eight courses required for the MCS-DS at their own pace, within a five-year window.

Not ready for a degree track yet?

Explore individual courses and certificates at Illinois Online (**online.illinois.edu**), or MOOC courses and specializations through the Illinois-Coursera partnership (**coursera.org/illinois**).

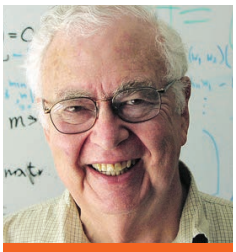
ENGINEERING AT ILLINOIS

ONLINE.ILLINOIS.EDU/MCS-DS

Golub and Ong Receive College of Engineering's Highest Honor

Two notable alumni were inducted into the Engineering at Illinois Hall of Fame, a distinction reserved for engineering alumni and other affiliates who have significant achievements that have impacted society.

Gene Golub



Gene Golub

BS Math '53,
MA Mathematical Statistics '54,
PhD Math '59,
Hon. DSc '91)

Inducted posthumously, scientific computing pioneer Golub was recognized for his preeminence in numerical analysis, building algorithms that laid the foundation for high-speed scientific computing.

A faculty member at Stanford for 45 years, Golub is well known for an algorithm known as the singular value decomposition, or SVD, which is used in a variety of applications, including search engines, signal processing and data analysis. It is sometimes called the "Swiss Army knife" of numerical computation for its versatility.

His contributions to the engineering and computer science field were internationally recognized, having received 10 honorary degrees from institutions around the world. He co-authored 18 books and about 250 papers during his lifetime. He was elected to the American Association for the Advancement of Science and National Academy of Engineering. He also received the B. Bolzano Gold Medal for Merit in the Field of Mathematical Sciences in 1994.

Peng Ong

Peng Ong

MS CS '88

CS alumnus Peng Ong was recognized for his breadth of influence in the fields of systems engineering and software development and for his investment and leadership in the Southeast Asia tech industry.

A coder, founder, advisor, and most recently, a venture capitalist, Ong worked in engineering and management roles at Illustra, Sybase, and Gensym before co-founding and serving as chief architect of Electric Classifieds, which launched Match.com. Match.com became the leading online dating service.

Later, Ong founded Interwoven, the leading provider of content infrastructure and one of the originators of the concept of content management systems. Interwoven was the standard for worldwide companies, such as General Electric, General Motors, Federal Express, and Cisco Systems.

After Interwoven, Ong founded Encentuate, the developer of identity and access management software. Encentuate was acquired by IBM in 2008. Today, the businesses Ong has created generate annual revenues of over $1 billion in total. Ong is a managing partner at Monk's Hill Ventures, a tech venture fund focused on post-seed stage companies in Southeast Asia.

Financial Industry Executive Rowe Inspires Students at Annual WCS Event

Ulku Rowe (MS CS '97) has excelled at driving business transformation by building scalable enterprise systems that leverage quantitative analytics and big data technologies. Rowe returned to campus October 27, 2016, as the keynote speaker for the annual Women in Computer Science Alumni & Student Dinner.

Then the head of Credit Risk and Capital Technology at J.P. Morgan, Rowe was responsible for the global technology platforms that manage the firm's counterparty credit exposure and capital.

During her talk, Rowe gave the Illinois students several timely pieces of advice. First, she said, focus on getting things done. "That requires ruthless prioritization, separating the signal from the noise." Second, collaborate as much as possible in school because while it may be frustrating at times, it leads to innovation. Third, take risks every day. "You'll fail now and then, but that's ok. You've got to push the envelope."

Rowe also told the students to surround themselves with the best people and maintain a healthy work-life balance. "It's easy to get excited about what you're doing and you could work endless hours, but don't forget about social and cultural opportunities," she said, encouraging her audience to take advantage of performances at Krannert Center and sporting events on campus.


Ulku Rowe

Technology Executive Abbasi Shares Keys to Success with Students

By his own account, Sohaib Abbasi (BS CS '78, MS '80) was in the right place at the right time in 1978 when he began studying relational databases at Illinois.

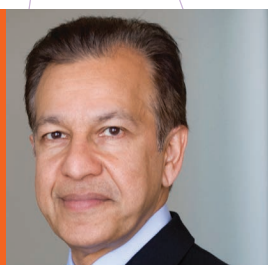
Abbasi parlayed the knowledge and experience he acquired under the supervision of the late CS Professor Geneva Belford into a successful career as a technology pioneer and business executive.

Widely known as the CEO of Informatica, where he guided the company's growth from $200 million in annual revenues to $1 billion in revenues, Abbasi spoke October 28, 2016, at the CS @ ILLINOIS Alumni Awards celebration.

Earlier in his career, Abbasi had worked for Oracle for 21 years, helping to lead the company's transformation from a small private database company with 30 employees to an industry-leading public company with 42,000 employees worth $10 billion.

Among the observations Abbasi shared with his CS audience was that successful businesses often copy and commercialize other companies' ideas, noting how IBM published the first paper on relational databases in the early 1970s, but Oracle ultimately captured the market with its product.

Another key to business success, Abbasi said, is building a world-class team through strong recruiting and motivational leadership. Abbasi concluded his talk by advising CS @ ILLINOIS students to sharpen their interdisciplinary skills as they enter the job market—something they can easily do through the CS + X degree programs.


Sohaib Abbasi

You can view Abbasi's address on YouTube in its entirety.

CS @ ILLINOIS RECOGNIZES OUTSTANDING ALUMNI

Each fall, the Department of Computer Science recognizes alumni and faculty members who have earned distinction through their professional achievements, teaching and research contributions, and service to the field of computer science. We welcome all alumni and friends to be part of this annual tradition—nominate someone you know worthy of this honor, and come back to campus to celebrate with each new class. Congratulations to our 2016 honorees:

DISTINGUISHED ALUMNI ACHIEVEMENT

The CS @ ILLINOIS Distinguished Achievement Award honors computer science graduates who have made professional and technical contributions that bring distinction to themselves, the department, and the university.

Steven Ashby

A leader in the computational science field, Steven Ashby (MS CS '85, PhD CS '88) managed the 500-person Computing Applications and Research Department at Lawrence Livermore National Lab, where he also helped found the Center for Applied Scientific Computing. Today, he sets the strategic direction for the Pacific Northwest National Lab, a federal facility engaged in energy, environment, and national security research.

Utpal Banerjee

A retired senior researcher with Intel's Software Solutions Group, Utpal Banerjee (MS CS '76, PhD CS '79) is known for developing techniques to enhance the performance of multi-core processors. His strategy for automatically analyzing a loop and determining whether it could be executed in parallel—known as Banerjee's test—has been widely used for compiler development.

Carl Dill

A veteran industry IT executive, Carl Dill (MS CS '69) led Time Warner's planning for the technology integration associated with the company's merger with AOL. At McDonald's, Dill led the company's global IT planning, development, and operations, including implementing the fast-food industry's first PC-based point-of-sale cash registers and accompanying software. Today, he runs his own IT strategy and alignment consulting firm, TriCour Partners.

Marcin Kleczynski

As a freshman at Illinois, Marcin Kleczynski (BS CS '12) founded software firm Malwarebytes. Today, Kleczynski leads the strategic expansion of the business, which employs more than 350 people in 15 countries and whose products protect consumers and businesses against dangerous threats such as malware and ransomware.

Yu Pan

A co-founder of PayPal and an early employee at YouTube, where he built the company's first player, Pan (BS CS '07) is the chief technology officer at 8i, a firm that makes it possible to easily create and experience photorealistic human holograms for virtual reality, augmented reality, and the web. Prior to 8i, Pan helped drive the early growth of consumer lending startup Affirm.

DISTINGUISHED EDUCATORS

The CS @ ILLINOIS Distinguished Educator Award honors computer science alumni or faculty members who have made outstanding contributions to computer science education and research, and recognizes those who excel at motivating computer science students.

Thomas Dietterich

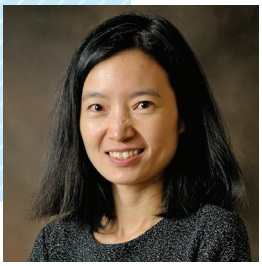
An Oregon State University faculty member since 1985, Thomas Dietterich (MS CS '79) is one of the founders of the field of machine learning. He is best known for his work on ensemble methods in machine learning, including the development of error-correcting output coding. His research has been applied to a range of real-world problems, including drug design, electronics manufacturing, ecological modeling, and natural resource management.

Edward Reingold

A highly regarded computer science teacher, mentor, and administrator, Edward Reingold spent most of his career (30+ years) as a CS @ ILLINOIS faculty member, where he made significant contributions to data structures and algorithm analysis. A noted textbook author, Reingold wrote *Combinatorial Algorithms* and *Calendrical Calculations*, the definitive reference for computer implementations of calendars. Today, he is a CS professor at the Illinois Institute of Technology, where he also served as CS department head.

Romit Roy Choudhury

An ECE Illinois faculty member and affiliate of CS @ ILLINOIS, Romit Roy Choudhury (MS ECE '03, PhD CS '06) has made impactful contributions to wireless networking, mobile sensing, and mobile computing technology. Working with embedded sensors, he and his students are exploring projects focused on indoor localization, real-time augmented reality, gesture recognition, motion data analytics, and the Internet of Things (IoT).



Yizhou Sun

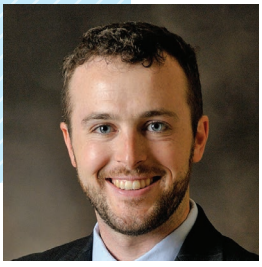
An assistant professor at UCLA, Yizhou Sun (PhD CS '12) conducts data mining, machine learning, and network science research, with a focus on modeling novel problems and proposing scalable algorithms for large-scale, real-world applications, such as academic databases, social media, and healthcare data. She has published more than 60 papers and has co-authored a book—*Mining Heterogeneous Information Networks: Principles and Methodologies*—with CS @ ILLINOIS Professor Jiawei Han, her former doctoral advisor.

DISTINGUISHED ALUMNI SERVICE

The Distinguished Service Award honors alumni or faculty who have demonstrated an outstanding level of commitment to the department and its students, faculty and alumni through their support and service.

Michael Hughes

A veteran software architect who spent most of his career with McAfee Associates, Michael Hughes (BS CS '89) currently works for the Intel Security Group, where he develops secure disk storage, memory scanning for malware detection, and malware monitoring from outside the operating system. A loyal alumnus, he created the Michael S. Hughes Award in Software Engineering in CS to attract, retain, and incentivize students in this workforce critical area.



Daniel Kaufman

A gifted problem solver, Daniel Kaufman (BS CS '11) helped consumer finance company Affirm grow its work force by expanding from 20 to 80 employees over an 18-month span. Today, he is a product manager with Affirm, where he addresses back-end services and customer-facing communications. A loyal and energetic alumnus, Kaufman initiated and helped plan Affirm's first-ever CS @ ILLINOIS alumni event in the summer of 2015, which drew more than 70 Bay Area Illinois alumni.

MEMORIAL ACHIEVEMENT

The Memorial Achievement Award is bestowed posthumously on those alumni, students, or faculty whose lives were characterized by remarkable achievement and accomplishment in computer science.

Michael Faiman

A devoted educator and mentor, Michael Faiman (PhD Physics '66) had a tremendous impact on CS students that extended beyond the Illinois campus. He founded the CS @ ILLINOIS Graduate Student Advising Office, guided hundreds of students through the Computer Architecture course (CS 231), contributed to the Graduate Records Exam (GRE) computer science subject test, and created an innovative logic design lab that was copied at other campuses. He retired from the faculty in 1999, and he died in 2004.

C.W. GEAR OUTSTANDING JUNIOR FACULTY AWARD

Established by alumni, friends, and former students to recognize contributions and services of C. William Gear, head of the department from 1985 to 1990, the C. W. Gear Outstanding Junior Faculty Award recognizes junior faculty for their outstanding research and teaching.

Andreas Kloeckner

An expert on scientific computing, Andreas Kloeckner has released numerous software tools derived from his research on high-order finite element and integral equation methods for the numerical simulation of wave phenomena. An inspired educator, he developed a new graduate-level class on using integral equations to solve partial differential equations (CS 598AK), as well as an undergraduate course on numerical methods (CS 357). He was also named to the campus *List of Teachers Ranked as Excellent by Their Students*.

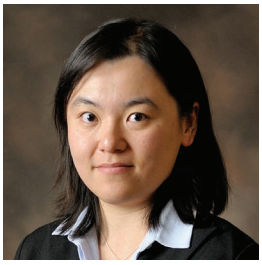
DAVID J. KUCK OUTSTANDING THESIS AWARDS

These awards were established by alumni, former students, and friends in recognition of Professor Kuck's intellectual and leadership contributions. Each year, two awards are given: one for an outstanding doctoral thesis and one for an outstanding master's thesis.

Milos Gligoric

As a member of Professor Darko Marinov's research group, Milos Gligoric (PhD CS '15) conducted important research on test-input generation, test-quality assessment, testing concurrent code, and regression testing—work that earned him an ACM SIGSOFT Outstanding Doctoral Dissertation Award and two ACM SIGSOFT Distinguished Paper Awards. Today, Gligoric is an ECE assistant professor at the University of Texas, where he conducts software engineering and formal methods research.

Le Xu



A member of Professor Indranil Gupta's group, Le Xu (BS Math & CS '13, MS CS '15) developed an on-demand elasticity feature that was implemented in the popular real-time data stream processing system Apache Storm. Known as Stream Processing Elasticity (Stela), her system, which outperformed Storm's default scheduler, allows a user to request scaling the number of machines that process the data either in or out without interrupting the on-going computation.

JOIN THIS ANNUAL TRADITION

MAKE YOUR PLANS NOW TO JOIN US for the 2017 CS Awards on Friday, October 20, to celebrate the accomplishments of our outstanding alumni, faculty, and students. This will again take place in conjunction with the Women in Computer Science (WCS) Alumni & Student dinner held Thursday, October 19.

NOMINATE a member of the CS @ ILLINOIS family that is worthy of this honor at https://my.cs.illinois.edu/submit/index.asp

Siebel's Latest Gift Will Enable Students To Flex Design Skills

The Thomas and Stacey Siebel Foundation has provided a $25 million lead gift to establish the Siebel Center for Design, a campus-wide hub for U of I student-focused design thinking and learning.

The center, which will be located on the south end of campus adjacent to Huff Hall, will facilitate and support multi-disciplinary approaches to product, process and user interface design.

The Siebel Center for Design will enable students to create physical things like a new mobile phone or medication, intangibles like software or social services, or processes such as the best way to deliver clean water in the developing world. Groundbreaking for the Center is planned for summer 2017, with construction expected to take about 18 months.

This generous gift from Siebel (BA History '75, MBA '83, MS CS '85) marks one more in a growing list of campus investments that include: endowed scholarships, faculty chairs, and the Thomas M. Siebel Center for Computer Science building. The founder of Siebel Systems, which was purchased by Oracle in 2006, Siebel is the chairman and chief executive officer of C3 IoT, an enterprise PaaS and SaaS software company that enables companies to design, develop, deploy, provision and operate large-scale IoT applications.

Tucker's Company Valued at Over $1 billion Following IPO

Founded in 2001 by Therese Tucker (BS Math & CS '84), cloud-based accounting software company BlackLine went public on October 28, 2016, and quickly rose in value to $1.1 billion.

Tucker is BlackLine's CEO and designer of the first offerings of the company's products, which support continuous accounting—a means of spreading accounting tasks over a longer period of time so work does not pile up.

BlackLine software enables companies to close their books faster than spreadsheet or manual processes. Among BlackLine's 1,500 customers are Coca Cola Co, Kimberly-Clark, Northrop Grumman, Under Armour, and Hyatt.

According to a *Business Insider* article, Tucker funded the company herself for many years, draining all her savings and retirement accounts in the process. The tide turned, though, in 2007 when she and her team decided to sell its service and software exclusively through the cloud just before cloud computing and its monthly software subscription fees became popular.

Prior to starting BlackLine, Tucker was chief technology officer at SunGard a leading financial software company that provides solutions for financial services, the public sector, and education.

Therese Tucker

CS @ ILLINOIS Faculty Earn Top Awards

PAUL FISCHER

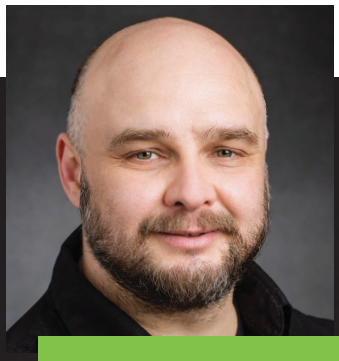
PAUL FISCHER and his research colleague Misun Min at the U.S. Department of Energy's Argonne National Laboratory earned an R&D 100 Award. Known as the "Oscars of Invention," this award is organized by *R&D Magazine*.

Fischer and Min received the award for NekCEM/Nek5000 scalable high-order simulation codes, which are an open-source simulation-software package that delivers highly accurate solutions for a wide range of scientific applications including electromagnetics, quantum optics, fluid flow, thermal convection, combustion and magneto-hydrodynamics. The size of the physical phenomena that can be simulated with this package ranges from quantum dots for nanoscale devices to accretion disks surrounding black holes.

WILLIAM D. GROPP

WILLIAM D. GROPP received the 2016 ACM/IEEE Computer Society Ken Kennedy Award for highly influential contributions to the programmability of high-performance parallel and distributed computers, and extraordinary service to the profession. The Kennedy Award is named for one of the world's experts on high-performance computing—a man whose work led to the message passing interface (MPI) standard, which has enabled researchers to use the enormous performance potential of highly parallel computer systems for over two decades.

A leader in developing the MPI standard, Gropp also designed and developed MPICH, the first functional implementation of MPI. This freely available software remains one of the most widely used implementations of MPI. In addition, he helped develop a numerical library—the Portable, Extensible Toolkit for Scientific Computation (PETSc), which has been used in a variety of applications, including nano-simulations, biology, fusion, geosciences, environmental modeling, fluid dynamics and software engineering, among others.



GRIGORE ROSU

GRIGORE ROSU won the Most Influential Paper Award at the 2016 Automated Software Engineering (ASE) conference in Singapore. His 2001 paper, "Monitoring Programs Using Rewriting," helped launch the field of runtime verification, which is a mathematically rigorous way to monitor and analyze software program execution.

Rosu's paper is significant because it helped establish runtime verification as a bona fide software analysis approach—an alternative and lighter method than conventional techniques at the time to ensure a program behaves correctly. The paper also demonstrated a system, Java PathExplorer, that could function without access to a software program's source code. That ability has become critical to industries like automotive manufacturing, where car makers embed third-party, proprietary software into their vehicles to control everything from power windows to brakes to the engine.

CS @ ILLINOIS Honors Four Distinguished Faculty with Named Chairs and Professorships

The highest honor the campus can bestow, named chairs and professorships acknowledge outstanding faculty research, service, and academic accomplishments.

These endowed positions are made possible through the generosity of alumni and friends and not only bring prestige to the faculty member, but also provide funds to support their continued advancements in the field.

Sarita V. Adve

Sarita V. Adve is now the Richard T. Cheng Professor in Computer Science thanks to a generous gift from Dr. Cheng (MS CS '69, PhD '71), an alumnus, entrepreneur, and influential educator who founded the CS departments at the Rochester Institute of Technology and Old Dominion University.

Early in her career, Adve brought the hardware and software communities together to address the memory consistency model, which affects a computer's programmability and performance and was one of the most challenging and contentious areas in concurrent hardware and software specification. She helped forge a consensus towards adopting the data-race-free model as the standard. Today, this model is the foundation of the memory models for most of the popular programming languages such as Java, C++, and C.

She has also conducted research that makes software-driven solutions widely accepted as a promising approach for hardware resiliency. Her most recent work, with Vikram Adve, has challenged the research community to rethink the design of parallel languages and hardware.

David A. Forsyth

A leading researcher in computer vision, Professor David A. Forsyth is the Fulton Watson Copp Chair in CS—an honor made possible by the generous estate gift of the chair's namesake, a 1925 electrical engineering alumnus and retired military officer who later worked in the oil and gas industries.

Forsyth has made distinctive contributions to human motion computing (detecting, understanding, and animating what people do), to how computers relate words and pictures, and to rendering objects into photographs. His group started the trend of attaching words to images by developing an award-winning model of object recognition as machine translation that could annotate image regions with words.

More recently, he developed the first method to produce sentences that describe images, which is now a hot topic. In collaboration with CS colleague Derek Hoiem, Forsyth's group showed how to describe unfamiliar objects in pictures by computing their attributes. This is now a standard strategy in object recognition.

Forsyth's recent work on realistically rendering synthetic objects into legacy photographs was widely covered (e.g., *Wired, The Atlantic, Popular Science, New Scientist,* and *IEEE Spectrum*), and has resulted in three patents. His book, *Computer Vision: A Modern Approach*, has been widely adopted as a course text, since it provides a unified vision of the field.

Laxmikant "Sanjay" Kalé

An expert in parallel programming, CS Professor Laxmikant "Sanjay" Kalé is the Paul and Cynthia Saylor Professor in CS, which is named for a retired CS faculty member and his wife. The Saylor Professorship was established by the late Stanford Professor Gene H. Golub (BS Math '53, MA Mathematical Statistics '54, PhD Math '59), a giant in the scientific computing field, in honor of his longtime friendship with the Saylors.

Kalé has developed tools and abstractions that make parallel computing easier and more efficient for modeling complex problems. He pioneered the idea of a powerful, introspective and adaptive runtime system to simplify parallel programming of complex applications and to automate resource management.

His research group developed the Charm++ parallel programming system, which is one of the few academically developed parallel programming systems that is used to solve real-world problems like simulating the precise chemical structure of the HIV capsid.

Kalé's group has also developed applications that enables astronomers to study the origins and evolution of the universe, researchers to study the quantum-mechanical details of photovoltaic materials, and scientists to simulate the spread of contagions like Ebola or H1N1 as they propagate through populations.

Josep Torrellas

Josep Torrellas is the Saburo Muroga Professor in CS, a position that was established by alumnus and former computer industry executive Douglas MacGregor (MS CS '80) to honor the late Professor Muroga, a pioneer in threshold logic.

A pioneer in parallel computer architectures, Torrellas has made important contributions to shared-memory multiprocessor design, including in cache hierarchies, coherence protocols, synchronization, consistency models, and thread-level speculation. These contributions make it easier to program parallel computers while enhancing their performance.

His work has improved the energy efficiency of multiprocessor architectures, and he has devised techniques to handle process variation and wear-out, and to reduce the power consumption of extreme-scale computer systems.

Torrellas has led industry–government research projects, including the DARPA-funded IBM PERCS multiprocessor project, which led to the initial design of the Blue Waters supercomputer, and DARPA- and DOE-funded Intel Runnemede multiprocessor, a 1000-core extreme-scale chip developed under the Ubiquitous High Performance Computing program.

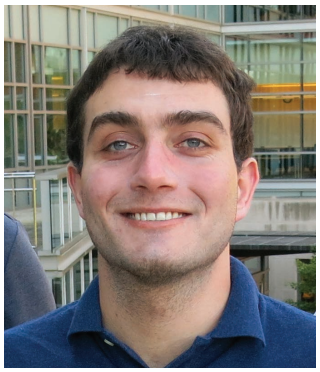
Five CS Students Named Siebel Scholars

In recognition of their outstanding academic record and leadership, these students will each receive $35,000 during their final year of study.

Congratulations to the 2017 CS @ ILLINOIS class of Siebel Scholars:

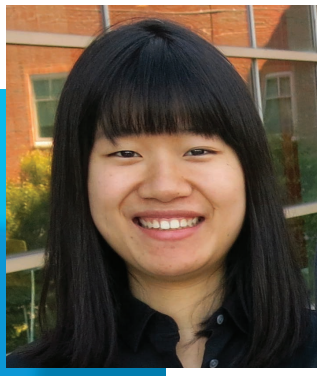
CHAMILA AMITHIRIGALA

Passionate about computer-aided education, **Chamila Amithirigala** is enrolled in the five-year BS-MS computer science degree program. She was part of a team that created Lecture Helper, an app that facilitates communication between instructors and students in large classes. Beta tested in CS Associate Professor Craig Zilles' Computer Architecture course (CS 233), Lecture Helper allows reserved students to ask questions anonymously, while providing instructors with real-time feedback on their lectures. Amithirigala is also active in STEM outreach and the campus Society of Women Engineers chapter, and she has interned at LinkedIn, where she developed a patent-pending feature for the company's iOS app.



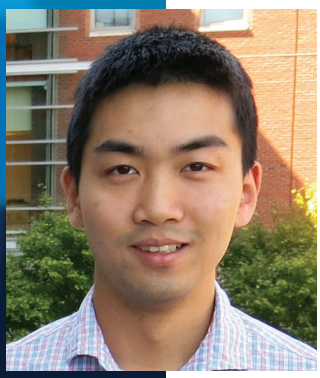
SPENCER GORDON

Spencer Gordon is conducting research to characterize the complexity of a group of search problems related to the computation of equilibria in games and markets. Working with Assistant Professor Ruta Mehta, Gordon is addressing continuous local search (CLS) problems, which include numerous optimization challenges in mathematical programming and game theory. Before coming to Illinois as a graduate student, Gordon worked at YouTube, where he helped create and launch the HTML5 live streaming video player; he also designed and built tooling and analytics that enabled his team to better understand live streaming performance.



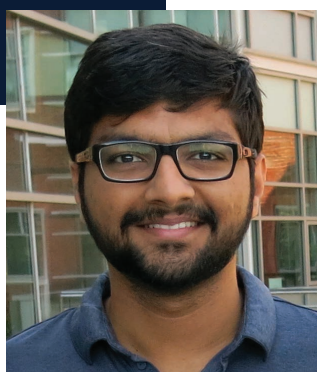
WENQI "MAGGIE" HE

A member of Professor Jiawei Han's Data Mining research group, **Wenqi "Maggie" He** is designing data-driven models for semantic analysis of unstructured text data. She has explored a new problem in distant supervision and developed a partial label embedding method for fine-grained entity typing. In recent experiments on three public datasets, her method outperformed conventional fine-grained typing systems in both precision and recall. She has also interned for eBay and Twitter.



DENGFENG "DAVIS" LI

A member of CS Professor Tao Xie's Automated Software Engineering research group, **Dengfeng "Davis" Li** is conducting research to ensure the security of private data on Android-based mobile apps, which people use for personal banking, online shopping, and health tracking. Using natural language processing and program analysis techniques, Li also addresses robustness and stability issues, proposing a method to prevent an app from crashing when a user enters an incorrect data type in a field. Li interned at Tencent, the maker of the popular WeChat instant messaging app, where he addressed limitations of existing software testing techniques.



VIPUL VENKATARAMAN

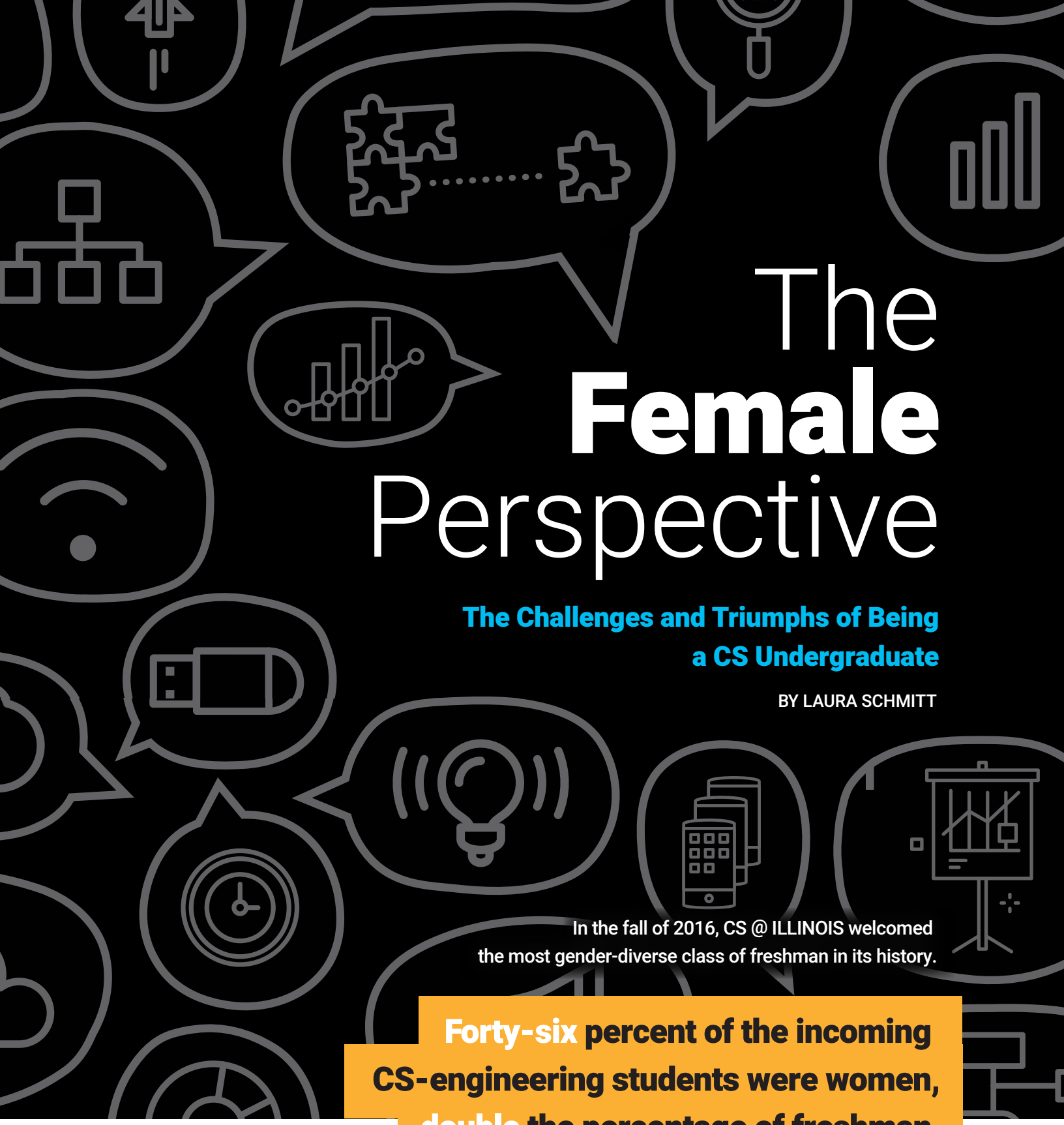
A member of CS Assistant Professor Aditya Parameswaran's research group, **Vipul Venkataraman** is exploring how to use crowdsourcing to solve problems in data analysis that are currently not possible to be fully automated by machines. Specifically, he's working on a project to crowdsource the captioning of video lectures for hearing-impaired people, and a project to crowdsource prostate cancer diagnosis at scale. In 2014, Venkataraman interned at Microsoft Research, where he developed efficient sampling techniques for probabilistic programs. He recently completed an internship at BloomReach as part of the Attribute Extraction team.

About Siebel Scholars

The Siebel Scholars program was established by the Thomas and Stacey Siebel Foundation in 2000 to recognize the most talented students at the world's leading graduate schools of business, computer science, bioengineering, and energy science. Each year, more than 90 graduate students at the top of their class are selected during their final year of studies based on outstanding academic performance and leadership to receive a $35,000 award toward their final year of studies.

Today, our active community of over 1,100 Siebel Scholars serves as advisors to the Siebel Foundation and works collaboratively to find solutions to society's most pressing problems.

"The Class of 2017 represents the best and brightest from around the globe and it's my greatpleasure to welcome them into this ever-growing, lifelong community."
–Thomas M. Siebel (BA History '75, MBA '83, MS CS '85), Chairman of the Siebel Scholars Foundation



The **Female** Perspective

The Challenges and Triumphs of Being a CS Undergraduate

BY LAURA SCHMITT

In the fall of 2016, CS @ ILLINOIS welcomed the most gender-diverse class of freshman in its history.

Forty-six percent of the incoming CS-engineering students were women, double the percentage of freshman women from the previous fall.

"CINDA HEEREN

When people are different from us, we tend to listen more carefully, which means the ideas presented in a group are better. **This is where innovation happens.**

That's good news for the computing and IT fields, which have been trying to attract more women for years—especially since studies indicate diverse teams lead to more innovation and better business performance.

"When people are different from us, we tend to listen more carefully, which means the ideas presented in a group are better," noted alumna and CS @ ILLINOIS Teaching Professor **Cinda Heeren (PhD CS '04).** "This is where innovation happens. If you perceive everyone to be like you, then the group becomes an echo-chamber because you assume everyone has the same opinion as you."

However, growth in the number of women CS students does not mean that men's interest is declining. Demand for a CS @ ILLINOIS education is skyrocketing as evidenced by the huge increase in overall applications—from 844 in 2010 to 4,599 received in fall 2016 for about 400 seats.

Parents and students alike are becoming increasingly aware that a CS degree makes graduates incredibly marketable. According to the non-profit organization, Code.org. According to the non-profit organization Code.org, which aims to broaden access to CS education, there currently are more than 500,000 U.S. computing-related job openings in every industry across the nation. And a University of Illinois College of Engineering survey indicated that CS graduates self-reported an average starting salary of $85,000.

CS Associate Head and Director of Undergraduate Programs Lenny Pitt has a theory about the explosion in interest. "Young people—men and women—have a better understanding of how CS impacts the world because everything they do is CS-related, from social media, to information gathering, to entertainment, to recreation," said Pitt. "They also understand the utility and power of computing because more of them can take CS courses in high school or even earlier."

"MARY MCDOWELL

CS is becoming a discipline that touches on so many aspects of life—**it impacts everything.**

Added CS alumna **Mary McDowell (BS CS '86),** CEO of technology company Polycom: "CS is no longer about back-office automation or gaming. CS is becoming a discipline that touches on so many aspects of life—it impacts everything."

HOLISTIC REVIEW OF UNDERGRADUATE ADMISSIONS

At the same time that the application pool was growing exponentially, the College of Engineering (COE) and the campus admissions office conducted a holistic review of undergraduate admissions to ensure they were identifying the most highly qualified students who were also good leaders, communicators, and team players.

The admissions process continued to consider each applicant's standardized test scores, high school GPA, courses taken, and essay. However, the process broadened the definition of leadership.

"For some very competitive majors, the temptation was to just look for activities that related to the major," said Sue Larson, COE assistant dean and director of Women in Engineering, who was involved in the admissions review process. "We believe students can show leadership in a variety of ways—from having a part-time job, to being a captain of their sports team, to being involved in theatre, to leading their computer science or math club."

The result? A deeper pool of highly qualified women applicants to choose from, which ultimately led to a more gender-balanced freshman class. In the larger scheme of things, could the computer science field finally be on the road to achieving gender parity? Well, maybe.

I had to learn quickly how to talk their terms, and **I learned who was forward thinking and could handle working with women in technology.**

RITA PATEL JACKSON

Women's interest in studying CS gradually increased during the field's early years through the 1970s until female enrollments peaked around 1984. Then, for reasons not completely understood, interest from women dropped off and kept dropping until it bottomed out in the early 2000s.

"I remember a time around 2004 when we celebrated 25 women total, not 25 percent," said Professor Heeren, referring to the fact that one in four CS-engineering undergraduates today at Illinois is a woman.

EXPERIENCES IN CS @ ILLINOIS

So what type of experiences have female students had over the years attending CS @ ILLINOIS? One of the earliest bachelor's degree graduates, **Sandra Rankin (BS CS '74)** transferred into CS her sophomore year, when the College of Engineering established its CS degree—the College of Liberal Arts had offered a Math & CS degree since 1965. "There were two of us [women] out of 64 students and I was often the only female in a class," Rankin recalled. "It didn't bother me because I had the same experience all through high school."

According to Rankin, the newness of the field made for a level playing field between the men and women students. "Very few people would have come into CS having had any real experience with computers," she said. "We were all starting off in about the same spot, which is different from what happened after PCs were introduced and guys started spending all their time playing on the computer, which gave them an advantage over young women."

CS alumna **Rita Patel Jackson (BS Math & CS '88)** started at Illinois in 1984, when women made up a quarter of the CS undergraduate population. "Tech was on a high, CS was still a new, cool field to be in," said Jackson, who is the Director, Cognitive Industry Solutions at IBM in Chicago. "By the time I graduated, there was a bust and things were tough, but I was a specific demographic so I ended up with two job offers."

Although the curriculum was challenging, Jackson enjoyed being in CS. "I couldn't see myself doing anything else because I loved computer science and technology," she said, noting how the promise of an interesting, well-paying job helped motivate her. Group projects, though, were difficult because the male students didn't always take her seriously. "I had to learn quickly how to talk their terms, and I learned who was forward thinking and could handle working with women in technology."

Jill Zmaczynski (BS CS '00) remembers the positive things about CS in the late 1990s when there weren't many other women undergraduates. "There were a lot of scholarships and job opportunities for women CS students and not a lot of competition, so that worked out to my advantage," said Zmaczynski, who landed a job at GE Global Research Center after graduation. "Also, if there was another woman in a CS class, you automatically had a friend, someone you could work with."

Zmaczynski, who transferred into CS her sophomore year, had a strong network of engineering friends that she'd made her freshman year while in the Civil

SANDRA RANKIN

There were two of us out of 64 students and **I was often the only female in a class.**

Suddenly programming was fun. It was a small thing, but I saw how it got pushed out into the real world and **millions of people were benefitting from my fix.**

MELISA "MO" KUDEKI

Engineering department. She was also very involved with the Society of Women Engineers, a College-wide student-run organization. "SWE was my saving grace," she said. "I needed that group of friends."

Although she had no programming experience, **Melisa "Mo" Kudeki (BS CS '11)** decided to major in CS because she loved working on her computer and hanging out with friends online when she was younger.

"When I started at Illinois, I met a lot of people who'd been programming since they were 10, so I was definitely a little intimidated," said Kudeki, who works now as the lead iOS engineer at VINA, a start-up company that makes a networking app for women. "I quickly found my community in the ACM student group, which was super important to my success. It was great being surrounded by and collaborating with a community of such smart people."

Kudeki thought of leaving CS at times, especially since programming was initially difficult for her. But she decided to stay because there really wasn't anything else that interested her. Things changed dramatically the summer before senior year when she was working at Facebook and she fixed a bug in the software's News Feed. "Suddenly programming was fun," she said. "It was a small thing, but I saw how it got pushed out into the real world and millions of people were benefitting from my fix."

Every so often, **Pooja Mathur (BS + MS CS '09)** questioned her choice of major—particularly after working on a programming assignment into the wee hours of the morning. Mathur stuck with CS because of the opportunities the degree would provide. "No matter what your interest might be, a CS degree would make it possible for you to find a job in any field," said Mathur, who has worked on video games, Xbox, operating systems, data analytics, and cloud computing at Microsoft during her career.

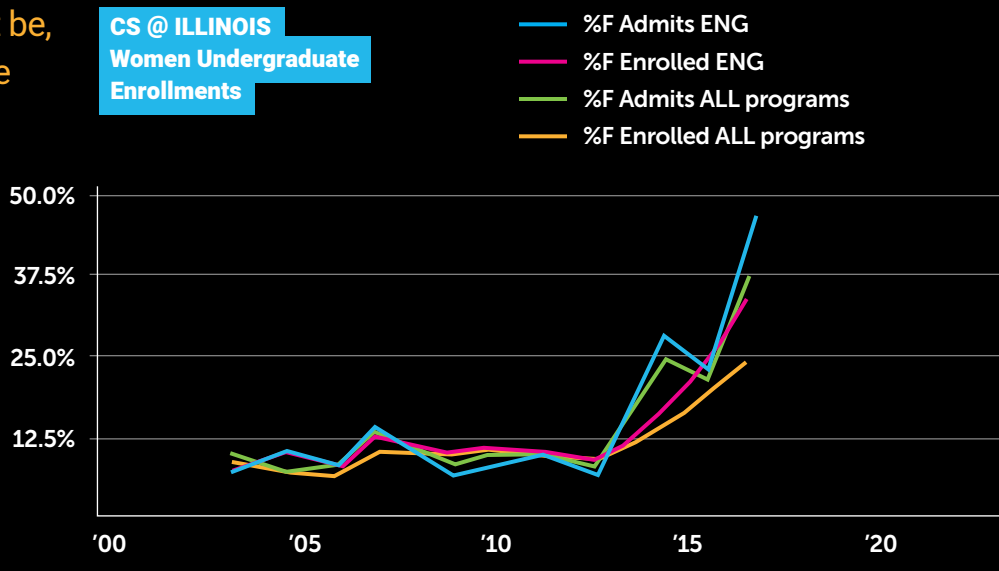
Connecting with a support network at Illinois was invaluable to Mathur, who found her niche with the Women in Computer Science (WCS) organization. "There was always a group of women I could go talk to," she said. "We could help each other, and it was helpful to have more senior students to talk with about things."

In addition, Mathur said, the department faculty and staff did a good job of supporting the female students. "Even though I had to study hard and I hadn't been

No matter what your interest might be, a CS degree would make it possible for you to **find a job in any field.**

POOJA MATHUR

CS @ ILLINOIS Women Undergraduate Enrollments



CORLY LEUNG

As an incoming freshman it was scary because I had minimal programming knowledge. A lot of people don't have programming experience but you don't realize that because the few that do are always bragging about it.

AMANDA SOPKIN

Faculty do a really good job with introductory-level classes by keeping things challenging for students with lots of CS experience, while leaving time for students who are just learning what a For Loop is.

coding since I was four, there were still people around who wanted me to be there and succeed," she said. "They all knew our names and their support made it feel more welcoming."

ENCOURAGING AND INCREASING WOMEN'S PARTICIPATION

Today the Department supports a chapter of the National Center for Women & Information Technology (NCWIT), a talent pipeline initiative to increase women's participation in computing and IT fields. NCWIT recently awarded CS @ ILLINOIS a $10,000 grant to support the recruitment and retention of its female students.

In addition to supporting its current students, the CS Department encourages under-represented groups to study computing through highly regarded outreach efforts like the free Gems summer camp, which introduces middle and high school students to the broad field of computing and its applications, and ChicTech, which was launched as part of a $1 million NSF grant that former Director of Undergraduate Programs Sam Kamin received in the mid-2000s.

Initially, ChicTech was a traveling roadshow that touted the benefits of majoring in CS to students at Illinois high schools. Mathur got hooked on CS at a ChicTech visit when she was in high school. "At the time, I didn't even know CS was something I could do," said Mathur, who later joined WCS and returned to her suburban Chicago high school to encourage young women to pursue CS in college. "It sounded so amazing to me and I wondered why I hadn't been doing this before."

Today, ChicTech is managed by WCS and includes an on-campus weekend retreat for high school girls. Last spring, 61 high school girls participated in U of I student-led programming workshops and other fun activities.

One thing that current and former female students have in common is a phenomenon known as Imposter Syndrome—a feeling that their success can be explained by luck or factors other than creativity, intelligence, or hard work despite all their notable accomplishments. In essence, it's a feeling of self-doubt that occurs among high achievers—more so among women than men.

Despite the progress they have made, many female students deal with feelings of doubt, which often manifest themselves freshman year and revolve around programming. "As an incoming freshman it was scary because I had minimal programming knowledge," said current BS + MS student **Corly Leung**. "A lot of people don't have programming experience but you don't realize that because the few that do are always bragging about it."

Senior **Amanda Sopkin** felt a similar sense of intimidation her first year. "It was kind of overwhelming starting out because I was in class with students who had taken 3-4 programming classes in high school and I'd only had one," said Sopkin. "But [the CS faculty] do a really good job with introductory-level classes by keeping things

challenging for students with lots of CS experience, while leaving time for students who are just learning what a For Loop is."

Once Sopkin made it through the required 125 and 225 course sequence, her insecurity lifted. "You develop the confidence that you're going to get through it," said Sopkin, who got an added confidence boost after attending the annual Grace Hopper Celebration of Women in Computing conference, which is the largest gathering of women technologists in the world.

"The conference had a big impact on me because I could interact with women computer scientists at all levels," said Sopkin. "The conference probably has an even bigger impact on women who aren't lucky enough to go to a school with as many women CS students."

CS senior **Brianna Ifft** had a similar positive experience at the Grace Hopper conference as a sophomore, having earned a travel award to the event from WCS for being the most active member. "I'd never been in a place where there were that many women pursuing the same thing," Ifft said. "I felt so supported and realized we could do this and be equal to the guys."

Junior **Sylvia Haas,** who is studying Statistics & CS, experienced the Imposter Syndrome her first year as she struggled with CS 125, the introductory programming class. "I didn't feel like I fit in," Haas recalled. "But I had an amazing TA, who not only helped me with the coursework, but he gave me advice on what classes to take and he introduced me to other students who had been through what I was experiencing."

"" BRIANNA IFFT

I felt so supported and realized **we could do this and be equal to the guys.**

Women Programming Pioneers

In the early days of computing, women dominated the software side while men mainly built the hardware.

"A large segment of our field was founded by women,"

said CS Lecturer Ryan Cunningham, who includes lectures on gender parity in the Ethics & Professional Issues class (CS 210) that he teaches.

The very first computer programmers were six women who created software just after World War II for one of the world's first electronic computers—the Army's ENIAC machine, which calculated the shell trajectories for new guns.

In the 1950s, NASA relied on teams of mostly African American women 'computers' to calculate the launch windows and flight trajectories of its Mercury—and later its Apollo—space missions. In the 1960s, programming pioneer Margaret Hamilton led the team that created on-board flight software for the Apollo command and lunar modules.

And then there was Rear Admiral and Mathematics Professor Grace Hopper, whose work helped make coding languages more practical by using words rather than numbers. Her COBOL programming language is still used today.

When CS alumna Sandra Rankin (BS CS '74) started her 30-year distinguished career at IBM in the 1970s, she recalled about 1/3 of the company's programmers were women. "It was still such a new field in the 1970s when I started that IBM used to hire math, electrical engineering, and even music majors that they could train to program," said Rankin, who initially worked on mainframe operating systems. "Software design attracted a lot of women in the United States, but when I went to work on hardware design later it was just me and the secretaries."

KATE MILLEKER

I feel like I have an obligation to **be a role model for these girls.**

Later, Haas became a course assistant (CA) with CS 125 and the follow-on course CS 225, helping the teaching assistants (TAs) with instruction and grading. "These connections have been helpful, too, because I know I can reach out to my fellow CAs or even the TAs and I've gotten to know some CS faculty, who I could go to if I needed help with something."

SYLVIA HAAS

I didn't feel like I fit in, but I had an amazing TA, who introduced me to other students **who had been through what I was experiencing.**

Another thing the alumnae and students have in common is a reliance on support networks to get them through. Ifft found her community with the Women in Computer Science (WCS) student group, where she took on a leadership role with the ChicTech retreat event. "I'm not sure that I'd have stayed in CS if I weren't involved with WCS," Ifft said. "They provide a great support network that you can tap into to collaborate on homework and projects. I've also met friends through the group."

Haas found her community by volunteering with the CS @ ILLINOIS Gems summer enrichment camp for girls. Last summer, Haas ran the camp that drew 350 young women and included one-week camps for middle school girls and a 2-week-long camp for high schoolers. "We tried to create a network for the high school students by inviting them to help with the weekly camps for the younger girls and a lot of them even attended our fall campus ChicTech retreat," said Haas, who has stayed in touch with many of the high school girls.

Her freshman year, CS senior **Sathvika Ashokkumar** felt a little isolated living in a dorm that was more than a mile from Siebel Center, so she began hanging out in the ACM student office and was soon helping plan HackIllinois, the popular 36-hour student-run programming competition held at Siebel each winter. Since then, Ashokkumar has also helped lead Reflections | Projections, a student-run tech conference.

"Illinois is a really good, collaborative environment," said Ashokkumar, who has acquired leadership and organizational skills from her ACM involvement that translate into the classroom. "With so much event responsibility I've learned how to handle stress and I have the confidence now to do things. I've also learned that anything is possible if you have the confidence and you keep trying."

A self-described theatre and arts person, CS junior **Kate Milleker** did fine her freshman year, but seriously considered dropping out her sophomore year when she took a succession of three rigorous, programming intensive CS courses. Life improved dramatically for Milleker when she discovered her passion this past summer working as an instructor at a Chicago-area Girls Who Code immersion camp for high school students.

"We showed them how they can use CS to do things in medicine, fashion, and other areas," said Milleker, who plans to apply her computing skills to technical theatre after she graduates. "It was rewarding to teach the girls and I feel like I have an obligation to be a role model for these girls."

This semester, Milleker co-founded the first Champaign-area chapter of Girls Who Code, which meets each Sunday at Siebel Center and is teaching middle and high school girls how to program and problem solve.

SATHVIKA ASHOKKUMAR

I've learned that **anything is possible** if you have the confidence and you keep trying.

Help us Grow the Talent Pipeline

Earning a computer science degree translates into exciting career options, including high-paying and rewarding jobs in engineering, IT, education, medicine, business, and even the arts.

CS @ ILLINOIS is dedicated to getting young people interested in the field through a variety of outreach efforts.

We welcome partners and participants for our programs, as well as advocates who will help inform K-12 educators and prospective students and their families about the fascinating and fun applications of computer science. We also need financial support to enhance and expand current programs.

GET INVOLVED:
learn more and register for outreach programs at: **cs.illinois.edu/engage**

MAKE A GIFT:
explore giving opportunities to invest in the pipeline through K-12 outreach programs and college student scholarships at: **cs.illinois.edu/give**

Help us **spread the word, join us, and support** these ongoing activities:

Sail

APRIL

- Free one-day event for hundreds of prospective and admitted CS students
- Informational meeting and tours for parents
- Engineering students design and teach both fun and technical classes

Gems Computer Science Camp for Girls

JUNE & JULY

- Weeklong free camps
- More than 250 middle and high school participants each year
- UI College students lead activities and instruction

Girls Who Code Community Chapter

SEPTEMBER–MAY

- Weekly meetings for middle and high school students
- CS @ ILLINOIS students teach girls programming and problem-solving skills

Curriculum and Training for Educators

YEAR ROUND

- Partnership with Champaign Schools to create CS courses and infuse CS content into existing STEM curriculum
- Continuing professional development workshops for K-12 teachers on CS topics
- Developing 4-H Computer Science youth guides, available to 4-H nationally for use in after school clubs

ChicTech Visits and ChicTech Retreat

SEPTEMBER – MAY; NOVEMBER RETREAT

- Ongoing in-school presentations and a free weekend-long retreat for high school girls
- Programming instruction, networking with peers, and a glimpse of college life at Illinois
- Led by Women in Computer Science (WCS) student volunteers

Hour of Code

DECEMBER

- Family friendly event
- In conjunction with Computer Science Education Week and Code.org, a worldwide movement to give every student in every school the chance to learn computer science
- Led by CS @ ILLINOIS faculty, staff, and student volunteers

Illinois Team Lands Major NSF Funding to Bring Spreadsheets into Big Data Era

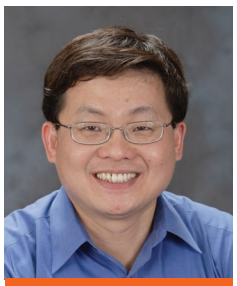
BY LAURA SCHMITT

CS @ ILLINOIS faculty Kevin Chang, Aditya Parameswaran, and Karrie Karahalios recently landed a prestigious NSF BIGDATA grant—$1.8 million over four years—to develop DataSpread, a system that holistically unifies spreadsheets and database systems.

"Although they both manage tabular data, databases and spreadsheets are two very distinct software paradigms," explained Chang, who serves as the grant's principal investigator. "We'll bring together the ease of use and interactivity of spreadsheets with the scalability, expressiveness, and collaboration capabilities of databases. While only programmers can directly use a database, people using spreadsheets are running into trouble because they can't handle the entire dataset in the memory of their computer. We hope to make it easy for everyone to deal with data of scale."

The Illinois team will develop new models, algorithms, and architectures that compactly represent spreadsheet data and computation, provide positionally aware indexing structures, and efficiently propagate updates to the user viewport. The project will also study the design of new interaction primitives to replace SQL, but can be effortlessly expressed within a spreadsheet interface.

Aditya Parameswaran



Kevin Chang

Karrie Karahalios

Marrying interactive spreadsheets with scalable databases is not an easy task. The graphical nature of spreadsheets allows everyday users to see the layout of their data and directly manipulate their data. "If, however, we suggest that users operate on millions or billions of cells on a spreadsheet, this process again becomes opaque due to the size of the data," said Karahalios, a computer interface expert. "It is not clear that our current spreadsheet metaphor will work. How will people make sense of millions of billions of cells on a spreadsheet? How can they see an overview of their data? What operators will they use and why? These are just some of the usability questions that arise in the design of DataSpread."

Another research challenge is spreadsheet transaction management, which involves avoiding conflict when multiple users are accessing and perhaps updating data at the same time. "The underlying challenges are not trivial to address," Parameswaran said. "Spreadsheets and database systems have such fundamentally different modes of operation that unifying spreadsheets and database systems is much like gluing an apple to a pancake."

The Illinois team is collaborating with several partners on DataSpread's development, including Yahoo and the NIH-funded Big Data 2 Knowledge (BD2K) center headed by CS Professor Saurabh Sinha.

Tool to Map Gene's Social Network Sheds Light on Function, Interactions, and Drug Efficacy

BY LIZ AHLBERG TOUCHSTONE, ILLINOIS NEWS BUREAU

Although the human genome has been mapped, many questions remain about how genes are regulated, how they interact with one another, and what function some genes serve.

CS @ ILLINOIS researchers have developed a new tool known as Mashup that distills the huge amount of genomic data into gene networks that can point to the function of genes, highlighting relationships between genes and offering insights into disease, treatment and gene analogs across species.

"A single gene cannot do the job," said CS Professor Jian Peng, who led the study in collaboration with researchers at MIT. "You need to have a lot of genes in pathways that work together through different types of interactions, and gene functions are determined by these interactions."

Peng added: "You can think of genes as being connected in a social network, where each gene is a person. There are different relationships between any two persons. They could be friends, they could be family, they could share similar interests, and the different interactions between them define who they are in the society."

Mashup uses machine learning tools to computationally integrate multiple gene interaction networks. Each gene is represented by compact patterns, or topologies, so that researchers can more easily analyze its function. By compressing the landscape of gene interactions, the main fingerprints of a gene pathway are revealed as the background noise of genomic data is stripped away, Peng said.

The researchers compared Mashup with other gene analysis methods and found it to be faster and more accurate at predicting a gene's function and at identifying genes of similar functions in other species. This can yield insights into human disease in cases where pathways in other organisms are better documented than in humans. For example, Peng and other collaborators are working to compare certain genes in yeast with the human genes that contribute to neurodegenerative diseases like Parkinson's or Alzheimer's.

Mashup also could be a tool for studying and treating cancer. The researchers tested Mashup's ability to predict whether certain cancer treatments would be effective for a particular tumor by predicting the efficacy of different drugs over hundreds of cancer cell lines and comparing the results to their known profiles from the Cancer Genome Project. They found the tool accurately predicted a large number of drugs' efficacy against specific cancer types.

In the future, Peng will test Mashup with clinical samples through a collaboration with Mayo Clinic.

Professor Jian Peng

CS Student Develops Prize-Winning Movement Analysis App to Detect Level of Lung Disease

Nearly 16 million Americans are afflicted with chronic obstructive pulmonary disease (COPD), a progressive disease where the lung gradually loses its ability to pump enough oxygen to the rest of the body.

Qian Cheng

Bruce Schatz

According to the Centers for Disease Control and Prevention, COPD is the third-leading cause of death in the United States and only half of the actual cases are diagnosed.

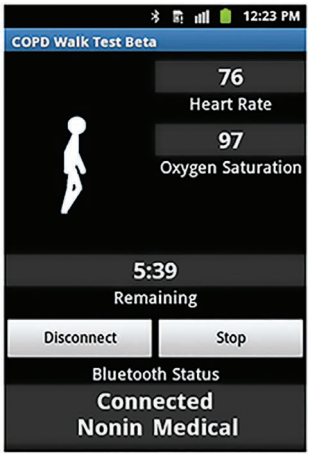
A team of University of Illinois researchers would like to help these millions of COPD patients better manage their health. Under the direction of CS and Medical Information Science Professor Bruce Schatz, the team is developing mobile technology that can accurately monitor COPD patients' symptoms through a smartphone that they carry in their pocket.

Specifically, team member Qian Cheng, a CS graduate student, developed the analysis technology to use only the phone sensors to predict results of the six-minute walk test, a simple, yet reliable, tool that doctors use in the clinic to help gauge the condition of COPD patients. In addition, he developed a predictive model to accurately compute the pulmonary function, the health status of these lung patients as measured by how well they can currently breathe.

"A doctor can tell from how a patient moves and walks during this test just how serious his/her cardiopulmonary disease is," explained Cheng. "Our idea is to develop the app so it could evaluate [patients'] risk without them having to come into a doctor's office to do the test."

The team's MoveSense app collected movement data from 24 older COPD patients who were doing the conventional six-minute walk test under medical supervision. Cheng then used data mining and machine learning algorithms to categorize the patients into groups based on the severity of their condition. This training model could then predict with perfect accuracy which of the four standard severity levels—mild, moderate, severe, more severe—other patients would be in when they are tested with the app.

Recently, Cheng received a $10,000 award as a top-10 finalist in the annual Student Technology Prize for Primary Healthcare administered by Massachusetts General Hospital associated with Harvard University (formerly known as the CIMIT Prize).



"It was very unusual to have a finalist who did predictive modeling using machine learning, rather than building a medical device," said Schatz, noting that the other nine finalists were bioengineering students.

TSA Could Save Money by Waiving Precheck Fees for Frequent Travelers, Study Finds

BY LIZ AHLBERG TOUCHSTONE, ILLINOIS NEWS BUREAU

There is an easy way to reduce lines at the airport, increase security and save the Transportation Security Administration money, according to a new study by CS Professor Sheldon Jacobson: waive the $85 fee for frequent fliers to enroll in the TSA PreCheck program, which allows pre-screened, verified travelers to go through expedited security at airports.

Jacobson and graduate students Arash Khatibi and Ge Yu calculated the cost of extensive screening compared with expedited screening in terms of workforce labor hours and equipment. They found that costs saved by frequent travelers using expedited security exceeded the cost of waiving their enrollment fees for PreCheck.

"This is an easy case where spending some money will save the federal government more money," Jacobson said. "There is a transition period—the savings are realized over the first five years, and then in perpetuity. So if the federal government is looking for a way to save money, giving TSA PreCheck at no cost to high-volume, high-value fliers makes sense." The researchers found that the average travel frequency of those enrolling would have to be six round trips, or 12 screenings a year.

"We only look at the direct cost savings in labor and equipment. We don't even talk about the savings in time of the passengers who would no longer have to wait hours in line," Jacobson said. "That could add tens or hundreds of millions of dollars a year, which would be a bonus to the economy. More people could decide to fly because of the time and cost savings."

The benefits would extend beyond the cost. According to Jacobson, an expert in aviation security, submitting every passenger to heightened security actually has the adverse affect of making air travel less safe by diluting resources that should be focused on high-risk, unknown passengers. TSA PreCheck reduces the number of unknowns by pre-screening passengers.

"The strength of PreCheck is the background check. It's not the item that we're trying to stop, it's the person with ill intent who we're trying to stop," Jacobson said. "PreCheck vets people and says, 'These people are not likely to be a problem to the air system.' They make sure you are who you say you are, and that your background shows no evidence that you are going to cause a problem."

Celebration of Excellence
Student Awards

Each semester, CS @ ILLINOIS honors students who have received important distinctions. We extend congratulations to these individuals whose hard work is a credit to themselves and a source of pride for the department.

In 2012, **Sandra (BS CS '74)** and **John Rankin (BS Math & CS '72)** established the Sandra L. and John P. Rankin Engineering Scholarship to help attract and retain more women in computer science, especially students who attended an Illinois high school. Sandra spent 30 years at IBM, including as vice president of Mainframe, Software, and Firmware Development.

Graduate Fellowships & Awards

3M FOUNDATION FELLOWSHIP
Silu Huang
Sheng Wang

ANDREW AND SHANA LAURSEN FELLOWSHIP
Joshua Bevan
Soham Dan
Apostolos Kokolis

BRIAN TOTTY GRADUATE FELLOWSHIP IN COMPUTER SCIENCE
Adit Krishnan
Aravind Sankar
Jiaming Shen

CHIRAG FOUNDATION GRADUATE FELLOWSHIP IN COMPUTER SCIENCE
Sarah Christensen
Muhammad Khan
Zhuolun Xiang

COMPUTER SCIENCE EXCELLENCE FELLOWSHIP
Angello Astorga
Shant Boodaghians
Ziwei Ji
Jung Lin Lee
Yunan Luo
Dominic Seyler
Belinda Tzen

DEBRA AND IRA COHEN GRADUATE FELLOWSHIP IN COMPUTER SCIENCE
Casey Hanson

GOOGLE PHD FELLOWSHIP
Xiang Ren

GRADUATE COLLEGE DISTINGUISHED FELLOWSHIP
Alex Morales
Sebastian Rodriguez
Justin Szaday

IBM PHD FELLOWSHIP
Cosmin Rădoi

MICROSOFT WOMEN'S FELLOWSHIP
Rui Yang

NSF GRADUATE RESEARCH FELLOWSHIP
Edward Huang
Pranjal Vachaspati
Helen Wauck
Doris Xin

NSF GRADUATE RESEARCH FELLOWSHIP, HONORABLE MENTION
Colin Graber

OUTSTANDING TEACHING ASSISTANT, SPRING 2016
Nathaniel Bowman
Muhammad Huzaifa
Vishaal Mohan
Alexander Steiger
Fangbo Tao

RAY OZZIE COMPUTER SCIENCE FELLOWSHIP
Zhengkai Wu

ROY J. CARVER FELLOWSHIP
Serif Yesil

RDA DATA SHARE FELLOWSHIP
Faraz Faghri

SABURO MUROGA ENDOWED FELLOWSHIP
Motahhare Eslami
Allyson Kaminsky
Shelby Lockhart
Tong Meng

SIEBEL SCHOLAR
Chamila Amithirigala
Spencer Gordon
Wenqi He
Dengfeng Li
Vipul Venkataraman

Ann Rajan (class of 2020) was a National Merit Finalist, National AP Scholar, and Academic Scholar during her time at Fremd High School. At Illinois, she is involved with the Society of Women Engineers, Women in Computer Science, and CS @ ILLINOIS Sail, while participating in the Cozad New Venture Competition.

SLOAN SCHOLAR
Sebastian Rodriguez
Justin Szaday

SOHAIB AND SARA ABBASI COMPUTER SCIENCE FELLOWSHIP
Wajih Hassan
Muhammad Huzaifa
Faria Kalim
Muhammad Mahmood
Hashim Sharif
Rohan Tabish

Undergraduate Scholarships & Awards

BOX ENGINEERING DIVERSITY SCHOLARSHIP
Amanda Sopkin

BP SCHOLARSHIP
Aaron Chiu

CHANNING BROWN SCHOLARSHIP
Grace Wehner

CHAN-TSAI SCHOLARSHIP
Gary Rudolph

COMPUTER SCIENCE VISIONARY SCHOLARSHIP
Tyler Awdisho
Olivia Begley

DUNN SYSTEMS SCHOLARSHIPS IN MEMORY OF ARTHUR R. DUNN
Hyunbin Park

FRIMA LUKATSKAYA SCHOLARSHIP
Robert Kaucic

GENERATION GOOGLE SCHOLARSHIP
Amanda Sopkin

JOHN DEERE & COMPANY SCHOLARSHIP
Laurel Chamberlin
Paige Kordas
Salina Ortega
Pooja Welling

JP MORGAN CHASE WCS SCHOLARSHIP
Monika Janas
Aafreen Lilly

ROWE FAMILY SCHOLARSHIP
Steven Schmidt

SANDRA L. AND JOHN P. RANKIN ENGINEERING SCHOLARSHIP
Ann Rajan

SARA AND LOUIS COHEN UNDERGRADUATE SCHOLARSHIP
Justin Isla

SPYGLASS ENDOWED SCHOLARSHIP
Julia Fiorino
Angela Lee

STATE FARM COMPUTER SCIENCE SCHOLARSHIP
Daniel Holley
Robert James
Troy Martin
Alexander O'Kennard

SUSAN SILVER AND ROSS ERLEBACHER SCHOLARSHIP
Polina Volodina

WILLIAM AND RUTH WITT SCHOLARSHIP
Connie Huang

Support CS Students

Most of these awards and scholarships were established by generous donations from alumni and corporate partners

Please consider a gift to the Computer Science Visionary Scholarship Endowment Fund, which increases our ability to offer large, renewable scholarships to deserving students.

NEW: DOUBLE YOUR GIFT'S IMPACT

Now through the end of 2019, The Grainger Foundation will match all donations up to $25 million to Engineering at Illinois' scholarship endowments.

If you would like to participate in the matching program by supporting an existing fund or by creating a new one, please contact Associate Director of Advancement Sean Williams at sdwill2@illinois.edu or visit cs.illinois.edu/give for more information on giving opportunities.

Brown's Legacy: Supporting CS Scholarships Now and Always

BY LAURA SCHMITT


Channing Brown

For years, Channing Brown (BS CS '80) has supported his alma mater through gifts of his time and talent, as well as through financial giving. After earning a master's degree at Berkeley, he started his software engineering career at Bell Labs in 1982. Brown also began contributing to the Computer Science Annual Fund and participating in Illinois alumni events through the New York area alumni club.

"Throughout my career, the company had a dollar-for-dollar match, so my donations were effectively doubled," Brown said.

When he retired 23 years later, Brown decided to return to Champaign-Urbana to be closer to family. The move also enabled him to participate in a myriad of campus activities, including ushering at Krannert Center for the Performing Arts, judging Engineering Open House projects, mentoring Illinois Promise students, and volunteering at the annual Roger Ebert Film Festival.

In 2010, Brown stepped up his philanthropy by endowing a scholarship for CS undergraduate students. And more recently, he created an estate plan that will someday add to the Channing Brown Scholarship.

"Giving has always been important to me," said Brown. "I've spent all these years working and saving money, so I want to make sure that it goes to something that I believe in. Everyone's story is different, but I'd always encourage alumni to help out the university in some way if they can."

Including the Department of Computer Science in a Planned Gift

In partnership with the University of Illinois Foundation

Bequest language can be simple to include in your will or living trust, or on an IRA, annuity, or insurance policy beneficiary designation form:

I give, devise, and bequeath to the University of Illinois Foundation, a not-for-profit corporation (Tax ID 37-6006007) located in the state of Illinois, (e.g., dollar amount, percentage, specific asset, or residue) for general, unrestricted support to enhance the academic excellence of the Department of Computer Science at the University of Illinois at Urbana-Champaign.

We encourage you to work with our advancement professionals and to share your final estate provision with the Department of Computer Science and the University of Illinois Foundation to ensure that your gift is administered and recognized appropriately.

TO GET STARTED, VISIT:
http://uif.giftplans.org or contact CS Associate Director of Advancement Sean Williams at sdwilli2@illinois.edu

Celebrating CS @ ILLINOIS 2016

From its beginnings, computing has been about creating tools to better understand the world around us. That was especially the case at Illinois, where the faculty saw the potential of the digital computer's computational power and decided that they were going to unlock it by building one, the ILLIAC.

Today, computing touches nearly everything, and as a result the arts, science, business, medicine, and engineering are all changing. In the words of Marc Andreessen (BS CS '94), "software is eating the world." Unsurprisingly, CS @ ILLINOIS is at the forefront in preparing students to bring the potential of computer science to a variety of disciplines.

CS @ ILLINOIS has been leading the way by expanding its joint degree offerings. To supplement long-standing programs offered with mathematics and statistics, the department created CS + X degrees in anthropology, astronomy, chemistry, and linguistics, as well as a new professional master's degree track in data science.

In September 2016, the CS community commemorated these degree programs at the annual Celebrating CS @ ILLINOIS event at the Thomas M. Siebel Center for Computer Science. Department Head Rob A. Rutenbar shared that, when including enrollments in the joint mathematics and statistics degrees, 34% of freshmen CS majors are now in a CS + X program. He also said that talks are underway with additional X's, including crop sciences and advertising. The goal: to help unlock CS's potential for the world.

The Celebrating CS @ ILLINOIS event was started two years ago as a way to foster a strong sense of community among faculty, students, and staff, while introducing new incoming students to the department. In previous years, the event celebrated significant gains in women enrollments and the dynamic student clubs/groups.

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University of Illinois at Urbana-Champaign
Thomas M. Siebel Center for Computer Science
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BELOW: CS @ ILLINOIS sponsors the Grace Hopper Celebration of Women in Computing because it is *the* conference for students to learn from successful women leaders in computing and related fields.