

ROCHESTER LAUNCHES INSTITUTE FOR DATA SCIENCE



Morgan Sinko '16 with UR Robotics Club laser harp (see related story on page 10).





University Trustee Danny Wegman speaks on behalf of the Wegman Family Charitable Foundation, which gave \$10 million to the University for the construction of the building that will house the Institute for Data Science.

ROCHESTER LAUNCHES INSTITUTE FOR DATA SCIENCE

At the October 2013 Big Data Forum, University of Rochester President Joel Seligman formally launched the Institute for Data Science (IDS). The institute is at the heart of the University's five-year strategic plan, which commits \$100M—inclusive of the \$50M it has invested in recent years—towards new faculty, programs, and facilities for data science. The institute will serve as an umbrella organization that unifies and strengthens research and education across all divisions of the University, including Arts, Sciences & Engineering; the Simon Business School; and the School of Medicine and Dentistry.

On April 1, 2014, the Wegman Family Charitable Foundation announced a \$10 million gift to the University for construction of a building that will house the IDS, the Department of Computer Science, and the Department of Earth and Environmental Sciences. New York State has named the University as a Center of Excellence for Data Science, allocating \$872,000 in support.



Computer Science at the Core

The Department of Computer Science will play a large role in the IDS. While the IDS will not hire its own faculty, many of the faculty whom are hired through the resources of the institute will have primary or secondary appointments in computer science. The IDS will be home to new degree programs in data science at the BS and MS levels, and these programs will include many courses offered by the computer science department.

The founding director of the IDS is Professor Henry Kautz (left), who has served as chair of computer science for the past seven years. With other faculty and University leaders, Kautz helped shape the strategic plan that led to the formation of the IDS. Scott Steele, Rochester's director of research alliances, serves as executive deputy director of IDS and leads the associated NYS Center of Excellence.

Faculty Growth

The Year One priority for the IDS was to grow collaborative research in data science. To this end, the University authorized an interdisciplinary faculty search in data science. The search committee included representatives from a dozen different departments and sought candidates whose research was exciting and cutting edge and bridged multiple disciplines. As Professor Kautz noted, the field of data science is inherently interdisciplinary, growing out of the intersection of statistics; computer science; and computationally oriented life, physical, and social sciences.

This IDS search resulted in hiring Thomas Howard, whose research is in robot learning and decision making and computational linguistics, and Gourab Ghoshal, whose work is in theory and applications of network science. Howard will hold appointments in computer science, electrical and computer engineering, and biomedical engineering,

while Ghoshal holds appointments in physics, mathematics, and computer science.

Beyond these IDS-led hires, however, a number of other searches across the University resulted in new data science-oriented faculty. These included machine learning researchers (Ji Liu in computer science and Gonzales Mateo in electrical and computer engineering), three computational neuroscience researchers in brain and cognitive sciences, and four bioinformatics hires in the School of Medicine and Dentistry.

Into the Future

The IDS has designed BS, BA, and MS programs in data science, which are currently undergoing review for New York State accreditation. The new programs will start in 2015. Meanwhile, interested students can begin an independent major with a concentration in data science offered through the University's Center for Interdepartmental Programs.

The activities and goals of the IDS will expand in the coming years; possible future activities will include summer schools and research experiences for undergraduates, sponsoring visiting professorships, and developing grants and gifts. An interdisciplinary faculty steering committee, including both junior and senior faculty along with a distinguished group of advisors from industry and academia will help plot the institute's course. Up-to-date information about IDS events and activities can be found at www.rochester.edu/data-science.

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President Joel Seligman and Danny Wegman at the announcement of the Wegman Family Charitable Foundation's gift to the University. In recognition of the generous gift, the new building for the Institute for Data Science will bear the Wegman family's name.

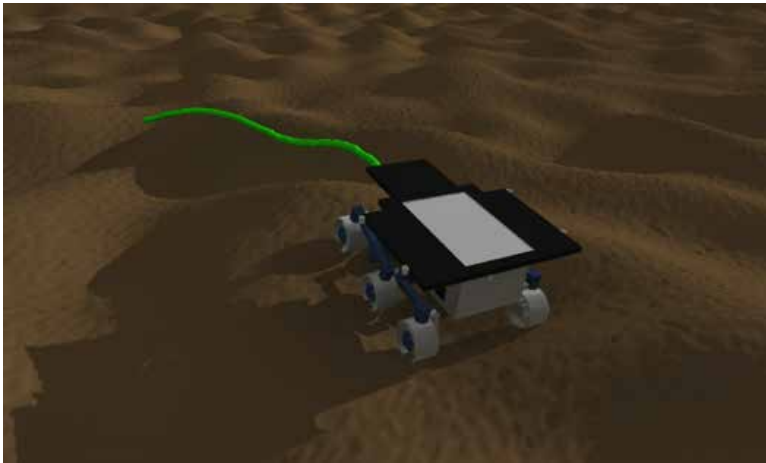


Figure 1: A solution generated by the model-predictive trajectory planner for a planetary rover navigating through rough terrain

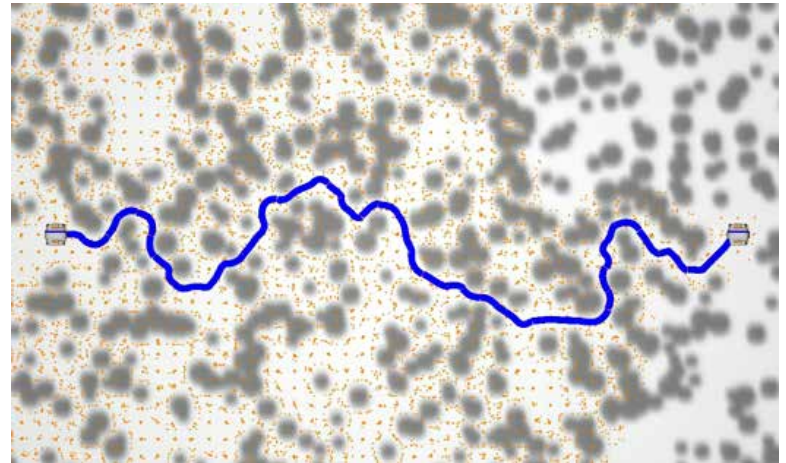


Figure 2: A solution generated by the Adaptive State Lattice for a mobile robot navigating through a cluttered obstacle field



Robot Learning and Decision Making in Complex Unstructured Environments

Thomas Howard will join the faculty of the Departments of Computer Science and of Electrical and Computer Engineering as an assistant professor in spring 2015. He will also be a member of the Institute for Data Science and hold

a secondary appointment in the Department of Biomedical Engineering. Currently he is a research scientist at the MIT Computer Science and Artificial Intelligence Laboratory in the Robust Robotics Group. Previously he was a research technologist at the Jet Propulsion Laboratory (JPL) and a lecturer in mechanical engineering at Caltech. Thomas received his PhD in robotics from the Robotics Institute at Carnegie Mellon University (CMU) in 2009 and BS degrees in electrical and computer engineering and mechanical engineering from the University of Rochester in 2004. He has authored or coauthored six journal articles, 22 conference papers, and a book chapter on motion planning and safety issues in the *Handbook of Intelligent Vehicles* and has received two NASA Group Achievement Awards. He also currently serves as a mentor of the MIT Program for Research in Mathematics, Engineering, and Science for High School Students (PRIMES) program.

At CMU, Thomas developed a model-predictive trajectory-planning algorithm for high-performance mobile robot

navigation in complex environments. He applied this algorithm for in-lane navigation on Boss, the self-driving automobile that won the 2007 DARPA Urban Challenge, and for autonomous navigation in unstructured environments on Crusher, a six-ton, skid-steered field robot. For his PhD thesis he developed the Adaptive State Lattice, a search space for robot motion planning that locally optimizes a uniformly distributed sampling of paths to more efficiently plan maneuvers for vehicles with mobility constraints through cluttered obstacle fields.

At JPL, Thomas expanded his research in manipulation planning, robot modeling and simulation, and position estimation. Thomas led three research programs as principal investigator on adaptive mobile robot search space design, perception and pose estimation in poorly illuminated environments, and adaptive simulation for mobile robot navigation. He applied his trajectory planner for dexterous manipulation on a robot torso as the motion planning lead for the JPL/Caltech team during Phase I of the DARPA Autonomous Robotic Manipulation (ARM) program. Additionally, he worked on autonomous navigation as a member of the flight software team for Curiosity, the planetary rover of the Mars Science Laboratory that has been exploring the surface of Mars since August 2012.

At MIT, Thomas is investigating algorithms on how to form and solve difficult planning problems from natural language

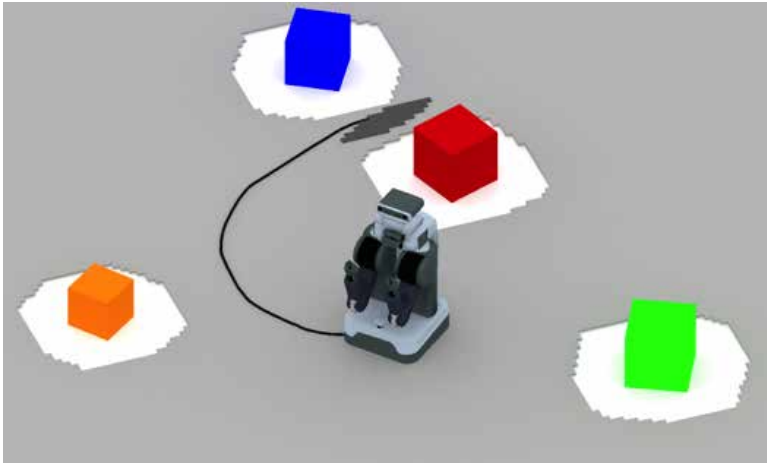


Figure 3: A representation of the motion constraints inferred from the expression “move near the red box and the blue crate” using the Distributed Correspondence Graph model with the resulting planned maneuver



Figure 4: A robotic wheelchair that was used as the experimental platform for inferring maps and behaviors

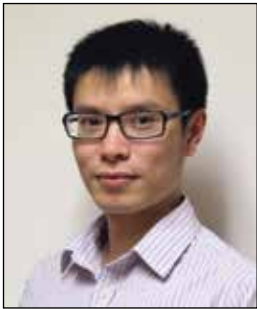
expressions in the context of the perceived environment. He developed the Distributed Correspondence Graph model, a probabilistic graphical model that is formed from the grammatical structure of the utterance and groundings from the physical environment. These models learn the correspondence between phrases and relationships in the physical world using machine learning algorithms that are trained from a set of examples. He recently applied this model to construct maps of the environment and integrated this framework on a robotic wheelchair for assistive mobility tasks. He also is serving as a mentor to a pair of high school students through the MIT PRIMES program on research to improve the efficiency and scalability of natural language interfaces on unmanned aerial vehicles.

Thomas's interdisciplinary laboratory at the University of Rochester will focus on improving the efficiency, fidelity, and optimality of robot learning and decision-making algorithms in complex unstructured environments. He will expand upon his experience with autonomous automobiles, planetary rovers, robotic torsos, unmanned aerial vehicles, robotic wheelchairs, and mobile manipulators to address critical problems in manufacturing, health care, and exploration. His vision for the future of robotics is one in which robots learn from knowledge bases, physical experiences, and interactions with people to efficiently perform novel tasks at speeds that exceed human performance.

Thomas is looking forward to returning to the University of Rochester, where he and his wife, Vicki, earned their undergraduate degrees. He plans to develop undergraduate and graduate courses in mobile robots, robot learning, human-robot interaction, and robot control and is excited about the opportunity to supervise undergraduate and graduate research in his laboratory.

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OPTIMIZATION AND



Ji Liu has joined the faculty in computer science at the University of Rochester as an assistant professor. He received his PhD degree in computer sciences from the University of Wisconsin–Madison in 2014, his MS degree in computer science from Arizona State University in 2010, and his BE degree in automation from

the University of Science and Technology of China in 2005. His research interests include machine learning and optimization and their applications in big data analytics, data mining, computer vision, medical data analysis, etc. He won the KDD best research paper award honorable mention in 2010.

His research experience can be summarized in three aspects of optimization: modeling, algorithm, and theory.

Modeling The main purpose of modeling in optimization is to find a neat mathematical model to precisely describe the practical problem and further formulate it into a minimization or maximization problem. Liu's projects in modeling span multiple domains and topics, including abnormal event detection, feature selection, dictionary learning, multitask learning, online scene classification, and reinforcement learning. Among these projects, one widely cited work is to define the tensor nuclear norm for capturing the low rank structure of tensors. This work received broad attention from various domains (e.g., computer vision, machine learning, data mining, and statistics) and has been used in many areas such as image/video in-painting/recovery, data compression, recommendation system, and video surveillance. Figure 1 shows an example of image recovery: the left image with 80 percent missing pixels is recovered almost perfectly as shown in the right image.

Algorithm While a practical problem has been properly formulated, the remaining issue is to find a solution to the target problem. Liu has contributed several algorithms that are both computationally and spatially efficient to solve in both general

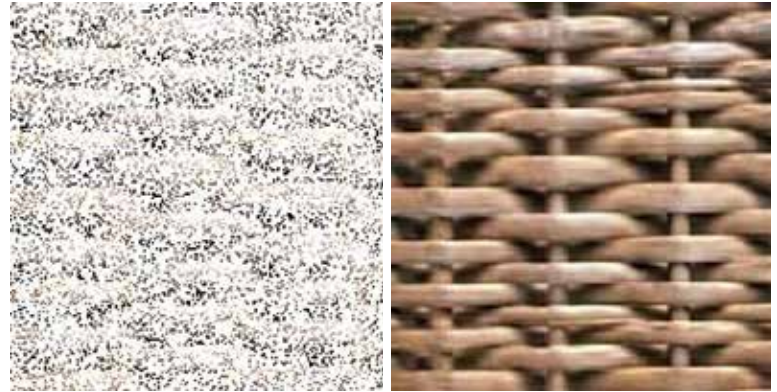


Figure 1: The left image contains 80 percent missing entries shown as white pixels, and the right image shows its reconstruction using tensor nuclear norm minimization. See more examples at www.youtube.com/watch?v=kbnmXM3uZFA.

large-scale optimization problems and specific areas such as (multi)linear systems and stream data analysis.

Theory Liu's research also covers theoretical topics, including sparse learning and compressed sensing. The key motivation of sparse learning and compressed sensing is to pursue a model as simple as possible (with sparse coefficients in most cases) to fit the training data. Some fundamental contributions in this area were made by him: refining (or extending) several classic and popular methods like LASSO, Dantzig Selector, and Forward-Backward greedy algorithms; and proving stronger theoretical guarantees.

In the Department of Computer Science, Liu is excited about the potential collaboration with other departments and institutes of the University, such as the School of Medicine and Dentistry, electrical and computer engineering, brain and cognitive sciences, and psychology. He is interested in many research projects conducted at Rochester and is looking forward to contributing his expertise in optimization and machine learning.

Liu plans to focus his research on all aspects of optimization and machine learning, with special emphasis on parallel algorithms for big data analytics. Big data opens the door to a new approach to understanding the world and making decisions.

BIG DATA

Recent success in applying asynchronous algorithms to big data problems is only the beginning, and it opens up a new direction for future research.

The scientific, social, and economic implications of big data will take years to fathom, and many fields will be involved—it may not live up to the hype, but the potential is clearly present for major impacts across many fields. Important big data application problems are found in speech, signal, and text processing (e.g., denoising/deblurring and medical imaging); biology and bioinformatics (e.g., identifying genomic and environmental risk factors for diseases); feature selection in geographical and astronomical images; and many other areas. Even U.S. government agencies have been busy solving big data problems of their own, for example, analyzing surveillance data from telephone and email communications.

Although the nature of the analysis differs across these applications, as does the usage of the extracted knowledge, they share many key technologies. For example, almost all of them can be formulated as an optimization problem. While optimization has a rich and mature history, it has developed rapidly in the recent decade, especially for applications in machine learning and data mining, because of the need to process enormous datasets and derive meaningful inference from them. For these reasons, the preferred optimization method in scientific applications has moved to stochastic and incremental methods instead of classical Newton and gradient-based methods.

However, the effort on the algorithmic level alone is far from enough for optimization schemes to gracefully scale to big data problems. Parallelization provides a solution to speed up optimization algorithms beyond the algorithmic level. Traditional parallel optimization schemes usually adopt the synchronous mechanism by splitting the workload per iteration onto multiple computation units, thus paying a heavy synchronization cost (all units have to wait for the slowest one to finish per iteration), especially when the number of involved units is large. To minimize the overhead due to synchronization, Liu's recent projects adopt an asynchronous parallel scheme costing minimal overhead to parallelize several sophisticated optimization algorithms. This pioneer work theoretically and empirically justifies the advantages of asynchronous methods over traditional synchronous methods and builds up the theoretical foundations for the asynchronous

parallelism. Successes applying this scheme have been demonstrated in solving the sparse linear equations LASSO, box constrained quadratic programming, and vertex cover.

Recent success in applying asynchronous algorithms to big data problems is only the beginning, and it opens up a new direction for future research. While the idea of assembling computation units or utilizing existing computation networks for parallel processing sounds simple, things get sophisticated when combining parallelism with optimization and machine learning techniques. A number of interesting questions arise naturally. For instance, how to make existing algorithms compatible with various constraints in practice (such as data distribution, privacy preservation, computer networking topology, etc.). All these questions are worth further exploration and call for more research efforts.

In the Department of Computer Science, Liu is excited about the potential collaboration with other departments and institutes of the University, such as the School of Medicine and Dentistry, electrical and computer engineering, brain and cognitive sciences, and psychology. He is interested in many research projects conducted at Rochester and is looking forward to contributing his expertise in optimization and machine learning.

Improving Security of Computer Systems

John Criswell is a new assistant professor in the Department of Computer Science at the University of Rochester. He earned both his BS in computer science (2003) and PhD in computer science (2014) at the University of Illinois at Urbana-Champaign. Criswell's industry experience includes computer security work at Argus Systems Group, Inc. and a summer internship at FireEye, Inc.

Criswell's research work primarily focuses on improving the security of computing systems. Long gone are the days in which computer security attacks were merely a nuisance. Computing systems are now high-asset targets; they store valuable information such as bank balances, tax and health records, and product designs, and they operate critical systems such as communications, voting machines, cars, and planes. The players also have changed: defenders no longer face off against curious programmers but against nation states and organized crime.

Criswell's research goal is to create computing systems that provide high-security assurances while minimizing adoption cost. High-security countermeasures are those that require significant expertise and effort to defeat (if they can be defeated at all). Ideally, such countermeasures thwart an entire class of attacks and can be verified correct via formal mathematical methods. Countermeasures should also have low adoption cost, meaning that they should induce as little overhead as possible and should require little, if any, modification to existing systems.

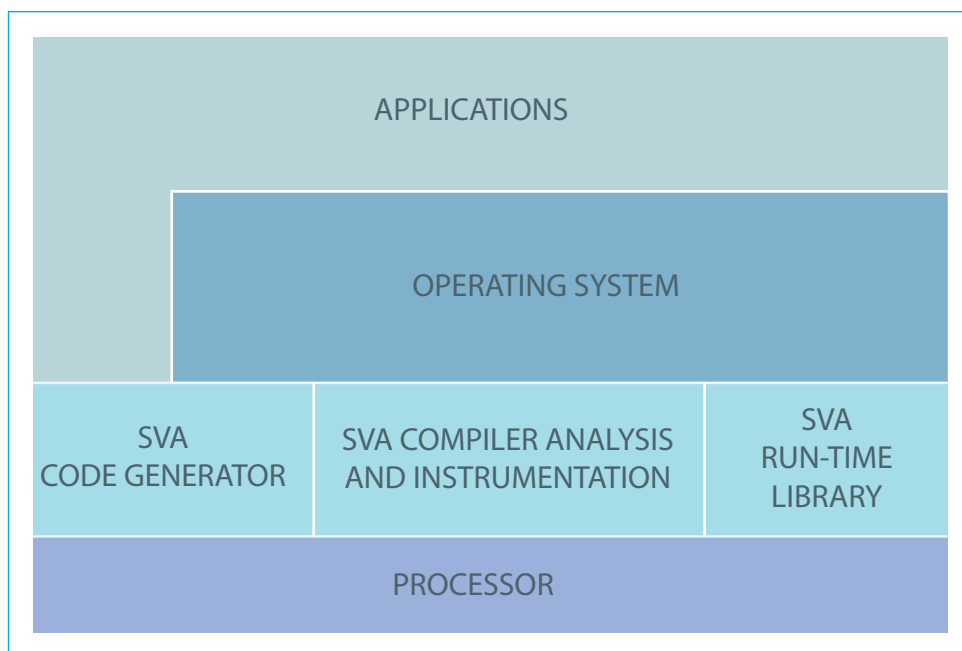


Figure 1: The Secure Virtual Architecture (SVA). The SVA Virtual Machine provides a virtual instruction set to which code is compiled and controls how the operating system interacts with the hardware and applications.

In previous work, Criswell designed and built the Secure Virtual Architecture (SVA) (Figure 1). SVA interposes a compiler-based virtual machine between the software stack and the hardware. By applying minimal changes to an operating system kernel and by using the LLVM compiler to translate source code to the virtual machine's instruction set, software can be made to run on SVA. SVA can then use a combination of compiler and systems programming techniques to enforce security policies on both the operating system kernel and applications.

During graduate school, Criswell employed SVA to protect operating system kernel code from attack using automated compiler techniques. His first system, SVA-M, was the first system to

enforce strong memory safety guarantees on commodity operating system kernel code. SVA-M automatically adds code to the kernel that checks whether operations such as memory accesses, pointer arithmetic, or control-flow transfers are being used to perform illegal operations; when such operations are detected, SVA-M can either halt the system or alert the system operator. More recently, Criswell designed and built the KCoFI (pronounced "coffee") system. KCoFI enforces a security policy that is lighter weight than SVA-M. By focusing on more common attacks that divert control-flow maliciously, KCoFI can provide strong protection with less performance overhead than SVA-M. Criswell has also formally verified parts of KCoFI's design using small-step

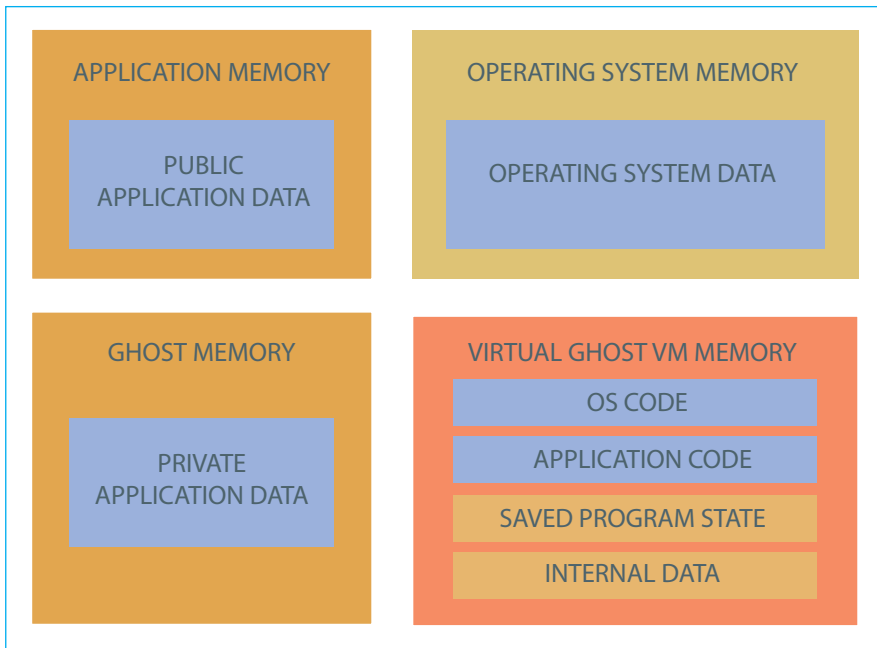


Figure 2: Virtual Ghost. Virtual Ghost provides both public and private memory to applications and standard memory to the operating system. Virtual Ghost’s data (as well as application and native OS code) is stored in memory that Virtual Ghost manages and controls.

semantics and the Coq proof assistant; this verification provides greater assurance that the design of the KCoFI system is correct.

A limitation of the SVA-M and KCoFI systems is that they only protect the kernel against certain classes of attacks; other attacks can still render the operating system compromised and allow the theft or modification of application data. To take a more holistic approach, Criswell designed and built Virtual Ghost. Unlike SVA-M and KCoFI, Virtual Ghost protects *applications* from a compromised *operating system kernel*. Using SVA’s compiler facilities, Virtual Ghost provides memory to applications that the operating system cannot read or write (Figure 2). Additionally, it controls how the operating system modifies application control flow to prevent the operating system from

maliciously modifying the application’s behavior. Combined with a novel system for delivering encryption keys to applications without operating system interference, Virtual Ghost permits applications to operate on an operating system kernel without trusting that kernel. In this way, even if the operating system kernel is taken over by an attacker, the attacker cannot subvert the security of applications.

At the University of Rochester, Criswell looks forward to leading graduate students in research in compilers and operating systems and their application to computer security. One topic that interests Criswell is security for mobile systems. Mobile systems have the same security needs as servers and desktop systems but have much tighter power and performance

constraints. Numerous security policies for mobile devices require compiler instrumentation, but such techniques require sophisticated compiler optimizations in order to meet the constraints of mobile devices.

Criswell is also interested in developing formal metrics for computer security. Numerous countermeasures exist for several classes of attacks, each providing different protection and performance tradeoffs. However, there does not currently exist methods for measuring how much protection is afforded by more secure, but more costly, countermeasures. Having the ability to measure the amount of security provided by countermeasures would be invaluable in helping system developers determine which countermeasures to deploy in different environments that have differing risks and assets.

In addition to research, Criswell is excited to be teaching the Operating Systems course this fall. Understanding operating system internals is key to developing code that makes efficient use of operating system services and is valuable to students who want to work in systems, security, and/or computer architecture. In addition to covering basic operating system topics such as memory management and synchronization, the course will have students working on and becoming familiar with the internals of a real-world operating system kernel.

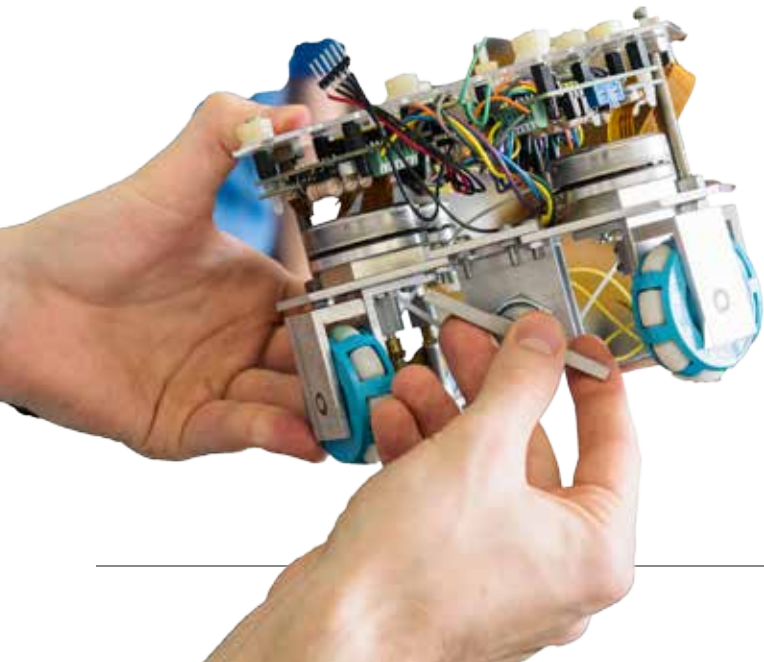
In his free time, Criswell enjoys music (especially Baroque) and, on occasion, plays recorder. Criswell is also interested in obscure abstract strategy games and is especially fond of connection games such as Hex, Unlur, and Antipod.

New Undergraduate Course in Robot Construction

CSC 297 (www.cs.rochester.edu/users/faculty/nelson/courses/csc_297/csc_297.html) was first offered in Spring Semester 2014.

Fifteen students from computer science, mechanical engineering, and electrical and computer engineering spent the semester designing and building “Fencebot,” “Spiderbot,” and “Blimpbot.” They drilled, milled, and sawed in the student machine shop; glued, screwed, and soldered in the computer science undergraduate makerspace; and printed in 3-D in the new Ronald Rettner Hall for Media Arts and Innovation to craft raw materials and basic components into bodies, brains, and sensors for their 21st-century beasts.

And then they had to program them.



Fencebot, constructed by Matthew Baker, Lucian Copeland, Yukun Liu, Morgan Sinko, and Ben Vespone, features two (small) robot sword fighters lunging, thrusting, and parrying to score points by hitting each other with their sabers. Several of the constructors are members of the University of Rochester fencing club, so they knew the rules.

Spiderbot, constructed by Chandler Haugh, Raaga Kanakam, Alex Matthers, Greg Palis, and Taylan Sen, is a magnetic-footed bug designed to crawl around on steel building frameworks like those exposed in the interior of Rettner Hall. “Spidey” is not quite as sure-footed as they would like, and the web self-arrest system not quite perfected, so it is not crawling above unsuspecting heads just yet (an impressive mass of motors, processors, and wiring, nonetheless).

Blimpbot (or Hindenbot), constructed by Jorden Brooks, Luke Kortepeter, Ryan Lee, Casey Waldren, and Julian Weiss, is a robot blimp designed to navigate in large indoor spaces like theaters, big-box stores, or (again) Rettner Hall. “Blimpy” wanders through 3-D space investigating locations and objects of interest, returning to a feeding station when it needs a recharge. Helium, rather than hydrogen is used as a lifting gas, so, hopefully, this bot will have a less fiery fate than its namesake.

UR Robotics Club members Lucian Copeland '15 and Morgan Sinko tinker with Fencebot.



An Interview with Daniel Russell



Daniel Russell '84 (PhD)

Daniel Russell is the Über Tech Lead for Search Quality and User Happiness at Google in Mountain View. He earned his PhD in computer science, specializing in artificial intelligence until he realized that magnifying and understanding human intelligence was his real passion. Twenty years ago he foreswore AI in favor of HI and enjoys teaching, learning, running, and music, preferably all in one day. He worked at Xerox PARC before it was PARC.com and was in the Advanced Technology Group at Apple, where he wrote the first 100 web pages for www.Apple.com using SimpleText and a stone knife. He also worked at IBM running an HCI lab and briefly at a start-up that developed tablet computers before the iPad was a thing. His MOOCs (Massive Open Online Courses) have helped students become much more effective online searchers. His online course, PowerSearchingWithGoogle.com, has had ~500K students go through the content, meaning across the earth, an image of him has been teaching search skills for more than 200 years.

Ed.: From all accounts, the faculty and students at the fledgling University of Rochester Department of Computer Science (CS) in the 1970s were pioneers with great vision and energy. No rules, just research. What was that atmosphere like for you, and how did a particular person or experience influence what you have done in your career?

DR: At the time, we were just kids with dreams. Remember, this was just when the ARPAnet was getting a start—the Internet as we know it didn't even exist except in science fiction, which I'm sure all of us thought was WAAY off in the future.

We'd grown up on *Star Trek* and similar fare. I started in AI because I was deeply interested in figuring out how intelligence really worked—little did we know how much longer that particular road was going to be. But it was all part of our dream. So we worked until late at night, working away on our research projects, trying hard to implement our visions of AI or distributed systems (and yes, playing more than a few games of *Trek*—thanks Gene Ball for bringing that first truly networked game to the Ethernets in the CS lab).

But to answer your question, the atmosphere was just wonderful—lots

of freedom, lots of classic grad school conversations with your peers, lots of hanging out with the faculty members.

Of the folks I talked with, many impressed me, but Jerry Feldman (my advisor and department chair at the time) had a great intellectual curiosity and a very laissez-faire approach to grad student management. That's probably for the good, as I changed my thesis topic a few times.

I was also profoundly influenced by folks in the neuropsychology department, especially Harry Whitaker (with whom I wrote my very first paper—a computational model of apraxia . . . of

all things) and the other grad students over there who opened my eyes to what cognition (especially from a neuro perspective) was really all about. When I think back on it now from the perspective of a few decades, the CS department gave me a structure to work in (the AI model), and the neuropsychologists gave me data and a deep appreciation for how cognition actually operates. Both have served me well over the years.

Ed.: Did the field of User Interface Design exist when you did your graduate work at Rochester? How did each company you worked at (Xerox, Apple, IBM, and Google) strengthen your commitment to move in that direction?

DR: Here's the true story, never before written down.

My thesis work was in AI planning. There's been a long and illustrious line of work on planning ever since then (remember I graduated in 1984).

I took my background in planning and went to work at PARC with Richard Fikes, one of the founders of the whole planning area. And we had a "great" time working on a planner that would generate (provably correct!) plans to help humans run a complex Xerox copier. It really was complex, and the planner we worked on (called Bluebonnet) would help people through even the knottiest of jobs. Do you want to make 500 copies of a 50-page document with perfect binding, 2-sided copies for the first 100 pages, then copy onto blue pages for the next 30 pages, then insert cardboard sections? Easy. Bluebonnet would walk you through the steps.

It was great. I wrote Lisp code to make the planner work, I wrote the serial driver to pull state from the copier (at the wire level), I wrote 3-D shaded animated graphics (for the animated help system), etc., etc. It really was a grad student's dream.

Then Lucy Suchman, an anthropologist at PARC, suggested that we watch what would happen when real people used Bluebonnet to do real tasks.

Great idea! Let's do that!

So we set up the cameras and brought in people to use Bluebonnet to solve their large, complex copying tasks.

It was kind of a disaster—the system worked perfectly, the state was correct, and the plans were correct . . . and the UI was terrible. We hadn't paid much attention to it, so it looked very "industrial" and had no obvious flow. People literally didn't know where to look.

As we ran the tests, Lucy kept saying "This is really interesting. . . ." And I kept thinking, "How did we find such terrible users?"

That is until the day Herb Simon and Alan Newell came to PARC on a visit. We managed to get them as test subjects for our user trial. And . . . THEY couldn't complete the task.

It was an epiphany for me. It really didn't matter how great, smart, or perfect the back-end planner was—if the UI didn't communicate what the human needed to know, it was so much computational junk.

And THAT'S the moment when I converted almost completely over to HCI. I still did AI as a day job for the next 10 years, but little by little I started doing work on HCI with Tom Moran, Peter Pirolli, Stuart Card, and Mark Stefik. That was really at the dawn of the discipline of HCI, when we were still very concerned with building predictive models of people, and the interest in the "design" of the UI was just emerging.

The Xerox Star was being developed as all this was going on, and it became abundantly clear that design REALLY matters—getting the iconography right, the appearance model, the information architecture, even the text of the error messages—it all matters.

So after 10 years, I went to Apple to work in the area of AI + HCI. I ended up

running half of Apple's HCI research lab, so it was a deeply broadening experience for me to work with truly great visual and interaction designers, as well as our own anthropologists, IR people, speech reco, and TTS team.

After an amusing time returning to PARC for two years with the best people from Apple HCI labs, we found that Xerox was (still!) not ready to get into hardware, and I ended up at IBM running a fairly large HCI research lab for them. Although it was organizationally complicated, I learned a good deal of managerial skills, which has proven useful at Google.

Ed.: In your position as research scientist in Search Quality and User Happiness at Google, you analyze the way different people use the Google search engine. Because of that, you have been called a search anthropologist for social media—part psychologist, part anthropologist, and part computer scientist. Which part is the most enjoyable for you, or do you see them blending seamlessly?

DR: Blending seamlessly in the manner of a fruit smoothie is about the right model. There's a little of this, a little of that—my work draws on all of these skills, using tools and analysis methods from whatever field will help answer the questions. It's question-driven research, not methods- or field-driven research.

My job is to understand how and why people search the way they do. To understand this at Google scale requires blending the skills of a big data scientist (to analyze millions of log records), a field anthropologist (to conduct field studies about how people are thinking about their search process), and a usability lab experimenter (when we bring participants into our labs to do traditional studies or eye-tracking analyses of their behaviors).

Although I was initially skeptical of the anthropological method, my early work with Lucy Suchman and later

work with Victoria Bellotti (at Apple and PARC) convinced me that this is a deeply important part of understanding how people consider the artifacts that we (as engineers) construct. It's really something to visit someone in their home and have them RANT at the computer because of the inane way it's operating (and you, as the designer of that particular system, realize that you didn't consider this kind of person in your design).

Ed.: What are some of the surprising results of your field studies of users' search techniques, and how has that impacted the way the Google search engine is evolving? What methods do you use to track the search behavior of subjects? Are there certain groups who show particular strengths and weaknesses?

DR: Probably the biggest surprise is how much of a gap there can be between logged behavior and actual behavior. In many ways, the rise of large amounts of log data has given researchers deep insights into what kinds of information people are really looking for, and how they respond to that. But there are interesting nuances that just clickstream data doesn't provide: the attitudinal response to our UX and product designs, as well as the mental model people have of our systems. We can impute some of that, but at the end of the day, you still have to go and look at people using the tools we've built.

The biggest surprise is the surprise that always happens—and that's the discrepancy between what people say they do, and then what they actually do. We see this repeatedly: People are not good describers of their own behavior, nor can they project forward very well to describe the tools they'd like to have. As Henry Ford reputedly said, "If I'd have asked people what they wanted, they would have said 'faster horses.'" We are in much the same boat. When we ask people what they want from search, they say "better

results," but their response to "better results" is complex. What seems to be happening is that it's very hard to describe accurately what "better" really means. This is why we keep experimenting.

There are definitely different sets of search skills out there. Typically someone will be very skilled in a given domain and not so great in another. MDs, for instance, are typically great at searching out medical information, but I've seen MDs fail at finding how-to information for a plumbing repair task. On the other hand, I've watched unemployed teens solve the plumbing search problem but have zero idea how to find medical information. An interesting effect is that people "socially norm" their search skill estimates. That is, if you ask people "who's the best Google searcher you know," it will typically be someone in their social group (usually defined by their working situation). A bus driver will point to another bus driver as the best searcher they know. That makes sense. But when you do studies across groups, you see each has domain depth, but in cross-domains, very few people have broad search skills. (Information specialists, like reference librarians, almost always do—but that's their profession, and it's relatively rare.)

Ed.: You have emerged as a leader in MOOCs (Massive Open Online Courses) such as A Google a Day and other Search Education tools. These reach millions of people each week. Will MOOCs reshape the educational systems of the future? What are the benefits and disadvantages to this type of learning?

DR: Learning in the Internet age is changing rapidly. A motivated student with a search engine is a powerful force and has access to a vastly larger set of resources than ever before.

MOOCs offer one way to reach a large number of students in a relatively short amount of time. My MOOCs

(PowerSearchingWithGoogle.com) have reached over 500,000 students in the past two years. I could have never done that in my lifetime using conventional methods. Even if I taught 500 students/year, that's a kilo-year of teaching. So in one way, MOOCs are incredibly efficient. And in studies I've done, I have been able to show that if you complete the MOOC, your search effectiveness basically doubles—and that improvement is persistent. Thus, the MOOCs can also be effective.

Will they revolutionize teaching? Yes, but I don't believe it will be the sudden collapse of academe that some predict. Instead, MOOCs will become just another tool in the educators' box of tricks. The bigger shift is from knowledge-buried-in-books to discoverable knowledge online and the ease with which students can search out, access, organize, and USE that knowledge. I see this in the classes I teach. Teaching programming or system building is now nothing like what it was when I was a graduate student at Rochester. There are vast oceans of data, code, systems, and knowledge out there to be discovered and used.

At the same time, large MOOCs also provide a wealth of socialization for learning that I hadn't expected. When you have 100K students all taking the class together, it's a radically different experience than if there are 300 students. The chance that another student will be online AND be able to answer your question is very high. The chance that this student had exactly the same misunderstanding as you did is also quite high. A student who has just come to understand something in the class can give a much better explanation of the concept than I can.

Ed.: How do we prevent the knowledge divide between the computer literate with access to unlimited information and those in the world who are off the grid without access?

DR: The answer is obvious: provide access. The means of doing that are not obvious. There are many programs that are attempting to bring connectivity to the rest of the world. The one I know a bit about is Google's Loon project (to fly high-atmosphere balloons with regional wireless networking that are six miles above commercial aviation traffic), but this is a huge problem for which there probably isn't a single panacea.

Ed.: Many of us have been victims of poor software design that we use in our daily work. Why aren't there more "User Happiness Designers" like you throughout the software industry? Will user interface and need finding become a more important part of the end product in the future? Is the university pipeline currently producing enough HCI/UI graduates to meet the demand of this growing field?

DR: "User happiness" has been a (unstated) goal for UX designers for quite a while. The biggest change over the past few years is the shift towards quantification and careful data analysis about how people are actually using our designs. As I discovered years ago when working in the AI end of things, it doesn't matter how good the service is—if people can't understand it and use it, the product fails. The job of the designer is to create something that works with the mental models of the user AND has the correct affective response. My particular job as a User Experience Researcher is to bridge the gap between design and implementation. It's really a perfect job for someone like me who has a background in classical computer science, a specialization in AI, a couple decades of practice in HCI work, all arranged over a set of broad ranging interests. HCI in general is a skill-set that's much in demand (that covers the needs from UI prototypers, designers, researchers, and data scientists), and my sense is that there's a fair bit of competition for these

people—which suggests that we need to grow the pipeline from university to industry.

Ed.: Is there too much personal information on the web? How can we protect ourselves from becoming vulnerable to criminals and scam artists as search abilities become more sophisticated? Is there a way to limit access to personal information and still allow public access to knowledge?

DR: This isn't my area of expertise, but my sense is that PII (personally identifiable information) is kind of a difficult battleground. There are too many repositories of information owned by too many different interests with too many levels of security and privacy. The biggest challenge I see now is to develop an awareness of what you're giving up when you sign up for this or that. People need to understand the basics of privacy, and I don't know where they're supposed to learn this—in school? That's not happening. Technologies change, scams change, best practices change—and yet people are, for the most part, immune to education about this. It worries me, which is part of the reason I've been spending so much time trying to figure out the best way to teach millions of people about how technology works, and how they can use it to change their lives (and incidentally, their personal information privacy practices).

Ed.: Looking back on your career to this date, what contribution in your body of work gives you the most satisfaction?

DR: That's a hard question: Which of your children do you love best?

Probably the most influential from an academic perspective has been my work on sensemaking—that is, the processes people go through when they're searching for, finding, organizing,

and understanding a complex body of information. I started that work at Xerox PARC back in the early '90s, and it's been a constant force in my research ever since.

But in terms of reaching people, my more recent educational work (with the PowerSearchingWithGoogle.com MOOCs and various other teaching programs) has certainly affected more people in the world. I often get messages from people telling me that what they learned in one of my classes completely changed the way they work, or they were able to solve a problem of longstanding. That's very rewarding.

Ed.: Knowing what you know now, what advice would you give to current computer science students at Rochester?

DR: When choosing a thesis topic, follow your heart but be ready to listen to good advice. I changed my focus several times and found a topic I really, really enjoyed. But when my advisor said, "Stop already, just drop Chapter 13 from your thesis, you're done . . .," he was completely right. I was passionate about Chapter 13, but it was time to go pursue that chapter (which ultimately turned into the sensemaking work) elsewhere.

Ed.: When you aren't working at making everyone else happy, what do you do for rest and relaxation?

DR: Family, running, bicycling, or scuba diving in exotic locations. And, truthfully, writing. (You'd have thought that all that writing for the thesis and all of those academic papers would have pounded it out of me, but you'd be wrong.)

Graduate Alumni News

If you graduated in a year that ends in 9 or 4, please join us *Meliora Weekend*, Oct 17, 3:30–5:30 p.m., for the Computer Science Undergraduate and Graduate Reunion Open House in room 601 of the Computer Studies Building.



Bai, Tongxin (PhD '11)—My current affiliation is with Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, which is located at Shenzhen, China.

Beygelzimer, Alina (PhD '03)—I've moved to Yahoo in NYC. Sitting next to Joel Tetrault and Amanda Stent!

Bukys, Luidy (MS '86)—My current position is Director, Advanced Application Development at Allworx (subsidiary of Windstream).

Campana, Ellen (PhD '07)—A couple years ago I left my tenure-track professorship at ASU and headed to Silicon Valley. After some time at the big data start-up Apixio, I moved to Intel and am now working as a Software Architect in the New Devices Group. I am about to celebrate my first anniversary there and I love it so far! Greg Aist and I will celebrate our 10th wedding anniversary next spring and are expecting our third child this September.

Coombs, David (PhD '92)—I recently ended my term appointment as a PM at IARPA and joined Raytheon. My role is Technical Director, Customer R&D, Raytheon Intelligence, Information, and Services. My charter is to grow more contracted R&D with DARPA and similar sponsors. I will be glad to forge alliances with university partners.

Cottrell, Gary (PhD '85)—I saw Peter Selfridge and other alums at the memorial service for Andy Haas outside of Albany. There was a display of his t-shirts! He was one of a kind.

Dallessandro, Luke (PhD '14)—won the 2013-2014 Outstanding Dissertation Award for Engineering.

Denber, Michele (MS '80)—I've been busy playing with the 3-D printer I built last year. I also recently restored a 1969-vintage Akai quarter inch open reel video tape recorder to operating condition. I'm still living in Brighton and Bradenton with my partner of 13 years and two big German Shepherds, enjoying being retired. Best regards to everyone in the department.

Dominguez, Melissa (PhD '03)—I was promoted last year and am now tech lead/manager of the Gmail team for iOS, mobile web, and offline. In addition to my official work duties, I also lead outreach efforts at the Google Waterloo, (Canada) office to encourage young girls and other underrepresented groups to consider computer science/STEM as a possible educational and career path. My older daughter Trella started first grade and my younger daughter, Beatrix, will be starting junior kindergarten.

Faliszewski, Piotr (PhD '08)—I won the "2013 Research Prize" of "Polityka" magazine (in the field of technological sciences). Since 2001, every year, "Polityka" selects a group of 15 finalists (in five fields: humanities, life sciences, social sciences, exact sciences, and technical sciences) and then picks one representative from each of the fields. "Polityka" is a weekly magazine in Poland.

Friedberg, Stuart (PhD '89)—I've been with ARRIS Group, a supplier to the cable TV industry, for about 4.5 years. Related anecdote: My first post-academic job was with Sequent Computers, eventually bought out by IBM and shortly thereafter discarded. I moved on to Polyserve, eventually bought out by Hewlett-Packard and discarded about two years later. ARRIS bought out Motorola Home from Google, which is a case of the fish swallowing the whale. I'm hoping the consequence is equally different.

Gallo, Carlos Gomez (PhD '11)—I'm a Research Assistant Professor at the department of Psychiatry and Behavioral Sciences, Northwestern University.

He, Shan (PhD '07)—I am now a staff engineer in Google. We have two boys. The older one, Kirik Altekar, is 2 and the younger one, Derek Altekar, just turned 3 months old. They love each other, and we hope it stays that way.

Light, Marc (PhD '96)—My current title is “Manager of the Applied Math Group” at WindLogics.

Meira, Wagner (PhD '97)—I have published a book with Mohammad Zaki that can be found at <http://dataminingbook.info/>.

Mellor-Crummey, John (PhD '89)—professor of computer science, and of electrical and computer engineering at Rice University, has been named a Fellow of the Association for Computing Machinery (ACM) for his contributions to parallel and high-performance computing.

Pearson, Jonathan (BS '05, MS '07)—I'm now working at Google in NYC.

Sabbah, Danny (PhD '82)—I am still working for IBM even though I had planned to be ‘retired’ by now.. They asked me to stay on till the end of 2015 and asked me to become the CTO and GM of IBM's next generation initiatives especially around cloud related technologies. I just launched a PaaS initiative a few months ago called Bluemix. It has grown to over 20K users in 3.5 months, so not so shabby. I am now working on other things including an IoT platform. Still having ‘fun’. My kids are off on their own and have been for quite a while. We are looking forward to ‘retirement’ whatever that means :).

Salgian, Garbis (PhD '98)—I'm still at SRI (formerly Sarnoff Corporation), I was promoted to Principal Scientist in April 2014. The kids are growing fast, they will turn 10 and 3 respectively in the Fall.

Selinger Salgian, Andrea (PhD'01)—I am still an Associate Professor in the Computer Science Department at The College of New Jersey.

Stent, Amanda (PhD '01)—I am now a Principal Research Scientist at Yahoo Labs in New York, NY where we are building an NLP group. And I have a new collection coming out from Cambridge University Press titled Natural Language Generation in Interactive Systems, edited by Bangalore and Stent.

Stewart, Christopher (PhD '08)—I was awarded the NSF CAREER award for my research on powering Internet services, like Facebook, with clean, sustainable energy. Here's a blurb about the award from the NSF website: “The Faculty Early Career Development (CAREER) Program is a Foundation-wide activity

that offers the National Science Foundation's most prestigious awards in support of the early career-development activities of those teacher-scholars who most effectively integrate research and education within the context of the mission of their organization. Such activities should build a firm foundation for a lifetime of integrated contributions to research and education.”

Tang, Chunqiang (PhD '04)—I left IBM Research and joined Facebook on July 1, 2013. My family also relocated from New York to San Jose, CA.

Tetrault, Joel (PhD '05)—I just joined Yahoo Labs in NYC in January as a Senior Research Scientist. Amanda Stent is here too and we're working together!



VanDurme, Ben (BS '01, PhD '09)—in September 2013 I married Sara Eleoff (BA/BS/ Take5 '01, Residency '08, Fellowship '11, MPH '12) (picture attached from a recent trip hiking Iceland). Also in September I was made head of text research at the Johns Hopkins Human Language Technology Center of Excellence (HLTCOE). Later in the year I was given a cross-appointment as research faculty in the Department of Cognitive Science, in addition to my existing appointment in Computer Science.

Zaki, Mohammed (PhD '98)—We are pleased to announce the publication and availability of our textbook on data mining and data science.

Data Mining and Analysis: Fundamental Concepts and Algorithms
Mohammed J. Zaki and Wagner Meira, Jr.
Cambridge University Press, May 2014

Zhang, Xiao (PhD '10)—Our second boy, Derek, was born in Jan. 2014. Now my hands are full with Sean and Derek ;-)

Recent PhDs

Marzieh Bazrafshan
Semantic Features for Statistical Machine Translation
H5, San Francisco, CA

Yi Chu
Intelligent Prompting Systems for People with Cognitive Disabilities
Nuance Communications

Luke Dallessandro
Preserving the Appeal of Transactional Programming
Indiana University

Elif Eyigoz
Morphology Modeling for Statistical Machine Translation
IBM, Watson Labs, Austin Texas

Licheng Feng
Learning Effective Grammar Rules for Machine Translation
Google

Jonathan Gordon
Inferential commonsense Knowledge from Text
USC Information Sciences Institute

Mehdi Hafezi Manshadi
Dealing with Quantifier Scope Ambiguity in Natural Language Understanding
Google

Tivadar Papai
Exploiting Constraints, Sequential Structure and Knowledge in Markov Logic Networks
Google

James Park
Managing and Exploiting Flash-based Storage for Data-intensive Systems
Hewlett Packard

Xiaoya Xiang
A Higher Order Theory of Locality and Its Application in Multicore Cache Management
Twitter

Hongzhou Zhao
Application-directed Cache Coherence Design
Nvidia

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Brandeis Hill Marshall is an associate professor of computer science in the Department of Computer and Information Sciences at Spelman College. She earned her PhD in computer science (RPI 2007) and completed a postdoc at Purdue University's Cyberinfrastructure Center (2007–2008). She was an assistant professor in the Department of Computer Information Technology at Purdue (2008–2014), earning promotion and tenure in April 2014.

Her objectives are two-fold: scholarly pursuits in data management and positively impacting diversity and outreach initiatives. Her research centers on the study and improved characterization of complex data networks—a subset of the emerging network science field. The advances in network science are used in business intelligence and data analytics, which lead to providing business leaders with knowledge to make more informed decisions. Intellectually, she is interested in discovering effective ways of handling text-based data and knowledge. The three main focuses are (1) labeled data analysis, (2) unlabeled data analysis, and (3) fixed-length data analysis, resulting in 25+ scholarly refereed publications including journal articles, conferences, and extended abstracts.

Since 2009, she has been actively engaged in mentoring the next generation of STEM professionals, particularly those from underrepresented groups. This engagement has included, but not limited to, serving on the program committees for the ACM Richard Tapia Diversity in Computing Conference, serving as a committee member of Super Computing's Broader Engagement, and leading the Purdue College of Technology cohort to the 2012 Grace Hopper Celebration of Women in Computing. Starting in 2012, Caio Soares (Bosch) and Marshall began co-leading the Broadening Participation in Data Mining Program, co-located with KDD.

Ed.: I found and enjoyed your blog—csdoctorsister.blogspot.com. What is the motivation for the blog and who is your audience?

BHM: A main reason for my blog is to break down some STEM stereotypes, even if it's one reader at a time :-). I hope that these posts are helpful not only to URM STEM faculty but also to any URM in the academy, especially those in the "ivory tower." Broadly, the URM in the academy are not exclusive to the faculty ranks but also graduate and undergraduate students.

Ed.: How has your life changed since you received tenure at Purdue? Explain the significance of this accomplishment.

BHM: Since obtaining promotion and tenure, I am more outspoken. I have a sense of clarity about my role as an instructor, scholar, and steward of computing. The significance of this accomplishment I wrote about in a blog post: <http://csdoctorsister.blogspot.com/2014/04/tenured-bwic.html>. In short, I made history again (#ThisIsEpic #TenuredBWIC). I was the first

Black woman to earn a PhD @ RPI (I asked when I graduated, but no one could name another), and I am the first Black woman to earn promotion and tenure in Purdue's CoT.

Ed.: Did you have role models for this journey? Are you hoping to be a role model as well? What do you think are the most important functions of a role model?

BHM: Yes, this journey is full of role models from keynote presenters, instructors, and research scholars to peers. I believe that I am a role model to those currently in the pipeline pursuing their BS, MS, and PhD in STEM degrees and seeking promotion and tenure in a STEM discipline. Role models should be present and thoughtful, as your words can help someone reassess his or her situation (and hopefully decide to persevere).

Ed.: You are leaving Purdue and beginning a new career at Spelman College, a historically black women's college. From a big school to a small school—big faculty, small faculty. Tell us

about your decision to move, the campus dynamics, and what you hope to accomplish at Spelman.

BHM: Spelman has charted a strategic path for each of our constituencies: students, faculty, staff/administrators, alumnae, trustees, and community partners. In particular, one of the student centric initiatives is providing access to opportunities for undergraduate research *and* career-related internships. A key element in my own journey has been the invaluable research and internship experiences. Couple this with Spelman's sustained effort in building strong STEM programs, and it is an exciting future ahead for Spelmanites. It's such a great forward-thinking plan. I look forward to contributing to its growth and success by delivering curricula and conducting research in information retrieval, data mining, data security, and social media.

Ed.: What challenges have you faced and at what part of your life were they the most significant? Since you were successful at overcoming them, could you explain your successes and how you found ways to deal with the challenges?

BHM: Trust in competency; being liked versus respected; guidance in navigating the unwritten rules: grants, students, research, teaching, and service. Truthfully, I'm a bit uncomfortable with calling this "my success." These accomplishments are obtained through exposure to several summer internships and with the assistance of a lot of people, hard work, and perseverance.

Ed.: What advice would you give to students interested in STEM disciplines that would help them be successful? How about women and women of color specifically?

BHM:

- Your path may not be lined in gold and full of fresh roses, but you would have some formal support networks.
- Being forearmed is being forewarned.
- Read *Unlocking the Clubhouse* by Jane Margolis and Allan Fischer.
- Attend at least one Tapia Conference.
- Attend at least one Grace Hopper Conference.
- Maintain a 3.0+ GPA.
- Have at least one co-op/internship experience.
- Build your professional network: have three to five letters of reference from former profs and employers

Ed.: What do you do outside of work for fun?

BHM: I enjoy listening to music, watching basketball, cooking/baking, and dancing.

Ed.: Do you have a favorite historical figure, and why is this person your favorite?

BHM: I don't have a favorite historical figure. However, if I was to host a dinner party inviting any celebrity, I would invite the following: Anita Borg, Warren Buffett, Jesus Christ, Whoopi Goldberg, Barack and Michelle Obama, Will and Jada Smith, Oprah Winfrey.

These men and women are a diverse group of impactful and purposeful agents of change. How each views (or viewed) and navigates (or navigated) through the world would be fascinating to hear.



UNDERGRADUATE ALUMNI NEWS

Abraham, Sunil '00—My current employer is Stifel Financial. I am a technology investment banker in Baltimore. My second child, a daughter, was born on May 15, 2014.

Bakken, Luke '98—My current employer is Basho Technologies and I still perform with the Spokane Symphony.

Balconi, Charles '03—I've been working for Siemens PLM Software for nearly 10 years, though the company name has changed a few times during that time. I basically support and customize CAD software and CAD data management software for some of our medium to large enterprise customers. The biggest change would certainly be that my wife and I had our first child, Nathan, in August last year.

Bhasker, Prakash '13—I am currently working at Intel in the research department.

Bhopale Plaisier, Seema '04—I have had a second daughter! Sonia Belle Plaisier, now 8 months old, sister to Aashna Lynn Plaisier, now 4 years old. I am taking care of them full time now, though I am still consulting with Dr. Delphine Lee at John Wayne Cancer Institute in Santa Monica, CA. Until Sonia was born, I was working with her lab part time doing bioinformatics and gene expression analysis. Since then I have shifted my scientific efforts to a new audience— I have started an informal preschool science class from my home. We have done fun and interactive chemistry experiments such as making acid-base volcanoes and faux lava lamps using oil and colored water. We have also explored the five senses (biology) and built sculptures out of toothpicks (engineering). It has been so rewarding for everyone involved.

Bodek, Haim '95—I don't even know where to begin. Maybe the place to start is this documentary about my campaign to reform the US stock market: <https://www.youtube.com/watch?v=GEAGdWHXfLQ>. Here's another article: www.nytimes.com/2014/04/05/opinion/nocera-michael-lewiss-crusade.html?_r=1.

Burke, Andy '03—I am currently the CTO at Hone, Inc. <http://gohone.com>. Hone is a small startup in the advertising and data space that powers audience engagement and metrics.

Carlberg, Jason '03—I work at CSB International in Omaha as a Lead Software Development engineer in Enterprise Software Management. My wife Natalie and I got married on June 9, 2012.

Chen, Jonathan '04—I got married on March 21, 2014 to Shiwei Ye.

Christopher, Ian '10—I am still working at the startup I cofounded, analyticsMD. We raised a seed round in early 2014 and have moved in to a new space in Mountain View and have also hired two employees. Doing our best to help healthcare.

Clubb, David '06—My current employer is Chartboost, in San Francisco.

Douglass, Scott '97—A little over two years ago Symantec bought Odyssey Software (and me with it). Last fall, they shut down the office here but offered to relocate me, which I declined, then offered a remote job, so now I'm working out of my house.

Eisenstat, David '06—I graduated with my PhD from Brown University in May 2014. My thesis title was "Toward Practical Planar Graph Algorithms."

Feil-Seifer, David '03—I am an Assistant Professor of Computer Science and Engineering at University of Nevada, Reno.

Feng, Jessica '12—I graduated from Fordham University and have started my new job at Citi.

Ferraro, Frank '11—I married Erin Sherman on December 28th, 2013, in Schenectady, NY. I just finished my third year as a Ph.D. student at Johns Hopkins University working on computational and event semantics.

Fong, Warren '04—I work at Memorial Sloan Kettering Cancer Center. About a year after graduation I switched to radiation physics due to an internship I got at Mskcc. They soon hired me after and I have been a radiation dosimetrist for the past 10 years and soon to be radiation physicist. I am finishing my part time masters of science in Medical Physics at Columbia University this year.

Frankel-Goldwater, Lee '06—I'm currently working with the Sustainability Laboratory, and heading to Costa Rica to co-lead the Global Sustainability Fellows Program. Recently, I taught myself some web development skills and have been creating sites for NGO's on the side. I'm also doing some research for a UN paper in Brazil this summer towards "Bridging the Digital Divide in Developing Regions".

Freidman, Jason '07—I left Google a few months ago to join the fine folks of Periscope, ('07 grads Tom O'Neill & Harry Glaser's company.). Things have been pretty great on that front, having a good time and signing up more customers, and building awesome software!

Frink, Steven '13—I am transferring from GWU to Cornell for my PhD. I've just submitted a paper for review with my advisor and another co-author a few weeks ago, but no news yet on whether it will be accepted to the conference or not.

Fu, Tao '13—I just finished two thirds of the program at Cornell. This summer, I did an internship with an asset management firm on Wall Street. I will resume my study in September and finish around December this year.

Goldstein, Greg '01—I recently finished my first year in the Computational Science and Engineering program at Harvard. I'm still working at Verifi LLC in Cambridge.

Gorenstein, Aaron '11—In December 2013 I decided to graduate from UW-Madison with a(nother) MS in CS rather than continue for a PhD. I'm now a SDE at Microsoft, working on the back-end compiler optimization team in Visual Studio.

Hanson, Edith '12—Josh Pawlicki '12 and I were married on July 5, 2014. I'm starting a graduate program at Northwest University for a Masters in Teaching.

Hardesty, Neal '96—I am a principal member of the technical staff in R & D, Salesforce.com.

Heavey, Brendan '02—I am getting married in October to a girl I met during grad studies at UB. She is from Buffalo and I'm doing my best to teach her how to juggle.

Ho, Brian '12—I am working as a programmer/software developer at Worldwide Environmental Products.

Hughes, Eric '07—I currently work for Novetta Soutlions developing in C#, (previously in Java and Ruby). I was married on June 29, 2014. In my spare time, I've been doing some community theatre, notable past shows include "Les Miserables" and "Next to Normal".

Isman, Michael '04—Since last year I got married and bought a house, still living in MA and still at Ubersense.

Jackson, Jonathan '03—I am working for Fitbit, Inc.

Kim, Brian '04—I am currently working at Catalog Spree, Los Altos, CA.

Kimball Schols, Erin '04—After having moved to the Netherlands four years ago for my job, I have since bought a house and married the most wonderful man, Sander. While the past years have been focused on learning to speak Dutch, experiencing different cultures, and



Dan Panzarella



Frank Ferraro



Seema Bhopale Plaisier's daughters Sonia and Aashna



Weingarten



Kimball

UNDERGRADUATE ALUMNI NEWS, CON'D

traveling all around Europe, the next adventure has just started with the birth of our first child, Brady, on June 28th! He is a beautiful healthy boy that we could not be happier with! We'll just have to wait to see how long it takes before he picks up my old programming books :-).

Kollar, Thomas '04—This year I joined Apple as a Research Scientist, working on Siri.

Lander, Sean '08—I finished my MS in CS at University of Missouri last month and I am about to start my PhD in Bioinformatics at the University of Missouri this coming fall. I got married in Sept. 2012.

Lu, David '07—I successfully defended my PhD in Computer Science from Washington University in St. Louis. The topic was "Contextualized Robot Navigation." I'll be teaching classes in the Wash U CS department for the next year.

Luis, Cristina '01—I am working at the Norwegian Meteorological Institute (met.no) as a research scientist in the Ocean and Sea Ice section. I mostly occupy myself with remote sensing of the Arctic to determine sea and ice surface temperatures, data that is then used by climate researchers and modelers. The job involves a lot of programming, making it a good fit for the Earth/computer scientist.

Merz, Evan '04—I finished my doctorate in music from UC Santa Cruz in December 2013. My daughter, Lucy, was born on Dec. 2, and I defended on Dec. 4. My dissertation deals with applying a theory of creativity to procedural content generation. I am now a lecturer in the computer science department at San Jose State University.

Miller Haddix, Cynthia '99—I am now working as a Software Engineer at IGT (International Gaming Technology) in Reno, NV.

Mueller, Daniel '06—I recently started as a Software Engineer at Twitter in Boston.

Norine, Christopher '09—I'm in California in the Navy. I fly in F/A-18F SuperHornets, and I'm a little more than halfway through my "sea tour" here. I've been doing training (most recently spent time with the Marines learning to become a JTAC—Joint Terminal Air Controller). I've spent a few months now on the USS Ronald Reagan (an aircraft carrier) and actually am leaving to go back out there for two months on a "Rim of the Pacific" exercise. We are slated to head to Hawaii twice, and that is definitely something to look forward to. I'm now engaged, with plans to get married back in NY once my deployment schedule gets a little less hectic.

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Osisek, Eric '07—I have earned a MS in Philosophy in Computer Science, I work full time at Factset Research Systems in Norwalk, CT, I'm still working part time towards a PhD, and I'm engaged to Kristen Morie (UR '08).

Oussayef, Karim '04—I have switched jobs and I'm now working at a patent litigation boutique called Desmarais LLP.

Panzarella, Dan '12—I got married on August 10, 2013 to Hannah Attard. I'm working as a software engineer at Blue State Digital.

Pawlicki, Joshua '12—was married to Edith Hanson '12 on July 5th and is currently working at Google in Kirkland WA.

Pearson, Jonathan BS '05/MS '07—I'm now working at Google in NYC.

Prithviraj, Preethum '05—I'm currently working at LifeCare Ambulance (Remote IT Support) and Blue Esoteric (my own Company). Last year, my son was born 15 weeks premature, but he's now turning 1 and doing great! I've become a stay-at-home dad and working from home in my spare time on Android Apps and the like. I'm also doing some volunteer work as a Paramedic.

Rau, Alex '99—I am Managing Director/ Solution Architecture at AXA US.

Richter, Isaac '11—I am now an ECE PhD. student at UR in Engin Ipek's lab.

Rotondo, Mike '07—I graduated in 2012 with a Masters of Arts in Music, Science and Technology (MAMST) from the Center for Computer Research in Music and Acoustics (CCRMA) at Stanford. After that I did an artist residency at the Children's Creativity Museum, and am currently making creative software for kids at Launchpad Toys. And I was married on July 26, 2014.

Schmid, Jonathan '03—Since April of this year, I have left the Department of Defense and now work at LexisNexis as a Business Software Engineer using Oracle ADF and RESTful web services in Raleigh, NC. I took this job in order to gain more experience with both front and back-ends of today's service driven web platforms. I also hope to launch a Facebook app soon for a visualization engine called Amble. (www.amble3d.com)

Silverman, Michael '08—I'm still working on my company, Silverware Games, Inc. So that's where I'm employed. I had a game featured in the Apple app store, "Don't Shoot Yourself!" and I'm working to bring it to other platforms. Also I'm right about to do my first release of a racing game for PC called "Speedway Heroes."

Snyder, Devin '09—I'm working at Moebius Solutions in CA as a software engineer.

Vandegriff, Evan '11—I'm now a software engineer at Nomi (Beacons based retail analytics startup in NYC) <http://techcrunch.com/2013/10/16/nomi-series-a/>.

VanDurme, Ben BS '01/PhD '09—please see graduate news.

Vong, Pamela '08—I have lived in Washington, DC for the past 4+ years and am currently working for InfernoRed Technology where my official title is "Tech Wizard". I consult in a wide range of software development projects (from LOB systems to mobile apps) and for a wide range of clients (including startups and non-profits). Some notable Windows 8.1 apps I've developed this year are the "Elmo Loves ABCs" game for Sesame Street and the "Be A Martian" app for NASA! I have also just finished my Master's Degree in Information & Communication Technology from the University of Denver, a program which I started 5 years ago while living in Colorado and was able to continue online after moving to DC.

Vukman, Emily '10—I am currently the lead web developer at Atomic Design, in Rochester.

Walker, David '06—I got married last October to Hilarie Lloyd. She and I have a baby boy, Alistair Lloyd-Walker, born March 25, 2014. I'm still working at Thomson Reuters.

Weingarten, Tom '06—My only big news is that my company rebranded ourselves to Wiser (<http://getwiser.com>). We're still the same company, though, and still always looking for new brilliant CS grads to join our ranks in NYC!

Zhao, Shan '07—My employer for the past 6 years is Icahn School of Medicine at Mount Sinai. (MD/PhD Candidate).

Zschau, Aaron '02—I'm currently working for Partners Healthcare with Research Computing (Since 2006) and still living in Waltham, MA.

If you graduated in a year that ends in 9 or 4, please join us **Meliora Weekend, Oct 17, 3:30–5:30 p.m., for the Computer Science Undergraduate and Graduate Reunion Open House in room 601 of the Computer Studies Building.**



Marty Guenther enjoying dinner on the Danube while attending the AIT Budapest conference in May

As part of Dean Clark's goals to increase the percentage of Hajim students who study abroad, there is an effort to find programs that fit the curricular needs of departments within the Hajim School. One such program is Aquincum Institute of Technology (AIT) in Budapest, Hungary. Established in 2007 to provide exceptional study abroad experiences for North American undergraduates in IT fields, it allows students both to complete foundational courses and to take electives in design and entrepreneurship as well as in cultural studies.

In May, Marty Guenther, the Department of Computer Science's undergraduate coordinator, traveled to a conference at AIT Budapest with Jackie Levine, director of study abroad for the University. They explored both the institute and the city to better advise computer science students about the experiences available at AIT. Attending the conference with them were computer science faculty and advisors and study abroad personnel from many liberal arts colleges around the United States. The conference included curriculum review; exploring the institute's facilities; meeting with students; a tour of the city; and several nights out on the town to understand the culture, historical significance, and beauty of Budapest.

This fact-finding mission was instrumental in Levine's decision to add AIT Budapest to the list of study abroad opportunities for Rochester students. Currently, the necessary documents to make AIT Budapest an official destination for our students are being processed, and specific courses are being approved to make the credit transfer for CSC students seamless. With the range of courses that are taught there, students in majors like computer science, digital media studies, and the new data science interdepartmental major might consider studying in Budapest.

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Hajim School of Engineering & Applied Sciences

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Class of 2014 — Front row, left to right: Dan Viterise, Emily Ansley, Jennifer Uvina, Christina Kayastha, Samantha Piccone, Shuopeng Deng. Second row, left to right: Chris Fredrickson, James Yuzawa, Julian Lunger, Andrew Nocka, Brett Sheingold, Nate Book, Tim Sebring. Third row, left to right: David Bang, Joe Brunner, Gerjo Tacaraya, Paul Petry, Sara Lickers, John Hinkel, Rebecca Galasso, Nik Skarlatos. Fourth Row: Bryan Ngadamin, Chris Miller, Mikhail Domrachev, Dillon Skeeahan, Conor Bohan, Dan Scarafoni, Emily Eisenberg, Eric Bigelow. Not pictured: Keenan Bartlett, Jialei Chen, Michael Gill, Nazmin Kharodia, Hyunjoon Kim, Alex Kurland, Ryan Swanson, Ted Teumer, Yazzmynn Wilson, Ge Wu, Vedant Ahluwalia, Hao Chen, Tanner Degenkolb, Matthew DeMartino, Carlos Diaz, Ciaran Downey, Peihong Jiang, Jeremy Meguire, Willie Reed, Praneet Tata, Ru Zhao

Thank you to all donors who have contributed to the University of Rochester in the last year. If you are interested in donating to the department or the University, please go to the alumni website and look for “Online Giving.”

www.rochester.edu/college/giving/

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