



CRA

Computing Research
Association

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COMPUTING RESEARCH ASSOCIATION, UNITING INDUSTRY, ACADEMIA AND GOVERNMENT
TO ADVANCE COMPUTING RESEARCH AND CHANGE THE WORLD.

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New Videos Encourage Undergraduates to Pursue Advanced Education in Computing

By Susanne Hambrusch (Purdue University), and Ran Libeskind-Hadas (Harvey Mudd College), CRA education committee co-chairs

The Computing Research Association (CRA) and its [education committee](#) (CRA-E) are excited to announce the creation of five short videos entitled “[Choosing a PhD in Computer Science](#).” These [videos](#) were designed in conjunction with award-winning producer Patrick Sammon (co-producer of “[Codebreaker](#)”) to explain the benefits of pursuing a PhD in CS. The videos showcase young researchers with PhDs who are now working in industry as they talk about what compelled them to pursue a doctorate and how they are using their advanced training in their work. While many undergraduates understand that a PhD is needed for a position in academia, these videos demonstrate how a PhD can be useful in industry as well.

The health of the U.S. research pipeline in CS is vitally important. While undergraduate enrollments are booming, the relatively low graduate enrollments of domestic students are a cause for concern for our universities, companies, national labs and, ultimately, for society. We’ve found that undergraduates often have a very limited view of computing research and graduate school.

So, we’re writing to ask that you help disseminate these videos to your students and colleagues. Here are some ways that you can help:

1. Post links to these videos (<https://www.youtube.com/playlist?list=PL6AeXx75IHxmrP0liOz9wmfA4KrL3cLA>) on your department’s website and pages specifically for undergraduate advising

2. Send out a note to undergraduates, faculty, and undergraduate advisors about these videos
3. Show one or more of these videos in a class and encourage your colleagues to do the same; each video is about research in a specific subdiscipline (e.g., machine learning, security, robotics, bioinformatics)

Thank you for your help in distributing the videos! We also want to thank the featured researchers for taking the time to participate and their employers (Google, PARC, MetaMind, and Cytobank) for their enthusiastic support for this project.

We hope to produce additional videos in the future and expand beyond the bay area (where this group of videos was filmed in order to stay within budget) and to a broader set of companies and labs. Please feel free to provide us with feedback and suggestions (crae-info@cra.org).



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Education

CRA Women Early and Mid-Career Mentoring Workshops



CRA-W

Computing Research
Association
Women

CRA's Committee on the Status of Women in Computing Research (CRA-W) will host early and mid-career mentoring workshops on November 19-20 in Washington, D.C. The goal of these two workshops is to provide an environment for mentoring, practical information, advice, and support among researchers and educators in computing. Application is free, but there

is a \$250 registration fee for those who are accepted the workshops. CRA-W will reimburse participants for hotel and airfare expenses after the workshops. In order to receive reimbursement, applicants must be affiliated with a U.S. institution or be employed in the U.S. These workshops are

open to individuals in their early career in research and labs, and mid-career in education, research, and labs.

Please share this opportunity with interested colleagues and friends.

**Deadline:
September 16, 2016**

Learn more about the
CRA-W Career Mentoring
Workshops at:

<http://cra.org/cra-w/early-mid-career-mentoring-workshop-application-open/>



2016 CRA Taulbee Survey Schedule

By Betsy Bizot, CRA Director of Statistics and Evaluation



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The 2016 *CRA Taulbee Survey* will be starting soon. As we did last year, the survey will be split into two parts, salary and main (everything else). This allows us to set an earlier deadline for the salary section in order to produce a preliminary salary report in December, while giving departments more time to collect and enter the information in the rest of the survey.

The schedule will be as follows:

- ▶ **By September 9:** All doctoral departments will be contacted to update Taulbee user information. The academic unit head will receive an email and so will the Taulbee primary contact, if separate.
- ▶ **September 13:** PDF will be available for data gathering.
- ▶ **September 27:** Both sections of the Taulbee will open for input.
- ▶ **November 18:** Due date for salary section.
- ▶ **December 19:** Preliminary salary report available.
- ▶ **January 18, 2017:** Due date for the main Taulbee section.
- ▶ **April 2017:** Full Taulbee report to CRA members and participating departments.
- ▶ **May 2017:** Published in *CRN*.

If you have any questions, contact Betsy Bizot at bizot@cra.org.

Save the Dates: Next Two CRA Conferences at Snowbird

2018

Monday, July 16, 2018, Conference begins with late afternoon reception

Tuesday - Wednesday, July 17-18, 2018, Conference full days

2020

Tuesday, July 21, 2020, Conference begins with late afternoon reception

Wednesday - Thursday, July 22-23, 2020, Conference full days

The New Chairs Workshop will take place on the day the conference begins.

The upcoming conference dates are revised somewhat from past schedules with the intent of making the Conference more family friendly by avoiding weekends. Because of the long lead time for reserving space at Cliff Lodge, this is being implemented gradually.

We do not record the conference presentations in order to encourage free-flowing discussions, but we do post the presentations by every speaker who provides them to us. For 2016 see: <http://cra.org/events/snowbird-2016/#agenda>. Names and sessions highlighted in blue have an associated presentation.

And a special thank you to everyone who submitted evaluations of the 2016 conference. We read this carefully and do our best to improve the conference based upon feedback.



Nominations Open for 2017 CRA Award for Outstanding Undergraduate Researchers

By CRA Education Committee



CRA-E

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Education

The Computing Research Association is pleased to announce the annual CRA Award for Outstanding Undergraduate Researchers, which recognizes undergraduate students in North American colleges and universities who show outstanding research potential in an area of computing research. The award is a terrific way to recognize your best student researchers and your department.

Eligible nominees must be enrolled as undergraduates in a North American college or university throughout the academic year September 2016 to May 2017. They must be nominated by two faculty members, and the chair of their home department must sign the nomination cover letter to confirm they are in good standing in the department. Departments that grant

Ph.D.s in one of the computing fields may nominate up to two male and two female students per year. Departments that do not grant Ph.D.s in one of the computing fields may nominate one male and one female student per year.

There will be up to one female and one male winner from Ph.D.-granting departments and up to one female and one male winner from non-Ph.D.-granting departments.

A small number of other outstanding candidates will be recognized as runners-up and finalists. All nominees whose work is considered to be exemplary will be recognized as honorable mentions. Each of the four winning awardees will receive financial assistance of up to \$1,500 to attend a research conference of their choice. The winners, runners-up, finalists, and honorable mentions will also receive appropriate recognition.

Everything you need to nominate a candidate, including detailed instructions and the nomination form, is available at: <http://cra.org/crae/awards/cra-outstanding-undergraduate-researchers/>.

Questions and inquiries about the awards should be sent to: undergradawards@cra.org. The deadline for nominations is Monday, October 24, 2016.

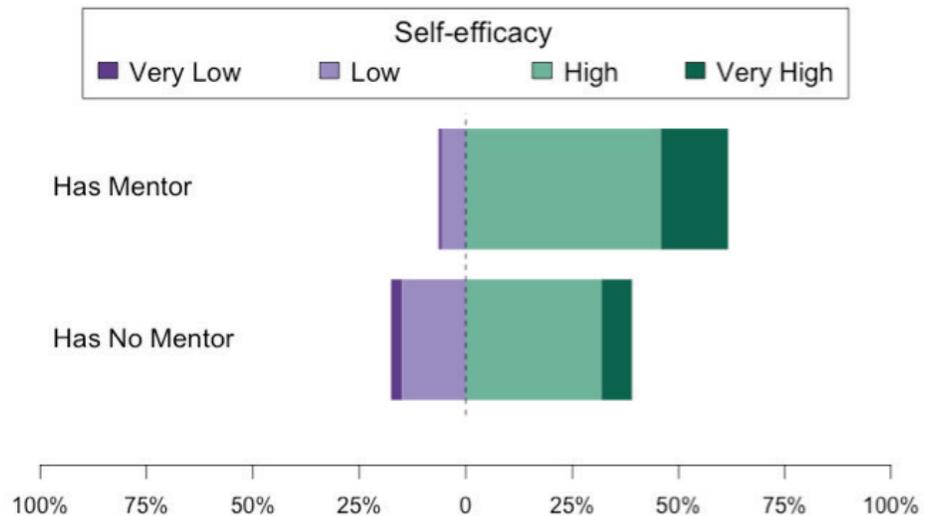
Microsoft Research and Mitsubishi Electric Research Labs (MERL) sponsor the Outstanding Undergraduate Researchers Award Program in alternate years. The 2017 award is being sponsored by Microsoft Research.

Please share this award information with your faculty who may have promising students to nominate.

Graduate Students Without Versus With a Mentor Report Lower Self-Efficacy

By Burçin Tamer, CERP research scientist

While almost all computing graduate students have advisors, recent CERP data indicate many of those students do not have a mentor. Specifically, 17% of a sample of graduate students enrolled in computing programs (sample N = 2,617) indicated they did not “have a mentor with whom [they] have an ongoing relationship, and who provides [them] advice and assistance in advancing in [their] career.” This graphic presents evidence for a potential implication of not having a trusted mentor as a graduate student: relatively low self-efficacy.



Self-efficacy refers to beliefs about one’s ability to plan for and execute steps necessary for future success. Indeed, the current analysis indicates students without a mentor report lower self-efficacy in their computing career track than students with a mentor, $p \leq .001$.

Notes. 2,617 graduate students from universities across the U.S. responded to CERP’s Fall 2015 Graduate Student Survey, and indicated whether or not they had a mentor through the following question: *A mentor is someone with whom you have an ongoing relationship, and who provides you advice and assistance in advancing in your career. Among the people below, who do you consider to be a mentor?* Response options included the following: *A professor within my department (not my advisor), My advisor, A professor at my college/university who is outside of my department, An individual I met through a formal mentoring program sponsored by an outside organization, Someone else, No one.*

The following five items were used to calculate a composite measure of self-efficacy (Cronbach’s alpha = .83): *I am confident that I can... become an expert in my field, complete my department’s milestones towards earning my degree in a timely manner, publish in the top journals in my field, discuss theory with senior members of your field, articulate thoughtful answers to theoretical questions about your work during a presentation* using the following 5-point Likert scale: (1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, (5) strongly agree. Labels in the graphic above correspond to scale labels in the following way: Very low = strongly disagree; Low = disagree; High = agree; Very high = strongly agree. Students who responded “neither agree nor disagree” were not included in the graphic above but were included while calculating the percentages.

The differences illustrated in the graph were tested using an independent samples t-test. The mean level of self-efficacy for students who had a mentor was 4.03, and the mean for those who did not have a mentor was 3.63. These averages were significantly different, $t(628.88) = -9.68, p \leq .001$. Note that the variances of the two groups were significantly different ($F(1,2615) = 6.43, p = .01$). As such, we report results for the independent samples t-tests, which does not assume homogeneity of variance.



CERP
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This infographic is brought to you by the CRA’s Center for Evaluating the Research Pipeline (CERP). CERP provides social science research and comparative evaluation for the computing community. To learn more about CERP, visit our website at <http://cra.org/cerp/>.

Computing, Cognition, and the Future of Knowing: How Humans and Machines are Forging a New Age of Understanding

By John E. Kelly III, Ph.D., senior vice president, IBM Research and Solutions Portfolio

IBM Research is a Lab and Center member of CRA. This article is the first in a series of our industry member profiles.

IBM Research



It's not surprising that the public's imagination has been ignited by artificial intelligence since the term was first coined in 1955. In the ensuing 60 years, we have been alternately captivated by its promise, wary of its potential for abuse, and frustrated by its sometimes slow development.

But like so many advanced technologies that were conceived before their time, artificial intelligence has come to be widely misunderstood—co-opted by Hollywood, mischaracterized by the media, and portrayed as everything from savior to scourge of humanity. Those of us engaged in serious information science and in its application in the real world of business and society understand the enormous potential of intelligent systems.

The future of this technology—which we believe will be cognitive, not “artificial”—has very different characteristics from those generally attributed to AI, spawning different types of technological, scientific, and societal challenges and opportunities, with different requirements for governance, policy, and management.

Cognitive computing refers to systems that learn at scale, reason with purpose, and naturally interact with humans. Rather than being explicitly programmed, these systems learn and reason from their interactions with us and from their experiences with their environment. They are made possible by advances in a number of scientific fields over the past half-century, and are different in important ways from the information systems that preceded them.

Those systems were deterministic; cognitive systems are probabilistic. They generate not just answers to numerical problems, but hypotheses, reasoned arguments, and recommendations about more complex—and meaningful—bodies of data.

What's more, cognitive systems can make sense of the 80 percent of the world's data that computer scientists call “unstructured.” This enables them to keep pace with the volume, complexity, and unpredictability of information and systems in today's world.

None of this involves either sentience or autonomy on the part of machines. Rather, it consists of augmenting the human ability to understand—and act upon—the complex systems of our society. This augmented intelligence is the necessary next step in our ability to harness technology in the pursuit of knowledge, to further our expertise, and to improve the human condition. That is why it represents not just a new technology, but the dawn of a new era of technology, business, and society: the Cognitive Era.

The success of cognitive computing will not be measured by a Turing test or a computer's ability to mimic human behavior. It will be measured in more practical ways, like return on investment, discovering new market opportunities, curing diseases, and saving human lives.

Here at IBM, we have been working on the foundations of cognitive computing technology for decades, combining more than a dozen disciplines of advanced computer science with 100 years of business expertise.

We are now seeing firsthand its potential to transform business, government, and society. We have seen it turn big data from an obstacle to an opportunity, help physicians make early diagnoses for childhood diseases, and suggest creative solutions for building smarter cities. And we believe that this technology represents our best—perhaps our only—chance to help tackle some of the most enduring systemic issues confronting our planet, including cancer, climate change, and an increasingly complex global economy.

The World's First Cognitive System

In February 2011, the world was introduced to Watson, IBM's cognitive computing system, which defeated Ken Jennings and Brad Rutter at "Jeopardy!"

It was the first widely seen demonstration of cognitive computing, and it marked the end of the so-called AI winter. The programmable systems that had revolutionized life over the previous six decades could not have made sense of the messy, unstructured data required to play "Jeopardy!"

Watson's ability to answer subtle, complex, and pun-laden questions made it clear that a new era of computing had arrived. Since "Jeopardy!," Watson has tackled increasingly complex data sets and developed understanding, reasoning, and learning that go far beyond deciphering information. Indeed, the goal of cognitive computing is to illuminate aspects of our world that were previously invisible—in particular, patterns and insights in unstructured data—allowing us to make more informed decisions about more consequential matters.

The true potential of the Cognitive Era will be realized by combining the data analytics and statistical reasoning of machines with uniquely human qualities, such as self-directed goals, common sense, and ethical values.

This is what Watson was built to do and, in fact, is already doing. For example, banks are analyzing customer requests and financial data to realize insights to help them make investment recommendations.

Companies in heavily regulated industries are querying Watson to keep up with ever-changing legislation and standards of compliance. And oncologists are testing ways in which cognitive systems can help interpret cancer patients' clinical information and identify individualized, evidence-based treatment options that leverage specialists' knowledge and experience.

Implications and Obligations for the Advance of Cognitive Science

The Cognitive Era is the next step in the application of science to understand nature and improve the human condition. In that sense, it is a new chapter of a familiar story, and the controversy surrounding artificial intelligence is merely the latest example of the age-old debate between those

who believe in progress and those who fear it. Within the scientific community—as opposed to the media and popular entertainment—the verdict is in. There is broad agreement on the importance of pursuing a cognitive future, along with recognition of the need to develop the technology responsibly.

Specifically, we must continue to shape the effect of cognitive computing on work and employment. Like all technologies, cognitive computing will change how people work. It will help us perform some tasks faster and more accurately. It will make many processes cheaper and more efficient. It will also do some things better than humans, which has been the case since the dawn of civilization.

What has always happened is that higher value is found in new skills, and humans and our institutions learn to adapt and evolve. There is no reason to believe it will be different this time. Indeed, given the exponential growth in knowledge, discovery, and opportunity opened up by the Cognitive Era, there is every reason to believe that the work of humans will become ever-more interesting, challenging, and valuable.

About the Author

As IBM senior vice president, Cognitive Solutions and IBM Research, Dr. John E. Kelly III is focused on the company's investments in several of the fastest-growing and most strategic parts of the information technology market. His portfolio includes IBM Analytics, IBM Commerce, IBM Security and IBM Watson, as well as IBM Research and the company's Intellectual Property team. He also oversees the development of units devoted to serving clients in specific industries, beginning with the April 2015 launch of IBM Watson Health.

About IBM Research

IBM Research is comprised of more than 3,000 researchers, with 13 labs located in six continents. Scientists from IBM Research have been recognized with six Nobel Prizes, 10 U.S. National Medals of Technology, five U.S. National Medals of Science, six Turing Awards, 19 inductions in the National Academy of Sciences, and 20 inductions into the U.S. National Inventors Hall of Fame. For more information about IBM Research, visit www.ibm.com/research.

Expanding the Pipeline: The National GEM Consortium Shines a Bright Light on Graduate Education and Retention

By Patty Lopez and Shameeka Emanuel, Intel Corporation



THE NATIONAL GEM CONSORTIUM

SCIENCE, TECHNOLOGY, ENGINEERING
AND MATH GRADUATE FELLOWSHIPS
M.S. Engineering | Ph.D. Engineering | Ph.D. Science

About the National GEM Consortium (@GEMFellowship)

GEM is a network of leading corporations, government laboratories, universities, and research institutions

that enables qualified students from underrepresented communities to pursue graduate education in applied science and engineering. Its mission is to enhance the value of the nation's human capital by increasing the participation of underrepresented groups—namely, African Americans, Native Americans, and Hispanic Americans—at the master's and doctoral levels in engineering and science. GEM recruits high-quality underrepresented students seeking to pursue advanced degrees in applied science and engineering, and matches their specific skills to the specific technical needs of GEM employer members. The average GPA of GEM students exceeds 3.5, and more than 80 percent of students accept full-time offers from sponsoring employers. Founded in 1976 at the University of Notre Dame, GEM has graduated more than 4,000 researchers, professors, entrepreneurs, inventors, and business leaders, including more than 400 individuals with doctorates in the physical sciences, life sciences, and engineering.

GEM's signature [GEM GRAD Labs](#) workshops encourage students to pursue graduate school and are held at partner universities across the country. The [GEM fellowship program](#) provides fellows with full tuition, fees, and an annual stipend. The window to [apply for GEM fellowships](#) runs from July 1 to November 15 each year. Click [here](#) to view upcoming events.

Get Involved

Please encourage undergraduate students to visit a GEM GRAD Lab in their area, consider hosting an event on your campus, or join GEM as an industry employer. The National GEM Consortium was able to fund only 150 GEM Fellows this year, which left more than 800 highly qualified applicants without funding. Your

support and advocacy for these students is critical to creating a talented, diverse, and inclusive workforce to meet 21st century challenges.

2016 GEM Conference

The 40th Annual GEM Conference (hashtag #GEM40) was held in Miami Beach, Fla., from August 3-5, and was a resounding success, with more than 300 attendees. The conference is a prestigious forum for stimulating debate on bold solutions to advance graduate education, and it creates a platform to raise nationwide awareness of GEM's mission, partners, and fellows. This is the "must-attend" event for those who want to transform how the U.S. educates and prepares engineering and science talent for advanced leadership careers, particularly among our nation's native-born, historically underrepresented ethnic groups.

The conference provided a tailored set of tracks for attendees and a technical presentation competition and poster session for students. The [University of Florida](#), [Florida International University](#), and [University of South Florida](#), all of which [GEM University are sponsors](#), shared their impressive statistics on the production of B.S., M.S., and Ph.D. degrees. Host Eric Evans, director of MIT's Lincoln Laboratory, shared his intern cohort success and commitment to its continuation, and showed an entertaining video featuring GEM interns in [Carpool Karaoke](#).



The breakfast plenary, sponsored by Georgia Institute of Technology, featured a panel of distinguished Georgia Tech GEM alumni. Moderated by Georgia Tech's Dean of Engineering, Gary May, panelists included Johney Green Jr., National Renewable Energy Laboratory; LeShelle May, CNN; and Linda Jordan, a financial services executive, all of who shared insights about their career paths and the importance of the GEM program as foundational to their professional success. The lunch plenary, "Breaking the Glass Ceiling: Women in Senior Technical Roles," featured a "keep it real" session with leaders from Intel, GEM's largest employer sponsor. Barbara Whye served as moderator and the panelists included Lakecia Gunter, Joan Tafoya, and Patty Lopez.



Among the conference highlights was a "The Importance of Mentoring" workshop by Howard Adams, GEM program consultant and founding executive director. Adams shared stories about his humble background, his work ethic, how he found mentors, why one needs different types of mentors, what a STEM career can offer, various life lessons, and advice for realizing your potential. His comments included, for example: "If you think math is hard, try paying your bills without any money. That's hard! Ask yourself: How am I using my time? Where am I using my energy? What return am I getting on my effort?" For Ph.D. students



who were in their final, exhausting year, he said, "You can't be tired getting a Ph.D. Look at me—I'm 76 years old!" A student from the back of the room shouted, "You look good!" and the room erupted with laughter.

The conference featured a gala dinner, which provided a history of GEM from 1976 to the present day. The gala dessert reception and after party with MCs and a community-based drum squad

was followed by dancing. GEM honored departing CEO and executive director Michele Lezama for her years of dedicated service with a framed photograph of Martin Luther King, Jr.

About the Authors

Patty Lopez, Ph.D., is a senior platform applications engineer at Intel Corporation, working with customers to deliver Xeon server chip solutions that power high-end data centers and mission-critical applications. Prior to joining Intel in 2008, she spent 19 years as an imaging scientist for Hewlett-Packard, creating and transferring technology in imaging into scanner, camera, and all-in-one products. Lopez has released more than 50 products and holds seven imaging patents. She earned her B.S. (with honors), M.S., and Ph.D. in computer science from New Mexico State University. Her research interests include CS education, e-textiles, and wearable computing. Lopez is

also the column editor for Expanding the Pipeline in *Computing Research News*.

Shameeka Emanuel's career spans 11 years at Intel Corporation. After completing her B.S. degree in systems and computer science at Howard University and her M.S. in computer engineering from North Carolina State University where she was selected as an Intel MS GEM Fellow, Emanuel joined the company. She spent most of her career within Intel's server design group where she worked to validate four processors in the Xeon product family. Currently, she is the diversity scholar program manager where she is responsible for driving diversity technical pipeline program strategies and maintaining relationships in the communities with organizations chartered and/or focused on developing and growing diverse technical talent.

Carnegie Mellon University sponsored the technical presentation and poster competition, and recognized the winners during the closing awards ceremony. The winners, along with their institution and GEM employer sponsor, are listed below:

Master's and 1st Year Ph.D.-Level Students:

1st Place: **Adrienne Sands**, 2015 GEM Ph.D. Fellow, University of Minnesota, Adobe Systems, Inc.

2nd Place: **Tenell Rhodes, Jr.**, 2015 GEM M.S. Fellow, Drexel University, Adobe Systems, Inc.

3rd Place (Tie): **Abisola Kusimo**, 2016 GEM M.S. Fellow, Stanford University, Oak Ridge National Laboratory, and **Dominic Bednar**, 2015 GEM M.S. Fellow, University of Michigan, Oak Ridge National Laboratory

2nd Year and Beyond Ph.D.-Level Students

1st Place: **Stefany Holguin**, Ph.D. student, Georgia Institute of Technology

2nd Place: **Adewale Odukumaiya**, 2013 GEM M.S. Fellow, current Ph.D. student, Georgia Institute of Technology, Oak Ridge National Laboratory

3rd Place: **Loretta Cheeks**, 2013 GEM Ph.D. Fellow, Arizona State University, Adobe Systems Inc.

Poster Competition Winner: **David Garcia**, 2015 GEM Associate Ph.D. Fellow, University of Tennessee-Knoxville

The conference featured the following tracks:

- ▶ **University track:** The nuts and bolts of naming, selecting, and funding GEM Associate and University Fellows, recruiting best practices through GRAD Lab, and other opportunities
- ▶ **Employer track:** Sponsorship structure for GEM Fellows, optimizing the selection process, networking session with GEM employers
- ▶ **Alumni track:** Speaker bureau training (presence and testimony to foster the next generation), how to conduct mock interviews, and the importance of mentoring
- ▶ **Undergraduate track:** GRAD Lab: Students learn why they should choose graduate school, how to apply, and how to fund it
- ▶ **Graduate (M.S. & Ph.D.) track:** Degree-specific best practices for preparing for academia or industry, networking for career success, bouncing back from setbacks, and a discussion of the unspoken rules of being a Ph.D. student

Whistling Past the Graveyard: What the End of Moore's Law Means to All of Computing

By Tom Conte, Georgia Tech



Tom Conte of Georgia Tech and Margaret Martonosi of Princeton, the two chairs of the "Whistling Past the Graveyard: Why the End of Moore's Law Matters to All of CS" panel at the 2016 CRA Conference at Snowbird.

Is "Moore's Law" ending? If so, what does this mean to all of us in the field of computing? These questions were discussed at a July 2016 panel at the [Computing Research Association's Conference at Snowbird](#) organized by Conte and [Margaret Martonosi of Princeton](#). The panel included a technologist ([Paolo Gargini, Intel fellow-emeritus](#)), three computer architects ([David Brooks of Harvard](#), [Mark D. Hill of Wisconsin-Madison](#), and [Tom Conte of Georgia Tech](#)), and a quantum computer scientist ([Krysta Svore of Microsoft Research](#)).

Is "Moore's Law" ending? The answer depends on what you think Moore's Law means. First, if Moore's Law means, as the popular press suggests, that "computer performance doubles every 18 months," then yes it has ended. Second, if it means that, "the economics are such that the number of transistors on an integrated circuit for a given cost can double about every two years," then Moore's Law is alive, but there are power issues with using all of the transistors. Third, if Moore's Law allows vertical scaling—as done in FLASH—then Gargini, especially, is optimistic about Moore's Law.

If so, what does this mean to all of us in the field of computing? Surprisingly given so many experts in disparate fields, there was a consensus: the way we compute needs to change fundamentally if we want computing performance to continue its historic exponential growth. Moreover, unlike

in the past where the changes could be hidden behind the scenes by architects, the changes coming will ripple throughout all of computing: from algorithms, to systems, to programming languages, on down through architecture to electron device selection.

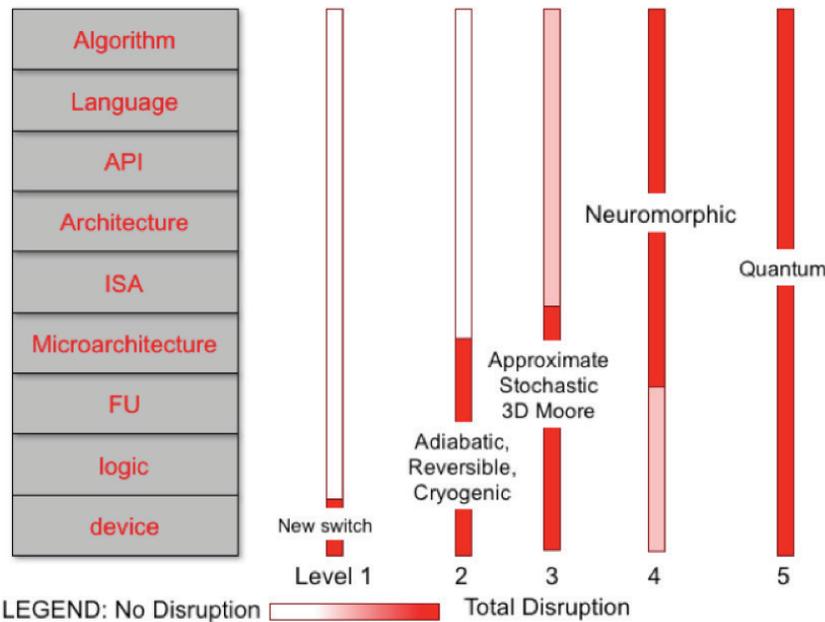
What might this "brave new world" look like? Krysta Svore presented how quantum computing is becoming practical. She estimated within the decade we will have enough qubits to solve important problems that we cannot solve today using these devices. Meanwhile, [Microsoft Research has created tools](#) that we can use today to program these systems of tomorrow.

[David Brooks](#) noted that in today's smartphones we use [fixed-function units to overcome the power limitations of the underlying technology](#). For example, we have specialized, non-programmable hardware units that perform one task—codecs, modems, etc.—more efficiently than any programmable solution could. When you cut out programmability, you remove the wasted power needed to fetch and decode a program's instructions.

[Mark D. Hill](#) reminded the audience of the [1000-fold \(cost\) performance gains from 1980-2000 that were done a manner hidden from software](#). He argued that another 1000-fold is in progress 2000-2020 but that this is software-visible via multi-core, heterogeneity, and (data center) clusters. These performance gains mattered—not to make word processing faster—but to facilitate new techniques like deep learning. To the extent that future applications TBD require more (cost) performance, it will require more cooperation up and down the software-hardware stack enable great efficiency, at least until radically new technology becomes available.

[Tom Conte](#) made the point that [some solutions on the horizon will cause massive disruption in the layers of abstraction of the computing stack](#). Others, however, will not. He presented the following to illustrate his point:

Differing Levels of Disruption in Computing Stack



[Click to enlarge and see full presentation.](#)

The new switch of level 1 doesn't appear to be possible because of the limitations expressed by Gargini. Levels 2-5 require disruptions at varying degrees. Quantum, for example, disrupts everything from algorithms on down. Neuromorphic computing currently runs on CPUs and GPUs, but it does so highly inefficiently. Google's AlphaGo example had a GPU/CPU cluster beating a human master at Go 4 out of 5 times. But the cluster consumed 1.2 kilowatts compared to the 10's of

watts consumed by the human brain of its opponent. True neuromorphic needs to run on "native hardware," hardware that will likely be made from analog circuitry rather than digital.

What is the future of computing? It is going to be significantly different from today. All of computer science and engineering needs to react to these changes now. There is much research to do, of course. But more pressing is how do we educate students today on computing when the fundamentals of the field are changing so rapidly?

Finding a Role for Your Department in the Computer Science for All Initiative

By Jan Cuny and Gera Jochum, Directorate for Computer and Information Science and Engineering, National Science Foundation



This year, a national initiative called [Computer Science for All \(CS for All\)](#) was announced in the [President's weekly address](#), drawing national attention to CS education. President Obama launched the effort on January 30, 2016. The initiative, led by the

[National Science Foundation \(NSF\)](#) and the [U.S. Department of Education \(ED\)](#) in partnership with other federal agencies and private partners, aims to ensure CS education is available to *all* K-12 students across the U.S.

CS for All has gained tremendous momentum, and it was the subject of many conversations at the [2016 CRA Conference at Snowbird](#). A [session](#) on Tuesday evening provided the opportunity to talk with faculty from leading computing departments about ways their departments are supporting

CS for All. Topics included research on CS education, involving undergraduates in K-12 CS learning projects, collaborating with education departments and schools, catalyzing state partnerships by working across districts to create CS education pathways, supporting the new Advanced Placement® CS Principles course, and grant opportunities to prototype professional development for regional teachers and broadening participation across the pipeline. Departments were given the chance to add their names to a public list of university and college departments that intend to take action to support K-12 CS for All. More than 70 departments have signed on so far.

There's a role for every department! We hope that you find ways to get *your* department involved to help make high-quality CS education available to all K-12 students across the country.



Announcements

CRA Welcomes Visa Research as its Newest Industry Member



VISA
Research

Visa Research has recently joined CRA as one of its Lab and Center Members. Visa Research Labs is Visa's expanded technology research division and is led by Min Wang, a CRA board member.

Martonosi named Cornell's Andrew D. White Professor-at-Large



CRA board member Margaret Martonosi has been appointed one of Cornell University's Andrew D. White Professors-at-Large. Named in honor of their first President who originated the idea, Cornell established this office of non-resident professor in 1965 in celebration of their centenary. The title Andrew D. White Professor-at-Large is bestowed upon up to twenty individuals, "from both America and abroad, who have achieved high international distinction in the various areas of science and scholarship as well as in the learned professions, public affairs, literature, and the creative arts." During their term, the individuals will visit the campus "to enliven the intellectual and cultural life of the university." Martonosi will hold this honorary, visiting professorship at Cornell while maintaining her position at Princeton.

National Science Foundation Awards



The National Science Foundation is currently accepting nominations for two prestigious awards. Consider nominating an individual from your department today! The **Alan Waterman Award** recognizes an outstanding young researcher in any field of science or engineering supported by NSF. The **Vannevar Bush Award** honors truly exceptional lifelong leaders in science and technology who have made substantial contributions to the welfare of the Nation through public service activities in science, technology, and public policy.

Alan Waterman Award Details

Nomination Form: <https://www.fastlane.nsf.gov/honawards/>
Application Deadline: October 21, 2016

Award: In addition to a medal, the awardee receives a grant of \$1,000,000 over a five year period for scientific research or advanced study in the mathematical, physical, biological, engineering, social, or other sciences at the institution of the recipient's choice.

For more information: please see the Waterman Award fact sheet, prepared by the NSF Office of Legislative and Public Affairs: https://www.nsf.gov/news/news_summ.jsp?cntn_id=102999

Vannevar Bush Award Details

Nomination Form: <https://www.fastlane.nsf.gov/honawards/>
Application Deadline: October 3, 2016



ACM Athena Lecturer Award Accepting Nominations

The ACM Athena Lecturer Award celebrates female researchers who have made fundamental contributions to computer science. Each year ACM honors a preeminent female computer scientist as the Athena Lecturer. The recipient gives an invited talk at a major ACM conference of her choice. A video of the talk is made available on the ACM website. The award carries a cash prize of \$25,000. Financial support for the Athena Lecturer Award is provided by Google.

Two CCC council members have received the award in recent years: Jennifer Rexford of Princeton University (2016) and Katherine Yelick of the Lawrence Berkeley National Laboratory (2013). Additionally, CRA-W board member Mary Jane Irwin of Penn State University (2010) also received the award. To date, 11 awards have been given: <http://awards.acm.org/athena/all.cfm>.

This year, the Athena Lecture Award moves from being an ACM-W award to being an ACM award, operating under the guidelines and structure of other ACM Awards. Most importantly, the nomination deadline is now **November 30** and nominations must be submitted through the standard online nominating form for all ACM awards. **Click here to submit a nomination.**

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ACM-W supports, celebrates, and advocates internationally for the full engagement of women in all aspects of the computing field.



Association for
Computing Machinery

women.acm.org



Be Creative. Stay connected. Keep inventing.

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Column Editor

Expanding the Pipeline
Patty Lopez, Intel

Professional Opportunities

Cal Poly, San Luis Obispo

Tenure-Track Position - Cybersecurity

The Computer Science Department at Cal Poly, San Luis Obispo, invites applications for a full-time, tenure-track Computer Science faculty position at the Assistant or Associate Professor rank beginning as soon as 4/3/2017 but no later than 9/7/2017. Rank and salary are commensurate with qualifications and experience. Qualified candidates with industry experience are encouraged to apply. This position, sponsored for the first three years by Northrop Grumman Corporation, will be named the Northrop Grumman Professorship for the duration of the funding. Duties include teaching undergraduate and master's level courses, enriching the curricula with new courses in computer security, conducting research, and providing service to the department, the university, and the community. A doctorate in Computer Science, Computer Engineering, Software Engineering or a closely related field is required. Particular areas of interest include: software security, malware analysis, mobile security and web security.

Cal Poly emphasizes Learn by Doing which involves extensive lab work and projects in support of theoretical knowledge. To this end, the Computer Science and Software Engineering Department maintains an array of modern computing facilities and specialized labs for instructional and faculty support. In particular, Cal Poly supports two cutting-edge laboratories dedicated to teaching and conducting research in computer security. In addition, a university-wide Center for Cybersecurity has been established for the continued development of the university's capabilities in cybersecurity research and education. A new cybersecurity training facility to be located at Camp San Luis Obispo is in development, which operates under the auspices of the California National Guard. Cal

Poly will serve as a partner in the upcoming facility, and collaborative efforts from computer science faculty will be desirable.

Cal Poly's Computer Science Department offers Bachelor's Degrees in Computer Science, Software Engineering, and Master's Degrees in Computer Science. Also, the Computer Science and the Electrical Engineering departments jointly offer a B.S. degree in Computer Engineering. U.S. News & World Report ranks the Computer Science Department among one of the top primarily undergraduate public programs in the nation. For further information about the department, visit csc.calpoly.edu

For full details, qualifications and application instructions (online faculty application required) visit www.calpolyjobs.org/applicants/Central?quickFind=165382.

Review Begin Date: October 3, 2016.

Cal Poly College

Assistant/Associate Professor in Computer Graphics

The Computer Science and Software Engineering Department within the College of Engineering at Cal Poly State University, San Luis Obispo, CA invites applications for a full-time, academic year, tenure-track Computer Science faculty appointment in the area of computer graphics and animation, at a rank and salary commensurate with the applicant's background and experience. Particular areas of interest include: computer graphics, interactive media, animation, and data visualization. The anticipated start date is September 7, 2017.

Duties include teaching undergraduate and master's level courses in the areas of computer graphics and animation, pursuing research in these areas, and providing service to the department, the university, and the community. A doctorate

in Computer Science, Software Engineering, or a closely related field is required. Candidates who can contribute teaching and research in computer graphics and interactive entertainment (i.e. game development, animation and effects, virtual reality, or creative computation, etc.), are encouraged to apply.

For full details, qualifications and application instructions (online faculty application required), visit www.calpolyjobs.org/applicants/Central?quickFind=165455

Review Begin Date: January 2, 2017. EEO.

Cal Poly State University

Assistant or Associate Professor - Software Engineering

The Computer Science and Software Engineering Department within the College of Engineering at Cal Poly State University, San Luis Obispo, CA invites applications for two full-time, academic year, tenure-track Software Engineering faculty positions, at a rank and salary commensurate with the applicant's background and experience. The anticipated start date is September 7, 2017. Candidates with industry experience are encouraged to apply. Duties include teaching undergraduate and master's level courses, supporting and expanding curricular development in Software Engineering, pursuing research in this area, and providing service to the department, the university, and the community. Strategic priorities of the department include the areas of: Mobile, Web and Cloud Computing, Applied Formal Methods, and Software Testing.

For full details, qualifications and application instructions (online faculty application required), visit:

<https://www.calpolyjobs.org/applicants/Central?quickFind=165513>

Review will begin January 2, 2017 and will continue until the positions are filled. EEO.

Professional Opportunities

Dartmouth College

Neukom Fellows: Call for Applications

The Neukom Institute for Computational Science at Dartmouth College is pleased to announce the Neukom Postdoctoral Fellows competition for positions starting September 1, 2017.

Neukom Fellows are interdisciplinary positions for recent Ph.D.s, DMAs, or MFAs whose research interests or practice cuts across traditional disciplinary boundaries, and has a strong computational theme. The successful candidate should have a history of collaborative work across disciplines, but still show good evidence of independence and initiative. Current and previous Fellows have research interests that span the sciences, social sciences, arts and humanities. The Fellowships are two- to three-year appointments with third year extensions considered upon request after a review early in year two. Fellows are mentored by faculty in two departments at Dartmouth College, take up residence in one department, and will teach one course each year on a subject of their interest. Beyond that there are no additional duties. Stipends are \$60,000 for 2017-2018. Additional funds are available for equipment, travel, and research materials.

For a list of current Neukom Fellows: http://neukom.dartmouth.edu/programs/neukom_fellows.html

For a full job description and to apply, go here: <https://academicjobsonline.org/ajo/jobs/7569>

For more information on The Neukom Institute: <http://neukom.dartmouth.edu/>

The Neukom Fellows Program and the Neukom Institute are made possible by a generous gift from Mr. William H. Neukom, Dartmouth College Class of 1964.

DePaul University

Postdoctoral Research Associate-Data Management/Databases

The Data Systems and Optimization Lab (DSL) in the School of Computing, College of Computing and Digital Media at DePaul University is looking for talented and motivated postdoctoral fellows to become part of our team working on exciting science research projects. Researchers in databases, high performance computing or any relevant data and computational science discipline, and who have received their Ph.D. within the last three years

are encouraged to apply. The successful applicant will receive a competitive salary, commensurate with Chicago area, and excellent benefits. The position is for up to three years beginning October 1st, 2016.

This post-doctoral position will be in the broad areas of graph data management, data provenance/lineage, and scientific data management. The objective will be to create new ways of capturing, tracking and making understandable large-scale, distributed scientific experiments. Focus will be on scientific experiments that employ finite-element models, large-scale distributed/high



SCHOOL OF INFORMATICS AND COMPUTING

INDIANA UNIVERSITY
Bloomington

Intelligent Systems Engineering Department Director of Curriculum and Instruction

The School of Informatics and Computing at Indiana University Bloomington invites applications for a non-tenure track Director of Curriculum and Instruction, who will report to the chair of the Department of Intelligent Systems Engineering and to begin as early as August 2016. The Director's primary responsibilities are two-fold: 1) course preparation and 2) curriculum and instruction management.

The Director of Curriculum and Instruction's primary role is to provide support for the vision and direction for the Intelligent Systems Engineering (ISE) department consistent with the University's mission under the leadership of the Department Chair and Faculty of the School of Informatics and Computing. Working collaboratively in a participative environment, the Director of Curriculum and Instruction provides academic leadership, faculty support, planning, coordination and guidance to the department's curriculum. This position works to support an environment conducive to effective teaching and scholarly achievement. Reports directly to the Department Chair of Intelligent Systems Engineering. Salary will be commensurate with qualifications and experience.

Education Requirements: Master's degree, required; Doctoral degree, preferred

In addition to education requirements, this position requires the following:

- Excellent analytical, quantitative, verbal and written communication skills;
- Ability to collaborate well with students, faculty and institutional leadership;
- Strong project management skills;
- Ability to identify and successfully engage appropriate stakeholders; and
- Attention to detail and timelines.
- Interest in online education.
- Experience in engineering or related curriculum/teaching.

Interested candidates should submit a letter of application, a current CV, and names and contact information for three references using the submissions link at: <http://indiana.peopleadmin.com/postings/2470>

For full consideration completed applications must be received by July 6, 2016. The search will remain open until the positions are filled.

Questions may be sent to [hiring@soic.indiana.edu](mailto: hiring@soic.indiana.edu) or by mail to ISE Curriculum and Instruction Search 901 E 10th Street, Bloomington, IN 47408.

Indiana University is an equal employment and affirmative action employer and a provider of ADA services. All qualified applicants will receive consideration for employment without regard to age, ethnicity, color, race, religion, sex, sexual orientation or identity, national origin, disability status or protected veteran status.

Professional Opportunities

performance computing infrastructure, and are in general challenging to reproduce. A multi-disciplinary advisory team will guide the project, offering advice, facilities, and potential opportunities for travel, training, and dissemination.

The [Data Systems and Optimization Lab \(DSL\)](#) performs innovative research in data management and organization, scientific computing, and database forensics. Current research projects are in the areas of cloud computing, provenance data management, data storage visualization, geospatial

poly-stores and poly-indexing, performance optimization, and benchmarking and performance modeling. More details on projects can be found on the website.

The Chicago metropolitan area provides a diverse and exciting environment. The local economy is vigorous, with international stature in banking, trade, commerce, manufacturing, and transportation, while the cultural scene includes diverse cultures, vibrant theater, world-renowned symphony, opera, jazz and blues. The College of Computing and Digital Media is

located in the Loop, in the heart of the city.

To apply please email your CV and a Research Statement to dbgroup@cdm.depaul.edu.

Knox College

Assistant Professor of Computer Science

Knox College invites applications for a tenure-track Assistant Professor in Computer Science beginning Fall 2017. Ph.D. preferred; master's degree or equivalent experience required. The successful candidate should be able to teach a broad spectrum of courses across the ACM/IEEE CS curriculum; six courses per year teaching load.

Candidates in all areas of specialization are welcome, but we are especially interested in HCI, software development, CS education, security, or computational science. Interest in undergraduate student/faculty research is highly desirable, as is an interest in interdisciplinary collaborations.

Computer Science at Knox is a dynamic, growing program, with an orientation that combines rigorous foundations with experiential education, student research, and collaboration with other departments. Our students engage in a very high level of undergraduate research, internship projects, and application development with faculty. We are very active in the SIGCSE community and many of our courses use Peer Instruction, a research-based active learning pedagogy, including StartUp Term, an immersive experience that combines business, entrepreneurship, and computer science. For more information on the Computer Science Department, see <http://cs.knox.edu>.

Computer Science is an increasingly prominent department, with 100 students enrolling in the introduction computer science course each year. Located in Galesburg, IL, Knox is a highly-selective, top-100 national liberal arts college of 1,400 diverse students, including 30%



**SCHOOL OF INFORMATICS
AND COMPUTING**
INDIANA UNIVERSITY
Bloomington

**Intelligent Systems Engineering Department
Director of Programs**

The School of Informatics and Computing at Indiana University Bloomington invites applications for a non-tenure track Director of Programs position in the Intelligent Systems Engineering department to begin as early as August 2016.

The Director of Programs' primary role is to provide strategic leadership for the Intelligent Systems Engineering (ISE) department and Digital Science Center (DSC) within the School of Informatics and Computing (SOIC) with respect to collaboration both within the university (IUB) and with external institutions. A key goal is to identify, pursue, and manage grants that fit the strategic plan for ISE and DSC. These collaborations would involve working with ISE, DSC, and other faculty and supervisors to identify opportunities and then a variety of outreach activities using in-person and virtual meetings. Leadership of proposal preparation and report writing is required. Experience in state of the art research needed to be able to interact as peer with collaborators. Salary will be commensurate with qualifications and experience.

Specific duties of the Director of Programs include:

- ☐ 70% Grant Development: Grant development, writing, and management for Intelligent Systems Engineering and the Digital Science Center. Lead the writing of new grants to state, federal, and international granting agencies to obtain funding for collaborations identified in activities described above. Monitor and evaluate these grants and the processes of both successful and unsuccessful grant applications.
- ☐ 30% Strategic Planning: Assist Department Chair and other ISE leadership with the development and implementation of a strategic plan, including setting and achieving specific priorities, objectives, and action items. Assist with the recruitment, appointment, and transition of new faculty scholars into ISE.

Candidates should possess a graduate degree (before August 2016) in Computer Science, Informatics, Information Science, or a related discipline, and must have two academic years' experience (may be part-time).

Interested candidates should submit a letter of application, a current CV, and names and contact information for three references using the submissions link at: <http://indiana.peopleadmin.com/postings/2436>

For full consideration completed applications must be received by July 6, 2016. The search will remain open until the positions are filled.

Questions may be sent to hire@soic.indiana.edu or by mail to Julie Overfield, 901 E 10th Street, Bloomington, IN 47408.

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Professional Opportunities



**SCHOOL OF INFORMATICS
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INDIANA UNIVERSITY
Bloomington

Lecturer Positions in Intelligent Systems Engineering

The School of Informatics and Computing at Indiana University, Bloomington invites applications for non-tenure track lecturer positions in Intelligent Systems Engineering to begin as early as August 2016.

We are particularly interested in candidates who can prepare and deliver the courses needed in the following areas: Computer Engineering, Cyber-physical Systems, Nanoengineering, Neuroengineering, Environmental Engineering and Bioengineering

In addition to teaching responsibilities, lecturers will be expected to participate in course preparation in collaboration with faculty and the Intelligent Systems Engineering Department Chair.

Lecturers at Indiana University are valued members of faculty and are expected to support the teaching mission of the School of Informatics and Computing through excellence in pedagogical practice, service to the school and academic programs, and inquiry into the advancement of pedagogy in computing. In addition to course responsibilities you will also be responsible for supervising Associate Instructors assigned to your classes, development of laboratory material, grading, and other duties as assigned. After successfully completing a probationary period, Lecturers will be eligible for long-term contracts and promotion to a Senior Lecturer position. Salary will be commensurate with qualifications and experience.

A Master's of Science (MS) or higher degree in a discipline closely related to our engineering specialties is required before the date of hire. Applicants should preferably have two academic years' experience (may be part-time). Qualified candidates must also provide evidence of teaching experience.

Interested candidates should submit a letter of application with a list of typical courses they are prepared to teach, a curriculum vitae, a statement of teaching interests and accomplishments, and names and contact information for three references using the submissions link at:

<http://indiana.peopleadmin.com/postings/2487>

For full consideration completed applications must be received by July 15, 2016. The search will remain open until the positions are filled.

Questions may be sent to [hiring@soic.indiana.edu](mailto: hiring@soic.indiana.edu) or by mail to ISE Lecturer Search, 901 E 10th Street, Bloomington, IN 47408.

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underrepresented minorities from the U.S. and 12% international students. The Department is actively striving to reflect this diversity; currently, our majors are 26% underrepresented minorities and 29% women. We especially invite applications from women and from members of historically underrepresented groups.

Candidates should send materials as PDFs to [cssearch@knox.edu](mailto: cssearch@knox.edu), including:

- Cover letter that addresses interests, qualifications and experience.

- Curriculum vitae.
- Statement of teaching philosophy, including your approach to teaching and mentoring a diverse student body.
- Statement of research interests.

Three letters of recommendation should be sent separately as PDFs by the recommenders.

Review of applications begins December 1, 2016.

For additional information, contact David Bunde, Chair, at [dbunde@knox.edu](mailto: dbunde@knox.edu).

Knox College is an affirmative action, equal opportunity employer and does not discriminate on the basis of race, color, ethnicity, national origin, age, sex, gender, sexual orientation, gender identity or expression, marital status, veteran status, religion, disability, creed, or any other protected class.

Lund University, Sweden

Associate Professor in Software Technology with starting grant

The Computer Science department at Lund University, Sweden, invites applications for a faculty position as Associate Professor in Software Technology. The position is supported by the Wallenberg Autonomous Systems Program and includes a starting grant adequate to finance four postdocs/PhD students over a period of 4 years.

Application deadline: September 15, 2016. For more information, see <https://lu.mynetworkglobal.com/en/what/job/jobID:105412/where:4/>

Marshall University

Assistant Professor - Computer Science

Banner Position Number - 002109

Salary is commensurate with qualifications and experience.

Job Description

The College of Information Technology and Engineering at Marshall University invites applications for an Assistant Professor in the Weisberg Division of Computer Science.

The start date for the position is January 3, 2017.

The positions are full-time, nine-month, tenure-track.

In addition to teaching undergraduate and graduate courses, the successful applicant will report to the Chair of the Weisberg Division of Computer Science and will

Professional Opportunities

contribute to the following: preparation for and compliance with ABET accreditation criteria and continuous improvement process; development of new curricula and programs of study; continued expansion of the Division to support new areas of emphases; interaction with constituency groups. The successful candidate will also support the University's general education curriculum, with its emphasis on a common First-Year Seminar and core curriculum courses that enhance student's critical thinking skills and the College's support of interdisciplinary programs of study.

Background: The Weisberg Division of Computer Science offers B.S. and M.S. degrees in Computer Science and an M.S. Information Systems degree. The Division is housed in the College of Information Technology and Engineering (CITE), a multi-disciplinary college with a wide range of faculty expertise and interests. A new building, the Weisberg Family Applied Engineering Complex opened officially August 13, 2015. An engineering laboratory facility was opened in the fall of 2008. More information can be found at www.marshall.edu/CITE.

Candidates interviewing on campus must have all official transcripts (undergraduate and graduate) forwarded directly to Search Committee for the Assistant Professor, Computer Science.

Pre-employment background check is required.

Required Qualifications

Ph.D. degree in Computer Science or closely related field. The candidate must exhibit a strong commitment to excellence in teaching undergraduate and graduate computer science courses. The candidate will be expected to develop a research program and actively seek external funding for research and collaborate on projects. Research experience in an area that complements existing initiatives of the

Division is preferred. Industrial experience is advantageous. The candidate must have the ability to contribute to Marshall University's commitment to cultural diversity and pluralism.

HOW TO APPLY:

From the job posting (<https://marshall.peopleadmin.com/postings/6044>), select Apply For this Job. This will ask you to create a profile in PeopleAdmin to complete the application process.

Posting Number
MU0262F
Open Date
07/29/2016
Open Until Filled
Yes

Required Documents

List of Three References w/contact information.
Cover Letter
Curriculum Vitae

Mississippi State University

Professor and Head

Applications and nominations are being sought for the Professor and Head of the Department of Computer Science and Engineering (www.cse.msstate.edu) at Mississippi State University. The Head is responsible for the overall administration of the department and this is a 12- month tenured position.

Part of the Bagley College of Engineering, the department has approximately 450 undergraduate majors, 80 graduate students, 18 tenured and tenure-track faculty, one clinical faculty and two instructors. The department offers undergraduate programs in Computer Science and Software Engineering, and jointly administers the undergraduate program in Computer Engineering with the Department of Electrical and Computer Engineering. At the graduate level, we

offer M.S. and Ph.D. degrees in Computer Science and the faculty directs graduate students in Computational Engineering. Certificates in Information Assurance, Cyber Operations and Computational Biology are also available. Research expenditures total about \$5.7 million dollars annually and the university as a whole is ranked 71st among U.S. institutions in computer science expenditures. Research core areas for the department are artificial intelligence, computational science, visualization and graphics, bioinformatics, parallel and distributed computing, software engineering, human-robot interaction, augmented and virtual reality, security and cryptography and computer science education. Faculty in the department are active in many university research centers including the Center for Advanced Vehicular Systems, the Distributed Analytics and Security Institute, the Center for Computational Science, and the Institute for Genomics, Biocomputing & Biotechnology. The computer security area has been designated a National Center of Academic Excellence in Information Assurance Education (CAEIAE) by the National Security Agency (NSA).

Mississippi State University is a comprehensive land-grant institution with approximately 20,000 students and about 1,300 faculty members. The university is a leader in high performance computing, housing a supercomputer in the top 20 among U.S. universities. The university's main campus is located in Starkville, Mississippi, a vibrant community approximately two hours from Jackson MS, Birmingham AL, and Memphis TN.

The successful Head will provide:

- Vision and leadership for nationally recognized computing education and research programs
- Exceptional academic and administrative skills

Professional Opportunities

· A strong commitment to faculty recruitment and development

A strong commitment to promoting diversity Applicants must have a Ph.D. in computer science, software engineering, computer engineering, or a closely related field. The successful candidate must have earned national recognition by a distinguished record of accomplishments in computer science education and research. Demonstrated administrative experience is desired, as is teaching experience at both the undergraduate and graduate levels. The successful candidate must qualify for the rank of professor.

Applicants must apply online by completing the Personal Data Information Form and submitting a cover letter outlining your experience and vision for this position, a curriculum vitae, and the names and contact information of at least three professional references. The online applicant site can be accessed by going to www.hrm.msstate.edu. Screening of candidates will begin November 1, 2016 and will continue until the position is filled. Inquiries and nominations should be directed to Dr. Pedro J. Mago, Department Head of Mechanical Engineering and Search Committee Chair (mago@me.msstate.edu or 662-325-3260)

MSU is an equal opportunity employer, and all qualified applicants will receive consideration for employment without regard to race, color, religion, ethnicity, sex (including pregnancy and gender identity), national origin, disability status, age, sexual orientation, genetic information, protected veteran status, or any other characteristic protected by law. We always welcome nominations and applications from women, members of any minority group, and others who share our passion for building a diverse community that reflects the diversity in our student population.

Montana State University

Multiple Positions

Montana State University's Gianforte School of Computing in beautiful Bozeman, Montana, invites applications for the following positions: (1) an Assistant Professor of Computer Science, (2) an Assistant Teaching Professor of Computer Science or (3) an Instructor of Computer Science.

For complete job announcement and application procedures, please visit cs.montana.edu/opportunities.html.

Equal Opportunity Employer, Veterans/Disabled

Northeastern University

Postdoctoral Research Associate

Northeastern University (Boston, MA) has one open Postdoc position in Networking, Security, and Algorithmic Transparency. We are looking for candidates with experience in empirical methods, measurement, networked systems building, and reverse engineering. The postdoc will work closely with faculty and students to develop research ideas, design experiments, conduct data analysis, and publish results. Initial appointment will be for one year, and will be renewable for a second year, pending review of performance in the first year.

For more information, visit <https://neu.peopleadmin.com/postings/42972>

Qatar University and Washington University, Saint Louis

PostDoc Position in Cloud Networking

Qatar University and Washington University, Saint Louis are seeking a Postdoctoral Research Scientist to work on a joint project in the field of cloud networking. The project aims to develop algorithms and systems for Inter-cloud Wide Area Networking (WAN)

Delivery Platform for distributed Business Applications. The position is based in Doha at Qatar University campus. The team is led by Dr. Aiman Erbad (Qatar University), in close collaboration with Dr. Raj Jain (Washington University in Saint Louis, USA).

Applicants need to have a strong experience in cloud networking, software defined networking, network function virtualization, and/or security. Each applicant should have PhD in Computer Science or related field, with strong publication record, and excellent communication skills. Applications will be reviewed immediately and the review process will continue until the position is filled. Employment benefits include: Competitive tax-free salary, furnished accommodations or housing allowance, annual round-trip air tickets for the candidate and his/her dependents, educational allowance for candidate's children, health insurance to candidate and family members, and annual leave, all in accordance with Qatar University Human Resource policies.

To apply, candidates should email the following information to Dr. Aiman Erbad (aerbad@qu.edu.qa): CV, 1 page research statement, and 2 references.

Salisbury University

Assistant/Associate Professor in Computer Science

The Department of Mathematics & Computer Science invites applications for two tenure-track Assistant/Associate Professor of Computer Science positions.

Please visit <http://www.salisbury.edu/HR/careers/> to apply online.

Salisbury University has a strong institutional commitment to diversity and equal employment opportunities to all qualified people.

Professional Opportunities

Shanghai University

Faculty and Postdoc Positions

The Institute for Theoretical Computer Science (ITCS) is a newly established academic unit at Shanghai University of Finance and Economics (SUFU), aimed at creating a world-class environment for research in broad areas of theoretical computer science.

Shanghai University of Finance and Economics is a top-ranked research university specializing in economics, finance and business studies. In recent years, SUFU has been earnestly developing fundamental and closely related disciplines besides finance and economics, among which computer science is at the top of its list. ITCS is one of the key priorities of this high-level mission.

We invite applications from highly-qualified candidates for various position levels in broad areas of theoretical computer science including (but not limited to), Algorithms and Complexity, Algorithmic Game Theory, Machine Learning, Information Theory.

Salary and compensation packages are attractive and competitive. Initial appointments are typically made for a six years fixed-term. Subsequent contract renewal, promotion and tenure follow standard international practices. Each year, the institute also offers two research fellowship positions. The appointment will be for two years with an annual salary of 300,000 RMB.

If you are interested in joining us, please send your CV to Pinyan Lu (lu.pinyan@mail.shufe.edu.cn).

Swarthmore College

Computer/Electrical Engineering Faculty (All Ranks) Position

Swarthmore College invites applications for a tenure-track or tenured position at any rank in the area of Computer/Electrical Engineering, to start during the Fall semester

of 2017. A doctorate in Computer or Electrical Engineering or a related field is required. The appointee will pursue a research program that encourages involvement by undergraduate students. Strong interests in undergraduate teaching, supervising senior design projects, and student mentoring are also required. Teaching responsibilities include courses in computer hardware such as computer architecture and digital logic, and electives in the appointee's area of specialization.

Located in the suburbs of Philadelphia, Swarthmore College is a highly selective undergraduate liberal arts institution with 1500 students, whose mission combines academic excellence and social responsibility. Eight full-time faculty members in the Department of Engineering offer a rigorous, ABET-accredited program for the Bachelor of Science in Engineering to approximately 120 students. Sabbatical leave with support is available every fourth year. The department has an endowed equipment budget, and there is support for faculty/student collaborative research.

For program details, see <http://engin.swarthmore.edu/>. Please upload your CV, brief statements describing teaching philosophy and research interests, along with three letters of reference to: <https://academicjobsonline.org/ajo/jobs/7247>.

Applicants should include a cover letter in which they describe their reasons for seeking this position and offer ideas about how they would attract and mentor students, especially those coming from diverse backgrounds. We will begin reviewing candidates on December 1, 2016; applications received before January 1, 2017, will receive full consideration.

Swarthmore College has a strong institutional commitment to excellence through diversity in its educational program and employment practices and actively seeks and welcomes applications from candidates with exceptional qualifications, particularly those with demonstrable commitments to a more inclusive society and world.

Texas State University

Department of Computer Science

Faculty Positions in Computer Science

Applications are invited for multiple tenure-track Assistant Professor positions in the Department of Computer Science to start the fall 2017 semester. We are seeking candidates to strengthen and complement our existing research in the areas of data analytics, human-computer interaction, artificial intelligence, computer security and networks, high-performance computing, and software engineering. Outstanding candidates in other areas will also be considered. Job duties include conducting research that results in refereed publications and external funding, teaching effectively at the graduate and undergraduate levels, supervising student research, and serving at the department, college, university, and professional levels. The position may require teaching on the Round Rock campus as well as on the main campus in San Marcos.

Qualifications

Required: Applicants must have completed all requirements for a PhD in computer science, computer engineering, or closely related field by the start of employment.

Preferred: Applicants should have a demonstrated record of excellence in research (including potential in obtaining external funding), in teaching, and in service, as well as effective oral and written communication.

Application Procedure

Review of applications will begin on January 6, 2017 and will continue until the positions are filled. Applications received by the review date will be given full consideration. On-line submission of all application materials is required. Please visit www.cs.txstate.edu/employment/faculty/ for additional information. All required documents must be uploaded, including a cover letter, a curriculum vitae, a statement of research interests, a

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separate statement of teaching, and a list of at least three references with email and postal addresses plus telephone numbers. The selected candidate will be required to provide official transcripts from all degree granting universities.

Personnel Policies

Faculty members are eligible for life, disability, health, and dental insurance programs. A variety of retirement plans are available depending on eligibility. Participation in a retirement plan is mandatory. The State contributes toward the health insurance programs and all retirement plans, www.hr.txstate.edu/benefits.

Texas State University is a tobacco-free campus. Smoking and the use of any tobacco product is not allowed anywhere on Texas State property or in university owned or leased vehicles.

Texas State University, to the extent not in conflict with federal or state law, prohibits discrimination or harassment on the basis of race, color, national origin, age, sex, religion, disability, veteran's status, sexual orientation, gender identity or expression. Texas State University is a member of The Texas State University System. Texas State University is an EOE.

University of California, Merced

Tenure-Track Assistant Professor

The Electrical Engineering and Computer Science (EECS) program at the University of California, Merced invites applications for one tenure-track position in the area of the Internet of Things (IoT) beginning in the 2017-18 academic year. Outstanding candidates with research interests in embedded sensors, pervasive connectivity, mobile computing, wearables, security, interoperability, mixed signal systems, fog networking/computing, and wireless embedded systems are encouraged to apply. A doctoral degree in electrical engineering,

computer engineering, computer science or a related field is required at time of employment.

Details and application information can be found at <https://aprecruit.ucmerced.edu/apply/JPF00359>. Position is open until filled with a final closing date of June 30, 2017; consideration of applications will begin on December 31, 2016. Applications will continue to be received until the positions are filled. For inquiries and questions, please contact us at scarpin@ucmerced.edu. EEO/AA employer.

University of California Merced

Faculty Position in Electrical Engineering and Computer Science program (Cyber-Human Systems)

The Electrical Engineering and Computer Science (EECS) program at the University of California, Merced invites applications for one tenure-track position in the area of Cyber-Human Systems (CHS) beginning in the 2017-18 academic year. Outstanding

candidates with research interests in human computer interaction, human-centric cyber-physical systems, interactive visualization and immersive environments, social informatics and computing, and ubiquitous computing are encouraged to apply. A doctoral degree in electrical engineering, computer engineering, computer science or a related field is required at the time of employment.

Details and application information can be found at <https://aprecruit.ucmerced.edu/apply/JPF00364>. Full consideration will be given to applications received by January 7, 2017.

Applications will continue to be received until the positions are filled. For inquiries and questions, please contact us at mkallmann@ucmerced.edu.

EEO/AA employer.



University of Colorado
Denver

ASSISTANT PROFESSOR Computer Science and Engineering

The Department of Computer Science and Engineering in the College of Engineering and Applied Science at the University of Colorado Denver invites applications for the position of Assistant Professor.

The candidate will be expected to develop and teach lecture and laboratory courses at all levels, establish an active, externally funded research program; conduct high quality research involving students at all levels, leading to sponsored research and refereed publications; advise students; and contribute to Department, College, and University governance and to the profession. The candidate must have a Ph.D. in Computer Science or closely related field and demonstrated expertise in computer science as evidenced by the candidate's record. Areas of cybersecurity, software engineering, artificial intelligence, programming languages and compilers, bioinformatics, computer systems, HCI, or a related field are preferred.

Applications are accepted electronically at <http://www.cu.edu/cu-careers> (refer to job posting **02763**).

The University of Colorado is committed to diversity and equality in education and employment.

Professional Opportunities

University of Massachusetts Amherst

Assistant / Associate Professor

The College of Information and Computer Sciences at the University of Massachusetts Amherst invites applications for multiple tenure-track faculty positions in Computer Science for the 2017-2018 academic year. Applicants must have a Ph.D. in Computer Science or a related area, and should show evidence of exceptional research promise.

Multiple openings are available for Assistant and Associate level Professors in the broad field of Data Science. One position in particular, at the Assistant Professor level, will focus on the subarea of Systems for Data Science. Under exceptional circumstances, highly qualified candidates at other ranks may receive consideration for these openings. Our college is highly supportive of junior faculty, providing both formal and informal mentoring.

Many of our faculty are involved in interdisciplinary research, working closely with other departments including statistics/mathematics, linguistics, electrical and industrial engineering, biology, physics, behavioral sciences, economics, political science, and nursing, as well as new green initiatives. Amherst, a historic New England town, is the center of a vibrant and culturally rich area that includes five colleges. For more information about our college, visit <https://cics.umass.edu>.

All applicants should submit a cover letter, curriculum vitae, research statement, and statement of teaching interests. Applicants at the Assistant Professor level should submit the names and contact information for three references and links to two papers that best represent their research/experience, using the submission link specific to the position. Applicants at the Associate Professor level should submit the names and contact information for four

references and links to three papers that best represent their research/experience, using the submission link specific to the position.

<https://umass.interviewexchange.com/jobofferdetails.jsp?JOBID=75312> (Assistant Professor Data Science)

<https://umass.interviewexchange.com/jobofferdetails.jsp?JOBID=75213> (Associate Professor Data Science)

<https://umass.interviewexchange.com/jobofferdetails.jsp?JOBID=75221> (Assistant Professor Data Science Systems)

Review of applications for the general Data Science openings will begin on October 17, 2016. Review of applications for the Data Science Systems opening will begin on December 15, 2016. We will continue to accept and review applications for all positions through the spring. Rank and salary will be highly competitive and commensurate with qualifications and



COLLEGE OF ENGINEERING
ROBOTICS
UNIVERSITY OF MICHIGAN



The Robotics Institute in the College of Engineering at the University of Michigan, Ann Arbor invites applications for junior or senior faculty positions. Successful candidates will have a relevant doctorate or equivalent experience and an outstanding record of achievement and impactful research in academics, industry and/or at national laboratories. They will have a strong record or commitment to teaching at the undergraduate and graduate levels, to providing service to the university and to the profession and to broadening the intellectual diversity of the College.

The Robotics Institute invites candidates across all research areas relevant to robotics to apply. Tenure lines will reside with one of the eleven departments comprising the College of Engineering. Women and underrepresented minorities are encouraged to apply. Please see application instructions and further information at robotics.umich.edu/jobs

Applications will be considered as they are received. However, for full consideration applications must be received by December 5, 2016.

The University of Michigan is an Affirmative Action, Equal Opportunity Employer with an Active Dual-Career Assistance Program. The College of Engineering is especially interested in candidates who contribute, through their research, teaching, and/or service, to the diversity and excellence of the academic community.

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experience. Inquiries and requests for more information can be sent to: facrec@cs.umass.edu.

The university is committed to active recruitment of a diverse faculty and student body. The University of Massachusetts Amherst is an Affirmative Action/Equal Opportunity Employer of women, minorities, protected veterans, and individuals with disabilities and encourages applications from these and other protected group members. Because broad diversity is essential to an inclusive climate and critical to the University's goals of achieving excellence in all areas, we will holistically

assess the many qualifications of each applicant and favorably consider an individual's record working with students and colleagues with broadly diverse perspectives, experiences, and backgrounds in educational, research or other work activities. We will also favorably consider experience overcoming or helping others overcome barriers to an academic degree and career. We are seeking talented applicants qualified for an assistant professor position. Under exceptional circumstances, highly qualified candidates at other ranks may receive consideration.

University of Notre Dame

Assistant, Associate, or Full Professor

The Department of Computer Science and Engineering at the University of Notre Dame invites applications for Assistant, Associate, or Full Professor. Excellent candidates in all areas will be considered.

The Department offers the Ph.D. degree and undergraduate Computer Science and Computer Engineering degrees. Faculty are expected to excel in classroom teaching and to lead highly-visible research projects that attract substantial external funding.

Applicants should submit a CV, statement of teaching and research interests, and contact information for three professional references at apply.interfolio.com/35544

The University of Notre Dame seeks to attract, develop, and retain the highest quality faculty, staff and administration. The University is an Equal Opportunity Employer, and is committed to building a culturally diverse workplace. We strongly encourage applications from female and minority candidates and those candidates attracted to a university with a Catholic identity. Moreover, Notre Dame prohibits discrimination against veterans or disabled qualified individuals, and requires affirmative action by covered contractors to employ and advance veterans and qualified individuals with disabilities in compliance with 41 CFR 60-741.5(a) and 41 CFR 60-300.5(a).

University of Waterloo

Open Rank Faculty Position in Computer Engineering and Software

The Department of Electrical and Computer Engineering at the University of Waterloo invites applications for a tenure-track position beginning on or around September 1, 2017. The department is inviting candidates in the broad areas of computer engineering, software systems, and computer science to apply for the position.



John Derby Evans Professorships in Media Technology (Associate Professors with Tenure)

The School of Information and the Department of Communication Studies in the College of Literature, Science, and the Arts at the University of Michigan invite applications for two tenured faculty positions at the Associate Professor rank focusing on the social implications of digital media. Successful candidates will be appointed to one of two endowed John Derby Evans Professorships of Media Technology, one in each unit. These positions together constitute a cross-disciplinary cluster hire in the area of "digital futures."

The mission of the School of Information is to create and share knowledge to help people use information -- with technology -- to build a better world. The Department of Communication Studies emphasizes the interdisciplinary study of the mass media and digital media.

We welcome applications from scholars in the social or behavioral sciences, computer science, or humanities traditions working on a range of topics and employing diverse methods. We are especially interested in qualified applicants whose research addresses important social problems, opportunities, and questions associated with digital media. Topical areas include computer-mediated communication, social media, mobile media, ethics and policy, socio-technical systems, computational understandings of digital media generation, distribution, and access, and other important and innovative areas of research.

Job duties in both units include research activity, teaching of graduate and/or undergraduate courses, and service to the department, school, university, and profession. A Ph.D. in Communication, Information, or a related field is required. The anticipated starting date for these university-year appointments is September 1, 2017.

All applicants should send a cover letter, a vita, three representative publications, evidence of teaching excellence, a statement of teaching philosophy and experience, a statement of current and future research plans, and contributions to diversity. (Letters of recommendation are not required at this time.) All application materials must be submitted electronically to: <https://apply.interfolio.com/35945>

Qualifications

- Ph.D. in Communication, Information, or a related area.
- A successful teaching record at the undergraduate and/or graduate levels
- Demonstrated scholarly impact
- A strong commitment to teaching, interdisciplinary research, and cultural diversity

Background Screening

The University of Michigan conducts background checks on all job candidates upon acceptance of a contingent offer and may use a third party administrator to conduct background checks. Background checks will be performed in compliance with the Fair Credit Reporting Act.

The University of Michigan is an equal opportunity/affirmative action employer. Women and minorities are encouraged to apply. The University is supportive of the needs of dual career couples.

Review of applications will begin on October 1, 2016 and will continue until the positions are filled. For questions about potential fit and/or your application please contact UM.DigitalFutures@umich.edu.

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It is anticipated that the position will be at the rank of Assistant Professor, but exceptional cases at the Associate or Full Professor rank will be considered.

To ensure full consideration, the application must be received before December 31, 2016. For more information on the opening see: <https://uwaterloo.ca/engineering/faculty-and-staff/faculty-positions#ECE2>

University of Waterloo

Open Rank Position in Computer Systems Software

The Department of Electrical and Computer Engineering at the University of Waterloo invites applications for a tenure-track position beginning on or around September 1, 2017. The department is particularly interested in candidates with a

demonstrated research record in building, evaluating, experimenting with, and scaling of computer systems software, with contributions being publishable in operating systems venues. It is anticipated that the position will be at the rank of Assistant Professor, but exceptional cases at the Associate or Full Professor rank will be considered.

IQC.UWATERLOO.CA

Postdoctoral Fellowships at the Institute for Quantum Computing

The Institute for Quantum Computing is inviting applications for postdoctoral positions in all aspects of quantum information processing, bridging areas from fundamental theory to physical implementations.

Quantum information science aims to develop transformational technologies that harness the power of quantum mechanics. The Institute for Quantum Computing (IQC) is a world-leading institute for research in quantum information at the University of Waterloo. IQC has 24 faculty members and growing, whose research programs span the areas of Applied Mathematics, Chemistry, Combinatorics & Optimization, Computer Science, Electrical & Computer Engineering, Physics & Astronomy, and Pure Mathematics. IQC members have the opportunity to interact with other research groups at the University, such as the Centre for Applied Cryptographic Research and the nearby Perimeter Institute for Theoretical Physics. New infrastructure, including an advanced nanofabrication and metrology centre, support an expansion of experimental research programs at IQC. We are based in the new Mike and Ophelia Lazaridis Quantum-Nano Centre, a state-of-the-art facility at the heart of the University of Waterloo campus, which provides unprecedented opportunities for research, collaboration and innovation.

We seek promising candidates to help advance the understanding of the foundations of quantum information, to develop new quantum applications and algorithms, and to implement these ideas in laboratory experiments and engineered systems. A PhD and proven ability, or strong potential, for excellence in research is required.

For information on how to join IQC as a postdoctoral fellow, please visit the *Available positions* link at <https://uwaterloo.ca/institute-for-quantum-computing/>

The preferred deadline for receiving applications is November 1, 2016, but applications may be considered year-round. Candidates are also encouraged to visit the [NSERC website](#) to learn about the prestigious Banting Postdoctoral Fellowship. The deadline for the Banting Fellowship applications is September 21, 2016; qualified candidates should contact a potential supervisor immediately.

All qualified candidates are encouraged to apply; however Canadians and permanent residents will be given priority. The University of Waterloo encourages applications from all qualified individuals, members of visible minorities, native peoples, and persons with disabilities.

Professional Opportunities

To ensure full consideration, the application must be received before December 31, 2016. For more information on the opening see: <https://uwaterloo.ca/engineering/faculty-and-staff/faculty-positions#ECE1>

Wesleyan University

Assistant Professor of Computer Science

The Department of Mathematics and Computer Science at Wesleyan University invites applications for a tenure track assistant professorship in Computer

Science to begin in Fall 2017. We encourage candidates in all areas of Computer Science to apply, including those who deepen our existing research strengths, and especially encourage candidates who can contribute to the diversity (broadly conceived) of the department. The teaching load is 2/1 (three courses per year).

We will begin reviewing applications on Dec. 1, 2016. Applications must be submitted online at <https://academicjobsonline.org/ajo/jobs/7547>, where the full job description may be found.