

COMPUTING RESEARCH NEWS



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Uniting Industry, Academia and Government to
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CRN At-A-Glance

Laying a Foundation: Best Practices for Engaging Teaching Faculty in Research Computing Departments

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See page 2 for full article.

Highlights from the 2018 CRA Conference at Snowbird

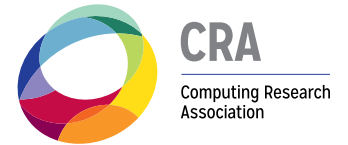
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See page 7 for full article.

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Laying a Foundation: Best Practices for Engaging Teaching Faculty in Research Computing Departments



By Penny Rheingans, Dan Grossman, and Jeff Forbes

Executive summary

To achieve their educational mission, computing departments at research universities increasingly depend on full-time teaching faculty who choose teaching as a long-term career. This memo discusses the need for teaching faculty, explores the impact of teaching faculty, and recommends best practices.

Essential best practices for departments include:

- Departments should provide teaching faculty with equitable rights and resources, except in limited areas where differing job responsibilities make that inappropriate.
- Departments should encourage teaching faculty to be equal and active partners on projects and committees with the goal of contributing to the department's educational mission.
- Departments should set course, preparation, student, and service loads of teaching faculty at a level that allows for innovation and quality instruction.
- Departments should advocate for titles for teaching faculty that include the term *professor* in order to best convey the professional status, substantial contributions beyond the classroom, and long-term commitment of teaching faculty.
- Departments should provide teaching faculty with professional development and career advancement opportunities to support their advancement and success.

- Criteria for evaluation and promotion of teaching faculty should be clear and explicit, with clear articulation of expectations beyond quality classroom teaching.
- Teaching faculty who are meeting or excelling in position expectations should have job security. While tenure for teaching faculty (either in name or practice) sends the strongest message about their role in the department, rolling multi-year contracts can alleviate the disruption and uncertainty of year-to-year arrangements.

Terms and Scope

Academic departments of computing at research universities have long included *teaching faculty*, whose focus is more on the educational mission of the department than that of more traditional faculty, called *research and teaching (or R&T) faculty* in this document. We choose not to use the term "tenure-track faculty" in order to recognize that teaching faculty may be eligible for tenure or its equivalent.

Despite the near ubiquity of teaching faculty, practices defining their work environments vary substantially across institutions for nearly every aspect of faculty life: titles, advancement, length of appointments, career support, voting rights, teaching load, etc. The purpose of this memo is to provide administrators of computer science and informatics departments, schools, and colleges (called *computing departments* in this document for brevity) with guidance and perspectives on these topics. It is based

on a wide information-gathering process including survey invitations and in-person discussions involving CRA-member department heads, teaching faculty, and other members of the academic computing community.

We focus on *full-time* faculty, with the assumption that such faculty intend to make teaching computing at a research university a long-term career choice. Naturally, there is a continuum of less permanent positions for adjuncts, postdocs, visitors, etc., either to fill short-term needs or for practitioners to contribute part-time toward a curriculum. Best practices for such part-time and/or temporary faculty are not our focus.

This document contains three subsequent sections. The first discusses why teaching faculty are critical to computing departments in a way not typical of departments in other disciplines. The second addresses the qualifications, contributions, and impact of teaching faculty. The last section makes recommendations for best practices in research departments.

Computing's Unique Need for Teaching Faculty

Computing is not the only discipline with full-time teaching faculty in research universities. Therefore, many relevant policies and issues related to faculty roles are defined at the institutional level and transcend discipline. However, it is crucial to identify and appreciate several ways in which the role of teaching faculty in computing departments is different

Laying the Foundation (*continued*)

from that in other units at a research university and, therefore, may warrant different policies and approaches. This role is also different from that of R&T faculty, with a greater emphasis on the education components of department mission. We call out three particular reasons that teaching faculty are essential in computing departments.

First and foremost, a majority of computing Ph.D.s take jobs in industry, leaving fewer qualified candidates for available academic positions. Computing graduates at all levels have ample employment opportunities with high salaries. While the current enrollment boom and technology surge have made these features more pronounced in recent years, they are *not* a passing phenomenon: Most computing departments have long relied on teaching faculty – with their focus on education and higher teaching loads – to meet a critical part of their educational mission.

Second, the computing curriculum evolves more rapidly than in many disciplines. This increases the need for faculty to stay at the forefront technically, adapt to changing introductory programming language selections, address a rapidly changing landscape of students' high-school preparation, respond to increasing interest in computing from students in other fields at all levels, and incorporate new best practices in computing education for engaging all students, particularly those from underrepresented groups.

Third, the role of computing is increasingly recognized as essential to

a broad university education, including offerings open to non-majors and as an integral part of general education. Models for how to best integrate computing with the broader university are still needed.

Characteristics and Impact of Effective Teaching Faculty

The typical computing department at a research university has a handful of teaching faculty members who love what they do – interacting with students, helping shape a rapidly evolving curricular space, and contributing to the maturing practice of computing education from positions in which they contribute primarily to the education mission. When best practices are followed, this specialization is valuable both for the university and the faculty member. Teaching faculty in computing are often shining stars on campus (and nationally), as they frequently serve as the “face of the department” for the many students taking the high-profile introductory courses.

Preparation Paths

The roles of teaching faculty vary widely across institutions and departments. Accordingly, the professional preparation paths that teaching faculty follow vary substantially. Some faculty have preparation similar to what is expected of R&T faculty such as a Ph.D. in the discipline. Other faculty are well prepared to teach undergraduate courses with a Ph.D. in computing or engineering education, a non-terminal degree such as a MS in computer science, substantial industrial experience, or substantial experience teaching at the high-school level.

Job Titles

Since there is a great deal of diversity in the preparation, role, and responsibilities of teaching faculty, one size of title won't fit all. The job titles for teaching faculty differ by institution and expectations. Teaching faculty report that titles are meaningful and can impact how teaching faculty are viewed from within and outside the department, as well as highlight opportunities for advancement and recognition. Job titles should accurately indicate the scope of contributions expected from a faculty member, the degree of commitment between the university and the faculty member, and the experience level of the faculty member. Titles including the term “professor” and offering a sequence of levels (for instance, assistant, associate, full, and distinguished) should be used for positions with an expectation of a long-term commitment and substantial, ongoing contributions to the department and institution.

Impact

Effective teaching faculty can have substantial impact on a department's educational mission and visibility. While most faculty teach, teaching faculty have a particular focus on teaching excellence and innovation. That passion and emphasis on engaging students is particularly crucial in a field where very large introductory courses are increasingly common, requiring pedagogical best practices in order to engage students in a potentially isolating atmosphere as well as to develop and manage large student staffs. Since

Laying the Foundation (*continued*)

A first principle for best practices is to treat all faculty, both teaching and R&T, as full-fledged faculty, differentiating treatment only in specific areas where job expectations differ substantially.

teaching faculty often are responsible for teaching introductory courses, they play a pivotal role in broadening the participation of underrepresented groups in computing. Furthermore, their role is especially critical because many students do not discover computing until college and many career decisions are made by students during their first year based on how well they learn and how welcomed they feel in these introductory courses. The impact of teaching faculty goes beyond the classes they teach. Teaching faculty in computing departments advance curriculum development and further national advocacy and visibility on issues connected to computing education. With their expertise, teaching faculty perform service on a variety of issues related to students and education. Teaching faculty may engage in the scholarship of teaching and learning – applying and developing evidence-based methods for effective teaching and student learning in computing. Teaching faculty can connect their department with the international computing education community.

Commitment

While adjunct instructors on short-term contracts can fill holes in teaching schedules and bring unique perspectives to campus, the contributions that full-time teaching faculty make require the stability and long-term planning available to faculty in tenurable and/or multi-year positions.

Best Practices for Departments

Department policies and practices should support the productivity, development, and professional satisfaction of teaching faculty. Such an environment reduces turnover, increases departmental stability and efficiency, allows R&T faculty to better balance their time between teaching and research activities, and enables teaching faculty to make the greatest contributions to their departments. *A first principle for best practices is to treat all faculty, both teaching and R&T, as full-fledged faculty, differentiating treatment only in specific areas where job expectations differ substantially.* A corollary to this principle is that teaching faculty should have autonomy over their responsibilities in a manner parallel to that of other faculty.

Role in Teaching and Curriculum Enterprise

Teaching faculty can contribute most fully if they participate in all departmental education activities rather than being limited to introductory courses or delivery of established courses. Full participation includes opportunities to teach upper-level courses and electives, teach graduate courses (if qualified and interested), update established courses, engage in new course development, serve on and lead departmental curriculum committees

and initiatives, and innovate in classroom approaches. A variety of different challenges is important for sustaining engagement, especially for experienced faculty.

Contributions to Broader Department Mission

Teaching faculty constitute a valuable resource to support department goals through contributions that extend beyond classroom teaching, providing departments with valuable and expert service and teaching faculty with additional opportunities for creative contributions and professional growth. These supplemental activities include service on department or university committees, membership in student thesis and dissertation committees, supervision and development of student course staffs, advising of student groups, mentoring of other faculty, leadership through administrative roles, engagement in computing education research, and participation in outreach initiatives. Some supplemental activities may be so substantial as to benefit from or require a reduction in teaching load in order to accommodate the time required. Not every teaching faculty member will make each of these contributions, but each should make some of them, with scope increasing as they advance in their career.

Workload Expectations

Teaching faculty can be most effective when their course, preparation, and student loads allow for innovation and quality instruction. In a 2015 survey of CRA member departments, average loads for teaching faculty were about twice the number of courses per term

Laying the Foundation *(continued)*

as R&T faculty. This level reflects the fact that teaching faculty were usually not expected to engage in research at the same level as R&T faculty, but does not necessarily allow for substantial contributions outside the classroom. Measuring workload solely in the number of courses, however, can fail to account for the load created by very large courses. Workload expectations should consider the number of course sections, the number of unique preparations, the number of students, and expectations for the supervision or coordination of others. Time and funding for curriculum and tool development should be made available as appropriate.

Benefits

Teaching faculty can be most engaged and productive when they are treated as valued and respected members of the department, with rights and resources commensurate with their responsibilities. Salaries for teaching faculty should reflect their central role to the mission of their department. *Teaching faculty should be provided with the same resources to accomplish their teaching responsibilities as other faculty.* These resources include offices, laptops and other equipment, teaching assistants and graders, technical support for classes, and the ability to express teaching preferences. *Similarly, teaching faculty should be broadly included in faculty governance on matters related to their roles in the department,* including participation in faculty meetings, voting rights on matters impacting the education mission, inclusion in evaluation of the teaching performance of other faculty,

Students, teaching faculty, and departments all benefit when teaching faculty have access to the professional development opportunities they need to stay current with technical content, learn about computing education research, develop relevant leadership skills, and pursue personal career goals.

and input on hiring decisions. *Lastly, teaching faculty should be first-class faculty with respect to workplace benefits* such as sick leave, retirement planning, child care, parking, housing, etc. Departments should be particularly mindful to avoid decisions that send indirect signals of second-class status such as excluding them from the “main” list of faculty or putting their offices on a different floor.

Professional Development

Students, teaching faculty, and departments all benefit when teaching faculty have access to the professional development opportunities they need to stay current with technical content, learn about computing education research, develop relevant leadership skills, and pursue personal career goals. *Departments should support professional development of teaching faculty* by providing structured onboarding procedures; mentoring programs for faculty; funding for conference and workshop travel, teaching circles or other cohort programs; infrastructure for a community of teaching-focused faculty; and sabbaticals or other time to concentrate on professional development. There are vibrant national and international communities that host

conferences, provide formal and informal mentoring, and advocate for change in computing education. The participation of teaching faculty in these communities is important for the development of individual teaching faculty, the diffusion of best practices to departments, and the cultivation of a national conversation about computing education. Note that opportunities to keep technical skills current and opportunities for improvements in pedagogy may or may not overlap, but both are important.

Evaluation

The responsibilities of teaching faculty are different from those of R&T faculty, making the traditional research, teaching, and service metrics used to evaluate R&T faculty not entirely appropriate for evaluating teaching faculty. *Teaching faculty should be evaluated for their contributions to innovative instruction, educational leadership, and the scholarship of teaching,* instead of primarily technical research. Examples of these contributions might include new course or curriculum development, textbook or online course authorship, educational tool or system building, educational resource curation, activities to promote the professional development of others, outreach to strengthen

Laying the Foundation (*continued*)

and diversify the computing pipeline, service on government and professional committees and boards, and publication of education-oriented research. Student evaluation of teaching is commonly used, but there are a number of potential challenges to its validity as a measure of how well an instructor produces learning outcomes for a given student population, as well as well-documented issues with bias. *Because teaching effectiveness is so central to evaluation of teaching faculty, evaluations should consider more than student input, as well as provide guidance on how to improve.* Possible approaches for evaluating teaching effectiveness include review by other faculty, input from staff of teaching and learning centers, and examination of teaching materials and products.

Job Security and Advancement

Teaching faculty can best have a stable and productive career in a department when they have both job security and a path for advancement. Universities such as those in the University of California system have recognized the importance of teaching faculty by creating a track for teaching faculty designated by Potential

for Security of Employment that offers job security much like that of tenure, as well as a path for advancement. *As a core principle, security of employment for teaching faculty should flow directly from the successful execution of explicitly articulated position expectations.* Other practices to increase job security and growth opportunities include multi-year contracts with decisions to renew (or not) made with ample time for career planning, the possibility for differentiated opportunities based on educational and professional background, and multiple position levels with clear promotion paths.

Conclusion

Teaching faculty in computing departments at research universities have long been the norm, but the field has been slow to coalesce on common expectations. The best practices outlined here are designed to benefit everyone: teaching faculty, other faculty, students, and administrators. These best practices recognize the unique and complementary role that full-time teaching faculty play in the educational mission of the academic computing-research community.

Other Resources

The CRA Taulbee Survey (<https://cra.org/resources/taulbee-survey/>) reports data on current salary data for teaching faculty.

The National Academies has reported on booming enrollments in computing and strategies for addressing them (<https://www.nap.edu/catalog/24926/assessing-and-responding-to-the-growth-of-computer-science-undergraduate-enrollments>).

Examples of department profiles, policies, and practices and resources from the teaching faculty community will be forthcoming.

CRA Committee on Best Practice for Teaching Faculty at Research Universities

Members include: Betsy Bizot (CRA), Michelle Craig (University of Toronto), Susan Davidson (University of Pennsylvania), Jeff Forbes (Duke University), Dan Garcia (University of California, Berkeley), Dan Grossman (University of Washington), Penny Rheingans (University of Maine), Mary Beth Rosson (Pennsylvania State University), and Mark Sherriff (University of Virginia).

Approved by the Computing Research Association Board of Directors, July 2018.

Highlights from the 2018 CRA Conference at Snowbird

From July 16-18, the Computing Research Association (CRA) held its biennial Conference at Snowbird with more than 300 people in attendance. Every two years, the chairs of computing and information departments, as well as the leaders of government and industrial laboratories from across the country and the world, gather in Snowbird, Utah, to network and discuss common issues concerning the future of the field.

The event began with a networking reception, award presentations and plenary talk by former CRA Board Chair and Turing award winner David Patterson. Over the following two days, outstanding speakers and panels addressed issues surrounding three themes.



Raquel Urtasun (University of Toronto/Uber Advanced Technologies Group) during the session on "A Future with Affordable Self-driving Vehicles."

The Ubiquity of AI

In her plenary talk "A Future with Affordable Self-driving Vehicles," Raquel Urtasun (University of Toronto/Uber Advanced Technologies Group [ATG]) showcased the latest advancements made by Uber ATG's research lab in the quest toward self-driving vehicles and explained her vision for how both industry and academia could come together to form the next generation of students. A subsequent parallel session, "Self-driving Cars: When Will They Become Mainstream," examined the key technical and societal challenges.

During the parallel session "Augmenting, Not Replacing, People," panelists explored areas where AI and people work together to improve what we do from healthcare to education to training, and on Tuesday evening, the CCC organized two thought-provoking after-dinner talks focused on "Online Disinformation During Crisis Events" and "Machine Learning for Science."

Diversity in Computing Leadership

A plenary talk on "Diversity in Leadership" kicked off the first full day of the conference. Carla Brodley (Northeastern University) moderated a panel of academic and industry experts who examined the challenges and opportunities in retaining diverse employees. The panelists emphasized that diversity must be a priority for progress to occur. In a following parallel session, "Increasing Diversity in Computing is Easier Than You Think: Some Small Steps that Make a Big Difference," led by Mary Hall (University of Utah), a panel shared information on best practices. Themes included creating a community and welcoming environment for students from underrepresented groups; encouraging faculty to engage in service activities that support the mission of broadening participation; and recognizing that diversity also includes disabilities. In "How to Stop Driving Women Out of Computing – What Happens in Your Backyard Matters!" participants explored three areas: certain issues that are driving women out of computing; harassment; and bias in research evaluation.



Carla Brodley (Northeastern University) moderates a panel of academic and industry experts on diversity in leadership.

Snowbird Highlights *(continued)*



Laura Haas (University of Massachusetts-Amherst) leads the Booming Faculty session.

Timely Topics for Computing and Information Departments

Several parallel tracks dove into community issues. The session on "Department Rankings" looked at three prominent efforts: Microsoft Academic, csmetrics.org, and csrankings.org. "Booming Faculty: Opportunities and Challenges," led by Laura Haas (University of Massachusetts-Amherst), explored one of the consequences of booming student enrollments as

many departments have been scrambling to rapidly grow their faculty. In "New Models for Industrial Research in CS," panelists shared their thoughts on how academics can better connect with industry. In "Making a Federal Case for Computing," CRA's Peter Harsha helped paint a clear picture of the current state of federal support for computing and science funding, and CRA's role in the process.

Informal Networking

In addition to all the formal sessions, Tuesday afternoon was dedicated to encouraging networking among the participants. Some attendees explored the mountain near Snowbird on both organized and unofficial hikes, while others participated in planned book discussions. At the event, attendees used the Whova mobile app to connect with each other, view the agenda, share photos, and more. CRA Conference at Snowbird participants used the [#CRASnowbird](#) hashtag to engage on Twitter. The CRA staff also captured excellent photos of the event. Click [here](#) to view the CRA photostream on Flickr.

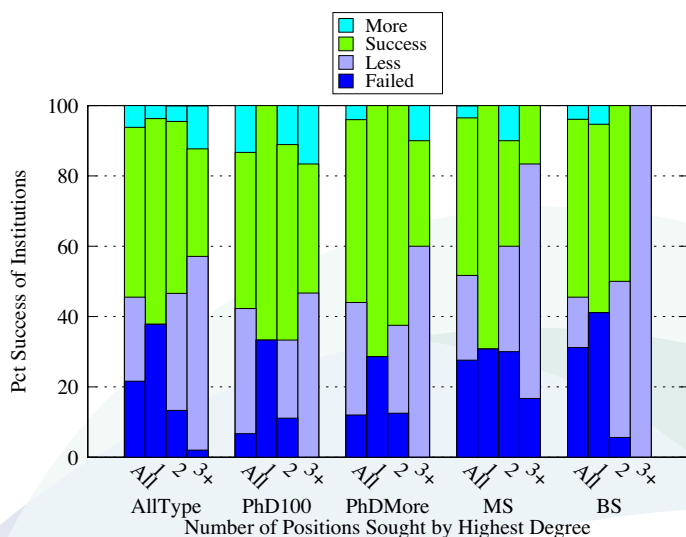
Speaker Slides and the 2020 Conference

The conference agenda is posted online [here](#) and speaker slides are highlighted in blue if available. Thanks to everyone who contributed to making this event a success! We are looking forward to the next CRA Conference at Snowbird. Mark your calendars for July 21-23, 2020.

2018 Computer Science Tenure-Track Faculty Hiring Outcomes

By Craig Wills, Worcester Polytechnic Institute

This work directly follows [previous work](#) that analyzed current and future Computer Science needs via advertised tenure-track faculty searches for 2018. This follow-on work looks to understand the relative success of institutions in hiring the tenured/tenure-track faculty in the areas of Computer Science that were being sought.



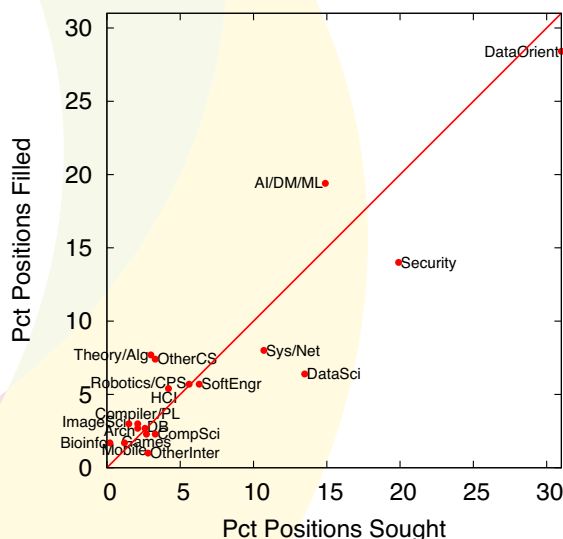
Responses to a survey were obtained from 176 institutions that reported seeking tenure-track faculty in 2018. Survey respondents reported seeking 363 tenure-track faculty positions and filling 269 such positions for an aggregate success rate of 74%. Examination on the success of the search for each of the institutions found that 22% failed to hire any faculty, while 54% succeeded in hiring at least as many faculty as were being sought. These survey results are similar to 2017.

In terms of results for different types of institutions, the top-100 PhD institutions had the smallest reported failed search rate of 7% while BS institutions had the highest reported failed search rate of 31%. Public PhD (62%) and private PhD (58%) institutions had the highest rate of hiring at least as many faculty as were being sought. Public MS&BS (48%) institutions had the lowest reported rate in hiring as many faculty as were being sought.

Reported results on the previous position for hired faculty show that three types of such positions predominant. 29% of hired faculty start with a newly-earned PhD, 27% were previously in a tenured or tenure-track position at another institution and 23% were previously in a post-doc/researcher position. These results are similar to those in 2017.

In comparing the areas of filled positions with the areas in which positions were sought, the area of Security showed the biggest negative difference with 14% of filled positions, but 20% of sought positions. Data-oriented areas, consisting of AI/DM/ML (Artificial Intelligence, Data Mining and Machine Learning), Data Science and Databases, accounted for 31% of sought positions and 28% of filled positions. In general, the net percentage differences between areas sought and filled were smaller than similar results in 2017.

Taulbee Survey results were used to compare areas of PhD production with areas of faculty positions sought and filled. Security is the area with most obvious discrepancy between percentage of PhDs produced (4%) and faculty positions sought (20%). Security and AI/DM/ML are the areas with the highest discrepancy between PhDs produced and positions filled with a net of 10% and 6% more positions filled than PhDs produced.



The full report containing a description of the methodology and the complete results is available at <http://www.cs.wpi.edu/~cew/papers/outcomes18.pdf>

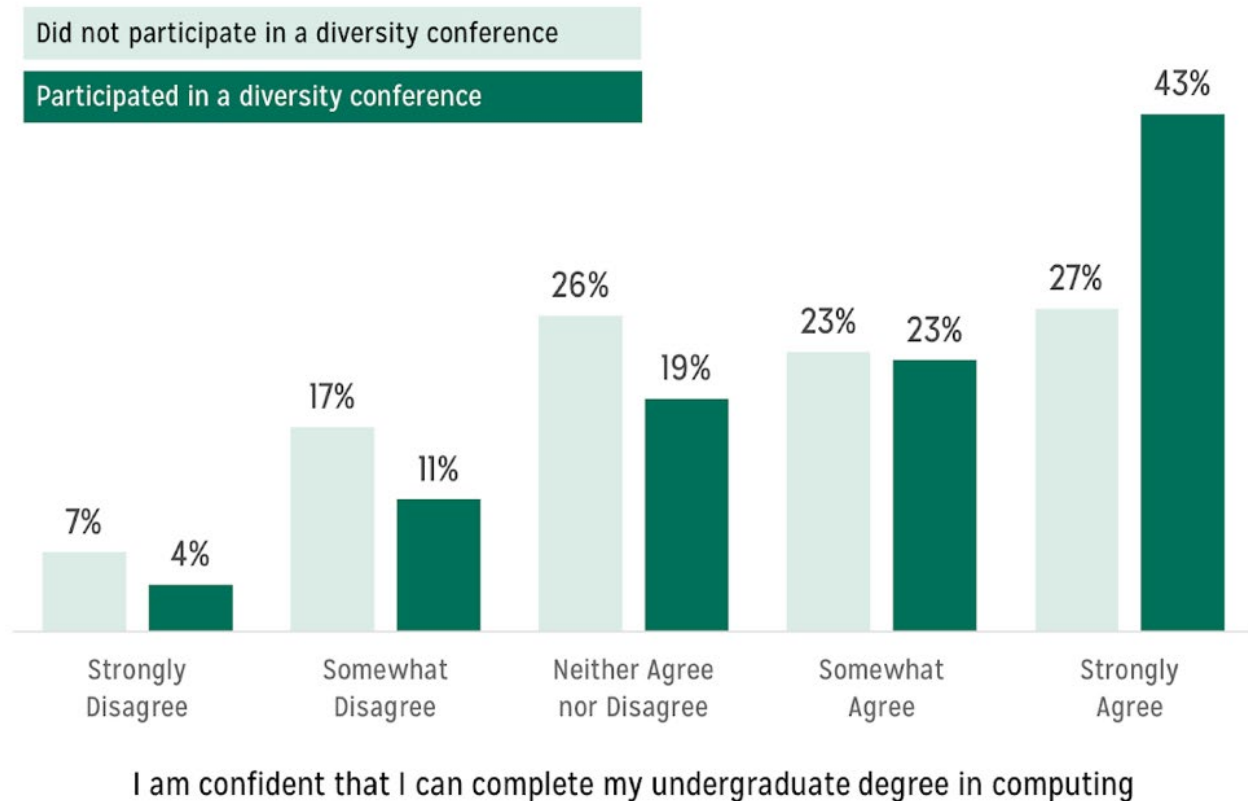
Students Who Participated in Diversity Conferences are More Confident in Their Ability to Complete Their Undergraduate Degree in Computing



CERP

Computing Research Association
Evaluation

By Burçin Tamer, Director of CERP



This graphic shows the level of confidence that underrepresented minority and women undergraduate students reported in their ability to complete their computing degree. Students who participated in diversity-focused conferences ([Anita Borg Institute's \(ABI\) Grace Hopper Celebration](#), [regional Hoppers](#), and/or [Association for Computing Machinery's \(ACM\) Richard Tapia Conference](#)) are compared to those who did not. Conference participants reported a higher level of confidence in their ability to complete their degree compared students who did not attend any of these conferences.

Participating in conferences and workshops gives students from groups underrepresented in computing an opportunity to meet other students who have similar experiences and to learn from leaders in computing who possess similar backgrounds. These interactions, in turn, may help students persist in their field by providing them with a supportive environment and a sense of belonging. For instance, Christine Alvarado, Zachary Dodds, and Ran Libeskind-Hadas reported in their 2012 article "[Increasing Women's Participation in Computing at Harvey Mudd College](#)" that one of the three strategies they used to recruit and retain



Diversity Conferences (*continued*)

women undergraduate students was to take students to the Grace Hopper Celebration every year. Within the 7-year time period after they began implementing these strategies, the percentage of women undergraduates majoring in computer science at HMC increased from 12% to 40%.

Encouraging and enabling students to attend diversity conferences early in their undergraduate career may help improve their odds of persisting in their field. In turn, this would support the field's efforts for broadening participation in computing.

This analysis 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. Subscribe to the CERP newsletter [here](#).

This material is based upon work supported by the National Science Foundation under grant numbers (CNS-1246649; and/or DUE-1431112). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

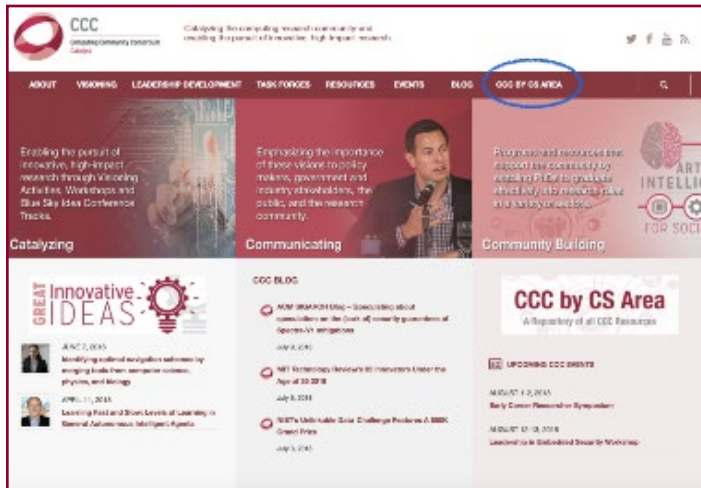
Notes:

[1] The survey data used in this chart were collected during the fall 2017 by CERP via the **Data Buddies Project**. The sample includes 3,631 undergraduate students majoring in a computing field who identify as women and/or are a member of a racial/ethnic group underrepresented in computing. Racial/ethnic groups underrepresented in computing (also referred to as underrepresented minority students [URM]) include students who identify as African American/Black, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, Arab/Middle Eastern/Persian, and Mexican American/Chicano/Puerto Rican/Other Latino. Of the 3,631 students, 562 (15%) attended Anita Borg Institute's (ABI) Grace Hopper Celebration, regional Hoppers, and/or Association for Computing Machinery's (ACM) Richard Tapia Conference.

[2] Proportions of students who participated in a diversity-focused conference were compared to students who did not for each scale level (e.g., strongly disagree, disagree) using z-tests. All of the differences shown in the graph, except for the proportion of each group who selected somewhat agree, were statistically significant at the $p \leq .05$ level.

Finding CCC's Resources in YOUR Area of IT

By CCC Staff, and Mark D. Hill



The **Computing Research Association's Computing Community Consortium** (CCC) mission is broad. Our mission is to catalyze the computing research community and enable the pursuit of innovative, high-impact research. CCC conducts activities that strengthen the research community, articulate compelling research visions, and align those visions with pressing national and global challenges.

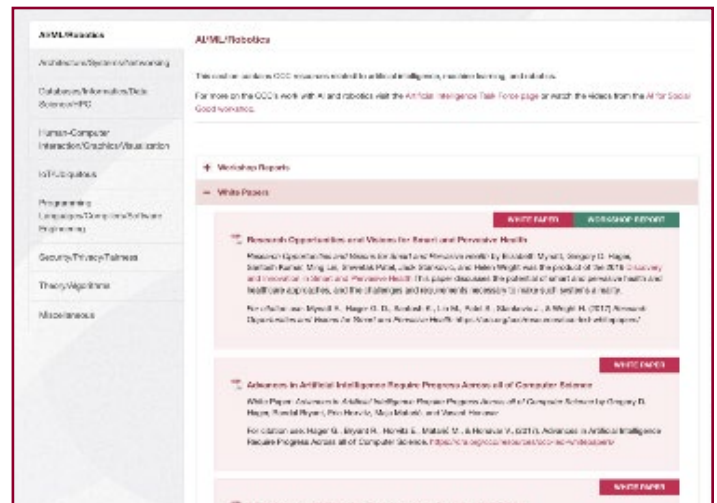
As a consequence, material on the CCC web site spans many areas of IT such as Intelligent Infrastructure, Privacy and Fairness, Artificial Intelligence, and Cybersecurity. Most IT professionals, however, only focus on one of these areas in order to make deep connections. Until recently, users had to know exactly what to search for in order to find material in their focus area.

For this reason, we created a **new repository of the CCC's work categorized by sub-areas**. To access it from the CCC home page,

select "CCC by CS Area" and then your area. The current areas—with links directly to them—are:

- Artificial Intelligence / Machine Learning / Robotics
- Architecture / Systems / Networking
- Databases / Informatics / Data Science / High Performance Computing
- Human-Computer Interactions / Graphics / Visualization
- Internet of Things / Ubiquitous
- Programming Languages / Compilers / Software Engineering
- Security / Privacy / Fairness
- Theory / Algorithms
- Miscellaneous

The items in this repository include workshop reports, white papers, presentations, and a variety of other materials that the CCC believes the computing community will find useful.



We at the CCC value your feedback. Please send comments on this new view of CCC to cccinfo@cra.org

The CCC Welcomes New Leadership and Council Members



CCC

Computing Community Consortium
Catalyst

By CCC Staff

Sunday, July 1st, was the start of a new CCC term!

The **Computing Community Consortium (CCC)** is happy to announce that **Mark D. Hill** from the **University of Wisconsin-Madison** is now the Chair of the CCC and **Liz Bradley** from the **University of Colorado-Boulder** is the new Vice Chair. **Beth Mynatt** from **Georgia Tech** is the Past Chair. The CCC Chair and Vice Chair both serve two-year terms – at the culmination of the two years, the Vice Chair typically becomes the new Chair.

The CCC also welcomes **four new council members** who began their three-year terms on Sunday:

- **Ian Foster**, University of Chicago
- **David C. Parkes**, Harvard University
- **Ronitt Rubinfeld**, Massachusetts Institute of Technology
- **Suresh Venkatasubramanian**, University of Utah



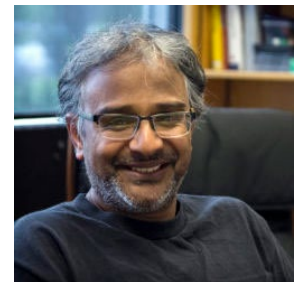
Ian Foster



David C. Parkes



Ronitt Rubinfeld



Suresh Venkatasubramanian

The CCC and CRA thank those Council members whose terms ended on June 30th for their exceptional dedication and service to the CCC and to the broader computing research community:

- **Elizabeth Churchill**, Google
- **Cynthia Dwork**, Harvard
- **Kathy Velick**, University of California, Berkeley



Elizabeth Churchill



Cynthia Dwork



Kathy Velick

The CCC Council is comprised of 20 members who have expertise in diverse areas of computing. They are instrumental in leading CCC's visioning programs, which help create and enable visions for future computing research. Members serve staggered three-year terms that rotate every July. To learn more about the CCC Council visit the [FAQ page](#).

The Surprising Security Benefits of End-to-End Formal Proofs

By Adam Chlipala



The following is a guest blog post by Adam Chlipala, associate professor of computer science at the Massachusetts Institute of Technology.

Many discussions of computer security adopt metaphors from war or biology. There is an arms race between attackers finding new ways to compromise systems, defenders implementing new mitigations, attackers figuring out how to breach them, and so on. Our systems must be prepared for great varieties of different attacks, each handled with its unique antibodies, which unfortunately can only be cooked up by surviving earlier, related attacks. What's essential is constant vigilance, and we never quite know what could go horribly wrong the next time.

The game could change if we rethink the way we design and build computer systems. This post is meant as a short pitch for how formal methods might enable that kind of major shift.

That is, we are talking about rigorous mathematical proofs that code behaves as expected. The concept may summon images of lovely foundational work by Dijkstra and others that became associated with significant over-promising in the 1980s. However, though it may seem paradoxical, in the 21st century, the ambition of formal methods has increased in ways that make practical application more achievable. Specifically, a significant community has sprung up around proofs that are machine-checked, that establish full functional correctness, and that apply in an end-to-end way to real, runnable code.

The general program of formal methods is to represent computer systems as mathematical objects, about which we can state theorems that we hope match our ideas of correctness, so that we can then prove the theorems and rule out misbehaviors. In short, the three principles called out above amount to the

With the approach we advocate for, there is much less code to audit for security problems, but human failings could still lead to consequential mistakes in that auditing.

following. Since humans are unreliable judges of mathematical arguments laid out on paper in prose, we prefer to use machine checking of proofs, where algorithms validate arguments spelled out in ASCII syntax, chaining together axioms and inference rules drawn from small vocabularies. We could rest on our laurels after proving that a program does not

crash, but there are good reasons to aim for full functional correctness instead, for instance showing that a program follows a mathematical rule mapping inputs to outputs. We could also be satisfied proving properties of mathematical models distinct from implementations, but it is much more satisfying to prove theorems about real, runnable code, ideally going end-to-end to include the whole platform it runs on (hardware, operating system, and so on).

Machine-checked proofs of functional correctness for real systems are a whole new engineering domain. Why should we expect security to come cheaper when we add new engineering tasks? The remainder of this article reviews standard challenges in applied security, which seem like they create new opportunities for costly human error with each new project. However, we show how formal methods can lower the risks of those errors dramatically.

It's worth emphasizing that the buck always stops somewhere. We will tour quickly through some ideas for reducing trusted computing bases dramatically. That is, on our list of components that go into a system, we are able to cross off many more of them, as weak points where single bugs could introduce security vulnerabilities. With the approach



Surprising Security Benefits *(continued)*

we advocate for, there is much less code to audit for security problems, but human failings could still lead to consequential mistakes in that auditing.

What If We Get the Proofs Wrong?

Many widely deployed security solutions involve relatively simple policies that are enforced by relatively complex mechanisms. For instance, as these things go, it is relatively straightforward to capture what constitutes a buffer overflow in a C program. However, if we want to detect buffer overflows automatically, quite a lot of sophistication in program analysis is required. Bugs in the mechanisms can invalidate the guarantees that policies led us to expect. Is this risk fundamental, where we shift our trust from the original systems to the security-mitigation code, which may itself be long and hard to get right?

The formal-methods tools called proof assistants provide a generic solution to that problem. Each proof assistant supports a very flexible language of logical specifications. For instance, the same tool can host reasoning about machine code, Java code, network protocols, or access-control policies. Even better, there is a generic proof checker applying to a fixed format of logical arguments, expressive enough to cover every proof strategy from the world of math. As a result, it is possible to settle on one tool that drives all of our security arguments, for a wide variety of policies and mechanisms. Now only our chosen proof assistant (with its runtime dependencies) is trusted, which is a big improvement over trusting a new



To be comprehensive, we must realize that time is a first-class citizen in security reasoning, so program semantics should associate timestamps with observable actions.

code base for each new security tool. The trusted cores of proof assistants tend to be relatively small and trustworthy, corresponding to checkers for small sets of logical axioms like those behind ZF set theory.

What If We Get the Specifications Wrong?

One new challenge with formal methods is deciding what theorems to prove about programs. If we pick the wrong theorem, then it is not very valuable to invest in a proof! Some of the same problems arise in today's mainstream security tools, where it is not obvious how to decide on the policies to enforce on programs. Fundamental but subtle gaps may exist from real users' expectations and priorities. Does this challenge need to remain as large as it is today?

An ironic phenomenon comes to our rescue. What does it mean to prove full

functional correctness of a program? Reasonable people may differ on which behaviors are mandated and which are implementation-defined. However, it tends to be true that the most common security vulnerabilities are ruled out when we manage to prove any theorem at all about a program! For instance, in proving an implementation of Dijkstra's algorithm, we could prove that it returns a shortest path, that it returns a path, or just that it returns a list of vertices that are actually in the input graph. If our program has a buffer-overflow vulnerability, then none of these theorems will hold! Buffer overflows and code-injection attacks give the attacker so much power that nearly any functional specification can be thwarted. That's why mechanized proof of modest-seeming behavioral specifications can yield big security dividends.

Admittedly, specification challenges remain, especially when behaviors we



Surprising Security Benefits *(continued)*

Systematic testing is often used in an attempt to gain similar confidence about systems, but it is hard to come up with good rigorous coverage metrics to tell us when our tests have covered all the corner cases.

had abstracted over come to be seen as security-critical. A good example is the recently publicized Spectre and Meltdown attacks, which take advantage of speculation and hardware memory caches to leak secrets through timing. Still, specifications don't need to get so specific about which attacks worry us. We just need to commit to being comprehensive and end-to-end in our theorems. To be comprehensive, we must realize that time is a first-class citizen in security reasoning, so program semantics should associate timestamps with observable actions. To be end-to-end, our proofs should encompass both software and hardware systems, to avoid surprises that one might provide to the other.

New challenges arise in proofs that span quite different abstraction layers, as in a C program running atop a processor. What if each major component of a system seems secure in isolation, but only through surprising interactions do we run into trouble? Spectre and Meltdown already provided a good example of this phenomenon. Again, commitment to end-to-end proofs can help us here. Consider the instruction-set interface, provided by a processor and relied upon by a compiled C program. Instruction-set manuals can be long and full of typos, so we might worry that we will make similar mistakes in creating

formal, mechanized versions. Here our key get-out-of-jail-free card is that as verified components snap together, specifications of internal interfaces leave the trusted base! That is, a full system with software running on a processor encapsulates the instruction set, the same way that a hash table encapsulates an array. The natural correctness theorem of the hardware+software system won't mention the instruction set, instead saying something like "when these bytes are sent on an input channel, these other bytes are received on an output channel." Any crucial bugs in the instruction-set specification will be discovered in trying to prove the system-level theorem.

Helpful Side Effects

We just outlined some principles for protecting security engineers from their own mistakes, and aspects of these principles can be made rigorous and formal themselves. However, some other nice benefits tend to follow as side effects of formalism.

Sometimes just writing down a specification promotes outside-the-box thinking. Before we even get to proving properties of systems, working out our detailed objectives can lead us to notice flaws. In this sense, formal specification acts like a souped-up kind of code review, where specification-writing forces deeper

understanding of systems and their consequences. Systematic testing is often used in an attempt to gain similar confidence about systems, but it is hard to come up with good rigorous coverage metrics to tell us when our tests have covered all the corner cases. By their nature, formal-specification languages often force consideration of all cases.

Once we get to carrying out proofs, it is undeniable that human engineers are going to expend significant effort working out the arguments. That effort may be considered the major obstacle to adoption of this approach (though see below for anecdotal evidence that the overhead is reasonable). However, it is natural for engineers to push back on complex system design choices, as a way to simplify their proofs. The proof engineer's headaches can be a good proxy for headaches that everyday developers would face, for instance in deciding how to configure a system securely. Perhaps things only get overwhelmingly complex in certain corner cases, but those corner cases could be crucial to some deployment, and proofs force consideration of all cases. So, then, for end-to-end mechanized proofs of functional correctness, the greatest payoff may be in nudges toward simpler system design.

Summing Up

- The classic technique to improve security assurance is to find ways to compartmentalize a system so that the trusted code base is as small as possible. However, several fundamental challenges arise:



Surprising Security Benefits (*continued*)

- While often security strategies can be captured in simple policy descriptions, complex implementation mechanisms may be required, which themselves account for large amounts of trusted code.
 - Many attacks have arisen based on clever ways to circumvent central abstractions, as with buffer overflows breaking type safety; and it is hard to enumerate (let alone protect against) all possible abstraction-smashing attacks up front.
 - Some vulnerabilities arise only when moderately complex components are composed, as with surprising consequences of processor-level speculation for observable timing in software. We can't hope to do separate security analysis of all possible compositions of components.
 - Even obscure corner cases can matter for security, and they will arise for users who don't specialize in security. It's challenging to anticipate all these cases in formulating a security analysis.
- All these challenges can push security engineers toward overengineered systems, with many features, each justifiable in isolation. Yet their combined complexity can overtax the cognitive capabilities of developers.
 - Perhaps surprisingly, adopting end-to-end mechanized proofs of functional correctness can provide principled help for all of these challenges.

Next Steps to Learn More

A number of serious projects have been carried out in the style advocated here. Some good examples are **CompCert**, the verified C compiler, and **seL4**, the verified operating-system kernel. The author has worked on a project called **Fiat Cryptography**, which generates low-level elliptic-curve-arithmetic code automatically with proofs of correctness. Today that generated code is included in Google's BoringSSL library, and Chrome uses it to establish most HTTPS connections. There is an interesting contrast between theorems covering

larger systems that have seen relatively less real-world use (e.g., CompCert, seL4) and theorems covering smaller but security-critical libraries (e.g., Fiat Cryptography). There is reason to bet on results of the first kind seeing increasing use in industry, considering the security benefits outlined here.

The most popular reference for learning proof assistants is the online book **Software Foundations**. Many undergraduates enjoy using it for self-study, starting just from usual first- and second-year undergraduate computer-science topics. The NSF Expedition **DeepSpec** runs related summer schools that each spend one week on basics and another week on advanced topics. Some of the characteristics called out in the second paragraph of this article form the basis of the concept of "deep specifications" as defined by the DeepSpec team, and many of the arguments used here were developed in that context.

Expanding the Pipeline: Diversity Sessions at the CRA Conference at Snowbird with a Focus on Women, Bias, and Harassment



CRA-W

Computing Research Association
Women

By Adam Chlipala

At the recent **CRA Conference at Snowbird** several sessions focused increasing diversity in computing. The conference provided an excellent opportunity to spread the message of increasing inclusion in computing to a wide audience of department chairs and leaders of government and industrial laboratories.

A plenary panel session on “Diversity in Leadership” moderated by Carla Brodley (Northeastern University) examined the challenges and opportunities in retaining diverse employees. The panelists emphasized that diversity must be a high priority for sustained period to make progress. In a subsequent parallel session, “Increasing Diversity in Computing is Easier Than You Think: Some Small Steps that Make a Big Difference,” led by Mary Hall (University of Utah), a panel shared information on **best practices**. The panelists emphasized: creating a community and welcoming environment for students from underrepresented groups; ways to recruit and to make a campus welcoming to diverse faculty, encouraging faculty to engage in service activities that support the mission of broadening participation; and recognizing that diversity includes people with disabilities as well.

Focus on Women, Bias, and Harassment

CRA and CRA-W board member Kathryn McKinley chaired the session “How to Stop Driving Women Out of Computing – What happens in your backyard matters!” which explored bias and harassment. It was well attended by both men and women. An interesting theme was that improving undergraduate culture has the potential for high impact on computing research and more broadly.

“Women did not just leave, they were pushed out.”

How We Lost the Women in Computing

Moshe Vardi (Rice University) explored the historical role of women in computing, sharing that in the early days of computing, women were pervasive, and that the social environment of computing has been and still is hostile towards women. Often men are not aware of this hostile environment. “Women did not just leave, they were pushed out.”



Vicki Hanson, CEO of ACM, shares a comment in the session, “How to Stop Driving Women Out of Computing”

Recent Harassment in our Community

Kathryn McKinley reported on the recent National Academies report *Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine*.

Findings of the report include:

- Sexual harassment is common in academic science, engineering, and medicine.
- Sexual harassment undermines women’s professional and education attainment, and mental and physical health. The cumulative effect is significant damage to research integrity and a costly loss of talent.
- The legal system alone is inadequate for reducing or preventing harassment.

Recommendations included:

- Go beyond protecting the “University/institutions”
- Address culture and climate.
- Add a code of ethics and research integrity.
- Hold PIs of Federal grants responsible.
- Professional societies have a role.



Focus on Women, Bias, and Harassment (*continued*)

Bias in Evaluation, Promotion and Recognition

Bobby Schnabel (University of Colorado-Boulder) presented insights from two recent studies. A longitudinal study assessed tenure outcomes of ~1,600 faculty, assistant professors in computer science, English and sociology. Explanations for differences in tenure outcomes between the genders were likely “subtle and/or unconscious gender bias.” The second study, “*Raising Doubt in Letters of Recommendation for Academia: Gender Differences and Their Impact*,” found more doubt raisers in letters for women faculty applicants.

Bias in Honors and Awards

James Allan (University of Massachusetts-Amherst) conducted an informal analysis of the number and percentage of women receiving organizational and society level awards (tables with detailed information are available in the [session slides](#)). In summary, while ~20% of PhDs go to women, only around 15% of awards go to them (with wide variations for individual award).

- The SIGARCH Blog created a digital meeting space for the community
- It takes a village to make change. There are many and diverse supporters taking action now.
- Sometimes it takes a public statement about how the community can improve.
- Sometimes it takes personal stories of bias and harassment to help understand the personal experiences of others.
- Change in large organizations is hard, but small steps matter
- Much work remains but the impact of this conversation is already visible

Change in large organizations is hard, but small steps matter.

Some Lessons from the Architecture Community

Sarita Adve (UIUC) shared her experience with shining a light on gender issues in the computer architecture community and lessons learned from it:

- Data speaks louder than vague perceptions – the architecture community collected historical data on the representation of women



James Allan (University of Massachusetts-Amherst)

A list of resources from the session are available [here](#) as well as the [session slides](#).

Applications Open for Upcoming CRA-W Career Mentoring Workshop



CRA-W

Computing Research Association
Women

Deadline September 1



CRA-W will hold early and mid career mentoring workshops for women on November 3-4 in Phoenix, AZ. The goal of these workshops is to provide an environment for mentoring, practical information, advice, and support among computing researchers.

Early Career Mentoring Workshops: (Labs and Research)

Deadline 9/1/18

The goal of these workshops is to bring junior researchers and educators together with women already established in their fields. The established professionals provide practical information, advice, and support to their younger colleagues. For women in the early career track this workshop is designed to provide advice and mentoring for junior faculty and graduate students.

Early CMW tracks offered – November 3-4, 2018:

- Research labs and industry (Early CMW-Labs)
 - » Track serves researchers in industry and government research labs, and senior graduate students interested in research lab positions.
- Research universities (Early CMW-Research)
 - » Track targets junior faculty in research universities and senior PhD students interested in research faculty positions.

Mid Career Mentoring Workshops: (Education, Labs, and Research)

Deadline 9/1/18

The goal of these workshops is to increase the percentage of computer science and engineering women faculty members and researchers/technologists who reach the top of their respective career tracks: faculty members by being promoted to full professor and researchers/technologists in industrial or governmental labs by being promoted to the top of their institution's technical ladder or entering upper management.

Mid CMW tracks offered – November 3-4, 2018:

- Teaching colleges (Mid CMW-Education)
 - » Track targets mid-senior teaching faculty.
- Research labs and industry (Mid CMW-Labs)
 - » Track serves mid-career researchers in industry and government research labs.
- Research universities (Mid CMW-Research)
 - » Track targets senior faculty in research universities.

My Parallel Careers in Industry and Academia

By Vivek Sarkar

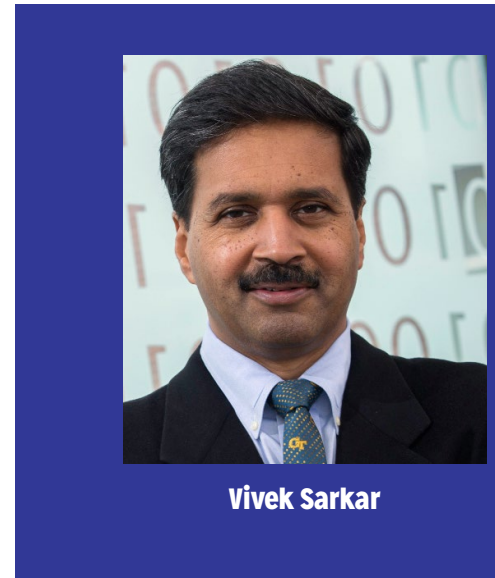
As a researcher, I am fascinated by the challenge of advancing the high-level foundations of computer software (programming models, compilers, and runtimes) to productively exploit the latest advances in computing systems. While there has been a long tradition of research in this area since the dawn of computing, the rapid evolution of hardware has continuously fueled a need for new software technologies as old approaches quickly become obsolete. Current explorations of new hardware directions that go beyond Moore's law have further amplified the motivation for this research direction.

I was fortunate to have two Turing Award recipients as mentors early in my career, and they considered this problem to be one of the fundamental challenges in computer science. During my graduate study at Stanford, my advisor, John Hennessy, encouraged my Ph.D. research on partitioning and scheduling the massive amounts of implicit parallelism available in functional/declarative programming models such as the Sisal language. When I joined IBM's T.J. Watson Research Center, my hiring manager, Fran Allen, inspired me to adopt more of a compiler-centric approach in my research so as to focus the mapping problem on program dependence graphs extracted from automatic parallelization systems such as IBM's PTRAN system.

My PTRAN research on mapping of parallelism naturally broadened to high-level program transformations for locality and parallelism, which in turn led to a unique opportunity for me to lead a development team to build IBM's ASTI optimizer, which is still being used in IBM's XL product compilers. In the

Jalapeño project, I was able to work with another world-class research team at IBM, this time with a focus on integrating dynamic compilation and runtime research in the context of Java virtual machines. This, in turn, grew into an opportunity to lead the creation of the Jikes Research Virtual Machine open source release in 2001, which continues to be used by researchers. The DARPA program on High Productivity Computing Systems (HPCS) offered me a new opportunity to tie together my past experiences in programming models, compilers, and runtimes for parallelism by leading the productivity effort in IBM's PERCS project, which included the development of the X10 parallel programming language. By the time I moved to academia in 2007, parallel computing had become mainstream with the widespread industry move to multicore computing. This motivated me to create the Habanero Extreme Scale Software group, first at Rice University and now at Georgia Tech, which led to the development of the Habanero-C/C++ and Habanero-Java programming systems to tackle many exciting research problems related to parallel software with impact on C++, Java, and OpenMP standards. Looking ahead, I am excited to have the opportunity to lead a new multi-university project in the Software Defined Hardware program as part of DARPA's Electronics Resurgence Initiative to address computing challenges beyond the end of Moore's law.

Every day, I try to emulate the values that John, Fran, and my other mentors have exemplified in their careers, which include a focus on advancing fundamental long-term research goals (rather than on short-term publication opportunities, for example), on building leading-edge prototype



implementations of new research concepts, on leveraging the technical vitality that arises from working in large and diverse teams, and in conducting all research-related and people-related activities with the utmost of integrity. I have also been very fortunate to have worked with amazing research collaborators throughout my career."

Pedagogy

While at IBM, I had the opportunity to teach or co-teach several graduate-level/professional short courses and tutorials, and discovered that I greatly enjoyed those experiences! I also recognized that development of new teaching material goes hand-in-hand with carrying out leading-edge research; the pedagogical clarity required to teach new concepts reinforces the conceptual clarity of the underlying research, and vice versa. However, it was only when I had the opportunity to teach undergraduate students at MIT in fall 1996 and fall 1997, while on leave from IBM, that I realized

My Parallel Careers *(continued)*

how truly rewarding teaching can be. After joining Rice in 2007, I sought out an opportunity to create a new undergraduate class on the fundamentals of parallel programming (COMP 322) in response to the trend that parallel computing was becoming mainstream, and the fact that parallel computing had mostly been taught at the graduate level. Undergraduate teaching also took on a personal meaning for me at that time, because that was exactly the time frame in which my oldest child was heading to college. Since there was limited pedagogic material available on this topic at the undergraduate level, I wrote 200-plus pages of lecture handout material and created 80-plus short videos with my children in mind as part of the target audience. By the time I moved from Rice to Georgia Tech in 2017, I was also able to use the COMP 322 material to create a Coursera online specialization of fundamentals of parallel, concurrent, and distributed programming. It has been truly gratifying to hear testimonials from Rice alumni who have taken this course, as well as from learners all around the world many of whom encounter these topics for the first time in the Coursera specialization.

Service and Mentoring

I truly believe that service is leadership and leadership is service. I feel that I have benefited in many ways from the vibrancy and support that I experienced as a member of the CS research community, and I always welcome opportunities to give back, whether in leadership roles such as serving as program chair, general chair, or steering committee member of major CS conferences, or in smaller ways such as seeking out junior members of

our community at research events to hear what's on their mind and offer them perspectives on what they are experiencing.

My awareness of CRA grew after I became chair of the CS department at Rice in 2013 and began to appreciate how CRA's mission to strengthen research and advanced education in computing plays a vital role in contributing to the well-being of CS departments overall.

I have been a member of CRA's board since 2015, and was excited to have the opportunity to serve as co-chair of the CRA Snowbird 2018 conference, and to develop its focus themes of "Diversity in Leadership" and "Ubiquity of AI" when putting together the conference program with the rest of the committee, along with timely topics for CS departments such as faculty growth, department rankings, faculty recruiting, schools/colleges of computing, industrial research in CS, and teaching faculty.

Finally, I especially value opportunities to mentor junior members of our community in industry and academia. While at IBM, I had the privilege of recruiting and mentoring a large number of researchers who were members of the department that I managed, and it has been especially satisfying to see them grow into world-class leaders. I also take special pride in the 16 Ph.D. students that I supervised more recently during my 10 years at Rice, and look forward to supervising at least as many more in the remainder of my career. When I was department chair at Rice, I also interpreted mentoring more broadly as community building within the department. It was extremely rewarding to meet with leaders of the undergraduate and graduate student

bodies to help them with their future initiatives and goals, and to discuss how to make our department more inclusive. One of my greatest satisfactions as department chair was to see the fraction of women in our undergraduate population increase from 23% to 35% during my term (2013-2016), while undergraduate enrollment in CS also doubled during that period.

About the Author

Vivek Sarkar is a professor in the School of Computer Science, and the Stephen Fleming Chair for Telecommunications, in the College of Computing at Georgia Institute of Technology. Prior to joining Georgia Tech, Sarkar was a professor of computer science at Rice University, and the E.D. Butcher Chair in Engineering. Since 2007, Sarkar has led the Habanero Extreme Scale Software Research Laboratory at Rice and Georgia Tech, which develops software foundations for current and future high-performance computing systems. He also served as chair of the Department of Computer Science at Rice during 2013-2016.

Prior to joining Rice in 2007, Sarkar was senior manager of programming technologies at IBM Research. Sarkar became a member of the IBM Academy of Technology in 1995, and was inducted as an ACM Fellow in 2008. He has been serving as a member of the U.S. Department of Energy's Advanced Scientific Computing Advisory Committee since 2009, and on CRA's board of directors since 2015.

Eben Tisdale Fellows Attend Policy Presentation at CRA Government Affairs Office

By Brian Mosley, CRA Policy Analyst



The Tisdale Fellows are, from left to right: Sidhartha Premkuma, Dell Inc.; Mia Luckett, Technology CEO Council; Amita Shukla, CRA; and Ashton Smith, Hewlett Packard Enterprise.

On Friday, June 29th, the CRA Government Affairs Office welcomed the 2018 class of **Eben Tisdale Science Policy Fellows** to the CRA office in Washington, D.C. These fellows, undergraduates at universities and colleges from across the United States, spent the summer at high-tech companies, firms, or trade associations in Washington, learning the intricacies of technology policy. Additionally, they took two class credits at George Mason University, and attended briefings at institutions such as the U.S. Capitol, Department of State, World Bank, and Federal Reserve. The fellows were in the office to attend a presentation by Brian Mosley, policy analyst in CRA's Office of Government Affairs, covering the policy concerns and issues that

the association works on and attempts to influence legislation and other concerns at the federal level.

This year's Tisdale Fellow for CRA is Amita Shukla (second from the right). Shukla is a rising junior at Columbia University, pursuing a major in computer engineering with a minor in political science; she is also a Presidential Global Fellow. This summer, Shukla has been tracking key federal appropriations and assisting CRA staff in the preparation of a number of events and reports. She also attended the 2018 CRA Conference at Snowbird in Utah. We've been thrilled to have her on staff this summer!

CRA Taulbee Survey Correction to Tables by Specialty Area



By Betsy Bizot, CRA Director of Statistics and Evaluation

In the report of the CRA Taulbee Survey published in the May 2018 CRN, there is an error in specialty area labeling in Tables D4 (Employment of New PhD Recipients by Specialty) and D4a (Detail of Industry Employment). In both D4 and D4a, the column labels for High Performance Computing and Human Computer Interaction were swapped. In addition, in D4a the column labels in alphabetical sequence between Informatics: Biomedical/Other Science and Social Computing/Social Informatics were incorrect.

Correct tables for 2017 are provided here. However, the High Performance Computing / Human Computer Interaction label swap goes back to 2014, and the D4a labeling error goes back to 2016. Corrected versions of those year's Taulbee reports will be posted online at <https://cra.org/resources/taulbee-survey/>

CRA regrets the error. If you have any questions, contact Dr. Betsy Bizot, CRA Director of Statistics and Evaluation, at bizot@cra.org

Table D4. Employment of New PhD Recipients By Specialty

	Artificial Intelligence	Computing Education	Databases / Information Retrieval	Graphics/Visualization	Hardware/Architecture	High-Performance Computing	Human-Computer Interaction	Informatics: Biomedical/ Other Science	Information Science	Information Systems	Networks	Operating Systems	Programming Languages/ Compilers	Robotics/Vision	Scientific/ Numerical Computing	Security / Information Assurance	Social Computing/ Social Informatics	Software Engineering	Theory and Algorithms	Other	Total	
North American PhD Granting Depts.																						
Tenure-track	22	3	11	2	5	4	12	5	10	5	8	2	2	2	0	14	0	9	2	11	129	9.1%
Researcher	2	0	0	1	0	1	3	2	1	1	2	3	2	0	1	4	0	1	1	2	27	1.9%
Postdoc	28	1	8	10	4	2	1	6	3	2	7	2	12	12	1	12	1	4	15	20	151	10.7%
Teaching Faculty	7	5	4	1	4	3	5	2	3	0	4	0	1	1	1	3	0	3	0	7	54	3.8%
North American, Other Academic																						
Other CS/CE/I Dept.	1	0	3	1	0	0	3	1	2	0	3	0	1	1	0	4	0	2	3	7	32	2.3%
Non-CS/CE/I Dept	0	0	0	0	0	0	0	2	3	0	0	1	0	0	0	0	0	0	0	1	7	0.5%
North American, Non-Academic																						
Industry	116	2	57	48	45	38	34	22	4	11	62	29	28	54	5	58	8	77	37	106	841	59.4%
Government	2	0	0	2	1	3	1	0	2	1	1	1	0	0	1	7	1	2	0	4	29	2.0%
Self-Employed	8	0	1	1	1	1	2	0	2	0	0	2	0	0	0	1	0	1	0	0	20	1.4%
Unemployed	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	3	0.2%
Other	1	0	0	1	0	0	0	1	2	0	0	0	1	0	2	3	2	2	0	7	22	1.6%
Total Inside North America																						
	188	11	84	67	60	52	61	41	32	20	87	40	47	71	11	106	12	101	59	165	1,315	92.8%



Taulbee Survey Correction (continued)

Table D4. Employment of New PhD Recipients By Specialty (Continued)

	Artificial Intelligence	Computing Education	Databases / Information Retrieval	Graphics/Visualization	Hardware/Architecture	High-Performance Computing	Human-Computer Interaction	Informatics: Biomedical/ Other Science	Information Science	Information Systems	Networks	Operating Systems	Programming Languages/ Compilers	Robotics/Vision	Scientific/ Numerical Computing	Security / Information Assurance	Social Computing/ Social Informatics	Software Engineering	Theory and Algorithms	Other	Total	
Outside North America																						
Ten-Track in PhD	2	0	3	1	0	1	4	1	5	0	1	1	0	0	1	2	0	3	2	4	31	2.2%
Researcher in PhD	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	4	0.3%	
Postdoc in PhD	6	0	0	0	1	0	3	0	0	1	1	0	0	0	1	0	1	3	1	18	1.3%	
Teaching in PhD	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	3	0	1	7	0.5%	
Other Academic	1	0	0	0	1	0	1	0	0	0	1	0	1	0	1	1	1	0	0	8	0.6%	
Industry	5	0	2	3	0	0	2	0	0	1	2	0	1	1	0	1	1	1	3	24	1.7%	
Government	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	5	0.4%	
Self-Employed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
Unemployed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
Other	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	0	1	5	0.4%	
Total Outside NA	15	1	7	5	3	1	11	1	6	3	7	1	2	1	5	3	11	7	11	102	7.2%	
Total with Employment Data, Inside North America plus Outside North America																						
	203	12	91	72	63	53	72	42	38	23	94	41	49	72	12	111	15	112	66	176	1,417	
Employment Type & Location Unknown																						
	43	2	19	21	16	5	11	7	2	5	17	7	2	8	3	9	2	14	18	206	417	
Grand Total	246	14	110	93	79	58	83	49	40	28	111	48	51	80	15	120	17	126	84	382	1,834	

Table D4a. Detail of Industry Employment

	Artificial Intelligence	Computing Education	Databases / Information Retrieval	Graphics/Visualization	Hardware/Architecture	High-Performance Computing	Human-Computer Interaction	Informatics: Biomedical/ Other Science	Information Science	Information Systems	Networks	Operating Systems	Programming Languages/ Compilers	Robotics/Vision	Scientific/ Numerical Computing	Security / Information Assurance	Social Computing/ Social Informatics	Software Engineering	Theory and Algorithms	Other	Total		
Inside North America																							
Research	82	1	21	20	27	14	20	14	3	6	21	12	15	40	3	24	2	34	17	23	28	427	50.8%
Non-Research	18	1	29	20	16	22	12	6	1	1	27	15	11	6	1	23	6	39	9	17	12	292	34.7%
Postdoctorate	0	0	2	1	0	2	0	1	0	0	4	1	2	1	1	2	0	0	4	3	2	26	3.1%
Type Not Specified	16	0	5	7	2	0	2	1	0	4	10	1	0	7	0	9	0	4	7	17	4	96	11.4%
Total Inside NA	116	2	57	48	45	38	34	22	4	11	62	29	28	54	5	58	8	77	37	60	46	841	
Outside North America																							
Research	3	0	2	3	0	0	2	0	0	0	0	0	0	1	0	0	0	1	0	1	13	54.2%	
Non-Research	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	1	1	0	1	1	8	33.3%	
Postdoctorate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
Type Not Specified	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3	12.5%	
Total Outside NA	5	0	2	3	0	0	2	0	0	1	2	0	1	0	1	1	1	1	1	2	24		

Congratulations to Ayanna Howard – 2018 Richard Tapia Award Winner



Ayanna Howard

CRA and CRA-W Board Member Ayanna Howard was recently named the recipient of the 2018 Richard A. Tapia Achievement Award for Scientific Scholarship, Civic Science and Diversifying Computing from the [Center for Minorities and People with Disabilities in Information Technology](#) (CMD-IT). The Richard A. Tapia Award is awarded annually to an individual who demonstrates significant research leadership and strong commitment and contributions to diversifying computing.

From the announcement:

“Ayanna Howard has been a leading innovator and researcher in the fields of robotics, computer vision, and artificial intelligence,” said Valerie Taylor, CMD-IT CEO and President. “Applications of her work have included the development of assistive robots in the home, therapy gaming apps and remote exploration of extreme environments. Throughout her career she has focused on bringing girls, underrepresented minorities, and people with disabilities into computing through programs related to robotics. Ayanna’s focus on engaging people with disabilities resulted in the creation of Zyrobotics, LLC., which provides inclusive mobile technologies that make learning accessible.”



CRA-W

Computing Research Association
Women

Howard will be presented with the award at the [2018 ACM Richard Tapia Celebration of Diversity in Computing Conference](#). She also received CRA’s [A. Nico Habermann](#) award in 2016.

CRA Board Member Nancy Amato to Head University of Illinois Department of Computer Science



Nancy Amato

Recently, Nancy Amato, a robotics expert and CRA board member, was selected to lead the University of Illinois Department of Computer Science. She will be the first woman to hold this position at the university.

From the announcement:

"We are thrilled to bring in someone with the esteem of Nancy Amato to lead the Department of Computer Science," said Tamer Başar, Interim Dean, College of Engineering. "Her global research reputation, the quality of her teaching, and her impact through an array of leadership positions will be a terrific asset for the department and the college. Our computer science programs' students and faculty have a great reputation. Professor Amato will grow our profile and impact even further in the coming years. This is a spectacular match."

Not only is Amato a CRA board member, but she is also heavily involved in other CRA committees and initiatives. Amato is a **CRA-W** board member and has served as co-chair. At CRA-W, she leads the **Distributed Research Experience for Undergraduates** and **Grace Hopper Celebration Research Scholars** programs. Amato is also a member of the **CRA Education committee** and organized the selection of the committee's **graduate student fellow**. Amato has participated in **CRA congressional visit days** and met with her representatives in Congress to make the case for computing research in Washington. In 2014, she received the CRA A. Nico Habermann Award for her efforts to increase diversity in computing.

From The News-Gazette announcement:

Amato said expanding access to all groups "is a strong passion of mine." She said the UI has made major strides in this area in terms of undergraduate enrollment and she hopes her role leading a program of its size and caliber gives her a "tremendous platform" to continue that work.

Congratulations, Nancy. [Click here to view the UI release.](#)



CRA-W

Computing Research Association
Women



CRA-E

Computing Research Association
Education

CRA and CRA-W Welcome Alejandra Guzman



Alejandra Guzman

CRA has recently hired Alejandra Guzman as a program associate. In this role, Alejandra supports CRA and **CRA-W** program activities with meeting planning, workshops, outreach activities, and committee support.

Alejandra graduated from Brown University in 2015 with an Education Studies degree. During her undergraduate career, she was deeply involved with student organizations that supported underrepresented student communities such as first-gen, low income, etc.

She has continued that work in her professional career as she supports disenfranchised students, particularly in STEM fields. Before joining CRA, Alejandra promoted computer science learning through Code Success, a Google-sponsored program at the National Society of Black Engineers (NSBE), which focused on enhancing NSBE members' CS technical skills as well as professional skills to ensure they were job ready upon graduation. In her free time, Alejandra enjoys spending time with her family, reading, running and playing with her cat.



CRA-W

Computing Research Association
Women



From the everyday to the exceptional, Microsoft Research pushes boundaries to help you achieve more.

microsoft.com/research



CRA Board of Directors

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Column Editor

Expanding the Pipeline

Patty Lopez, Intel

Abu Dhabi New York University

Visiting Faculty Positions Computer Science

Abu Dhabi New York University (NYU) Abu Dhabi is in a multi-year phase of growth. As such, the University's Program in Computer Science invites applications for a visiting faculty teaching position in computer science. Applicants holding a PhD, with teaching experience in all areas of computer science are welcome to apply. However, specific teaching areas of interest include (1) introduction to computer science and programming in Python; (2) discrete mathematics; (3) data structures; and (4) algorithms. Candidates are expected to be excellent teachers of undergraduate courses. The expected teaching load is two courses per semester (four courses per academic year). The classes are relatively small and typically have at most 24 students.

NYU Abu Dhabi is located on Saadiyat Island, the cultural centerpiece of Abu Dhabi. Successful candidates will find a vibrant teaching environment that includes supportive and highly motivated colleagues, and access to outstanding resources.

The terms of employment are highly competitive, and include housing and relocation allowances. Appointments, which are dependent on final budgetary approval, are for one academic year and can begin as soon as September 1, 2018, but later start dates are possible.

Review of applications is ongoing. To be considered, applicants should apply online

via Interfolio by submitting a complete curriculum vitae, a teaching statement and student course evaluations to: <https://apply.interfolio.com/51087>. To complete the online process, applicants will be prompted to enter the names and email addresses of at least three referees. Each referee will be contacted to upload their reference letter.

Please visit <https://nyuad.nyu.edu/en/about/careers.html> for instructions and other information on how to apply. If you have any questions, please e-mail nyuad.science@nyu.edu.

UAE Nationals are encouraged to apply.

American University

Term Faculty Position: Instructor or Professorial Lecturer Department of Computer Science

The Department of Computer Science of the College of Arts and Sciences at American University invites applications for a term faculty appointment for Academic Year 2018-2019. Rank will be dependent on experience and stature in the field. The appointment is a 9-month position and will commence on August 27, 2018. The position is potentially renewable.

Applicants should hold a Ph.D. in Computer Science. Highly qualified applicants with a master's degree in Computer Science will be considered. The ideal candidate will be an inspiring teacher with demonstrated excellence in entry-level Computer Science courses. The successful candidate will be expected to teach six sections (3 fall semester, 3 spring semester) of our

Introduction to Computer Science course (a python-based course that serves as an introduction to the computer science major). The teaching assignment also includes coordinating activities related to this introductory course including managing teaching assistants. All faculty are expected to hold office hours and participate in School and University activities and service.

The Computer Science Department offers both a BS and a MS in computer science. The undergraduate major has been experiencing rapid growth. As of Spring 2018, the department had 93 students registered as majors and 12 as minors. Learn more about the department at <https://www.american.edu/cas/cs/>.

American University is a private institution within easy reach of the many centers of government, business, research, and the arts located within the nation's capital. For more information about American University, visit www.american.edu.

American University is an equal opportunity, affirmative action institution that operates in compliance with applicable laws and regulations. The university does not discriminate on the basis of race, color, national origin, religion, sex (including pregnancy), age, sexual orientation, disability, marital status, personal appearance, gender identity and expression, family responsibilities, political affiliation, source of income, veteran status, an individual's genetic information or any other bases under federal or local laws (collectively "Protected Bases") in its programs and activities. American University is a tobacco and smoke free campus.

Submitting an Application

Salary is competitive. Review of applications will begin on June 15, 2018 and will continue until the position is filled. Please submit applications via <http://apply.interfolio.com/51082>. Include a letter of application, curriculum vitae, teaching statement, three letters of recommendation, and teaching evaluations and/or other material documenting teaching excellence, especially in the context of introductory computer science courses. Please contact Arthur Shapiro, at arthur.shapiro@american.edu if you have any questions.

Cal Poly State University

Full-Time Lecturer - Computer Science

Computer Science: Full Time Lecturer positions available in the Computer Science Department at Cal Poly, San Luis Obispo, during the 2018-2019 academic year.

For details, qualifications and application instructions (online faculty application required), visit WWW.CALPOLYJOBS.ORG, and refer to Requisition #104884.

Review Begin Date: July 2nd, 2018. EEO

Carnegie Mellon University

School of Computer Science - Faculty Hiring

The School of Computer Science consists of seven departments, spanning a wide range of topics in computer science and the application of computers to real-world

systems. Faculty positions are specific to each department, though in certain cases, joint positions are also possible.

We are seeking tenure, research, and systems track faculty candidates with a strong interest in research, an earned Ph.D., and outstanding academic credentials. Candidates for tenure track appointments should also have a strong interest in graduate and undergraduate education.

We are also seeking teaching track faculty candidates. You should have a Ph.D. in Computer Science or a related computing discipline, a background of demonstrated excellence and dedication to teaching, the ability to collaborate with other faculty in a fast-paced environment, and must be prepared to teach in a wide variety of settings, including large undergraduate lecture courses and classes delivered in non-traditional formats.

Candidates with a commitment toward building an equitable and diverse scholarly community are particularly encouraged to apply. We are very interested in applications from candidates who have a demonstrated track record in mentoring and nurturing women and students from groups traditionally underrepresented in computer science.

We will begin accepting applications beginning September 1, 2018. To ensure full consideration of your application, please submit all materials no later than December 3, 2018. In your cover letter, please indicate clearly the department(s)

you are applying to. You can learn more about our hiring plans and application instructions by visiting <http://www.cs.cmu.edu/employment-scs>.

For more information about the hiring priorities in a particular department, please visit a department site below:

Computational Biology Department:
<http://www.cbd.cmu.edu/tenure-track-faculty-positions/>

Computer Science Department:
<https://www.csd.cs.cmu.edu/careers/faculty-hiring>

Human-Computer Interaction Institute:
<https://hcii.cmu.edu/careers/list>

Institute for Software Research:
<http://www.isri.cmu.edu/jobs/index.html>

Language Technologies Institute:
<http://lti.cs.cmu.edu/news/lti-hiring>

Machine Learning Department:
http://www.ml.cmu.edu/Faculty_Hiring.html

Robotics Institute:
<http://ri.cmu.edu/about/hiring-faculty-positions/>

Please send email to faculty-search@cs.cmu.edu with any questions.

Carnegie Mellon University shall abide by the requirements of 41 CFR §§ 60-1.4(a), 60-300.5(a) and 60-741.5(a). These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities, and prohibit discrimination

against all individuals based on their race, color, religion, sex, or national origin. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, national origin, protected veteran status or disability.

EPFL Ecole Polytechnique Fédérale de Lausanne

Distributed and Decentralized Systems at EPFL

A position is available for a Post-Doctoral Researcher in the *Decentralized and Distributed Systems (DEDIS) lab* at EPFL led by *Prof. Bryan Ford*. The DEDIS lab focuses on building secure, scalable, and privacy-preserving decentralized systems, with a strong emphasis on building and deploying fully functional and usable systems. DEDIS is currently developing next-generation blockchain or distributed ledger technology, already *available as an open-source prototype* and in use by industry partners and within EPFL's campus-wide infrastructure. DEDIS is the only academic research lab globally to have both built a next-generation blockchain system from the ground up and regularly published its design elements in top-tier peer-reviewed security/privacy conferences such as IEEE S&P '16, '17, '18 and USENIX Security '16, '17.

The Post-Doctoral Researcher will work closely with Prof. Ford, PhD and undergraduate students, senior researchers, and software

engineers within the DEDIS lab, along with multiple external research and development partners from industry and academia. Some participation in teaching activities is also expected. Research activities will include notably the design, implementation, and experimental validation of state-of-the-art decentralized systems, including playing a core role in the ongoing design and development

of DEDIS's next-generation blockchain architecture and software infrastructure.

For further information and to apply, please see: <https://recruiting.epfl.ch/Vacancies/568/Description/2>



Postdoctoral Fellow in Center For Complex Networks and Systems Research

The Center for Complex Networks and Systems Research (CNetS.indiana.edu) has one open postdoctoral position to conduct an empirical investigation of time-evolving processes in large-scale complex networks, with a focus on scholarly communication. The appointment starts in September 2018 for one year and is renewable for another year, subject to funding and performance. The salary is competitive and benefits are generous.

The postdoc will join a dynamic and interdisciplinary team that includes computer scientists, physicists, and social scientists. The postdoc will work with Prof. Johan Bollen (www.informatics.indiana.edu/jbollen/) and Prof. Filippo Radicchi (homes.soic.indiana.edu/filiradi/)

Minimum Qualifications:

The ideal candidate will have a PhD in Physics, Applied Mathematics, Computer Science, or Computational Science; a strong background in analysis and modeling of complex systems and networks; and solid programming skills necessary to handle big data and develop large scale simulations.

Salary: Commensurate with qualifications and experience.

Rank: Postdoctoral Fellow

Appointment Type: Twelve-month non-tenure track appointment subject to satisfactory performance and funding; Potential to be extended annually for a maximum term of 2 years, subject to performance and funding. Position is currently funded for two years.

Apply Online at: <https://indiana.peopleadmin.com/postings/5933>

Special Instructions: Interested applicants should upload a letter of interest, CV, and contact information for three professional references using above application link.

Questions may be sent to tgholbro@indiana.edu

For Best Consideration Apply By: July 1, 2018

Ideal Start Date for position: September 1, 2018

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.

Florida Gulf Coast University

Department Chair and Associate/Full Professor, Software Engineering

U.A. Whitaker College of Engineering

The Department of Software Engineering at Florida Gulf Coast University (FGCU) invites nominations and applications for the position of Department Chair. Appointment will be at the Associate/Full Professor level with a 12-month multi-year contract with a preferred starting date of January 2019. FGCU is a public, comprehensive university offering a wide range of undergraduate and selected graduate degree programs. Faculty in the U.A. Whitaker College of Engineering is dedicated to quality education, research, and service, and are expected to be excellent teachers who are committed to innovative delivery of instruction that results in improved student learning; to engage in scholarly and service activities; and to engage in a continuous and outcomes-based assessment process. With an excellent climate, magnificent beaches, and superb natural resources, *Money* magazine recently ranked Fort Myers as one of the "best places to live in America."

MINIMUM QUALIFICATIONS:

An earned Doctorate in Software Engineering, Computer Science, Computer Engineering, or a closely related field from a regionally accredited institution with an established record of success and excellence in university teaching, scholarship, and service commensurate to being hired at the level of Associate

Professor or Full Professor. Ability to teach undergraduate software engineering courses, mentor and coach software engineering faculty and students, and participate in regional/national seminars, workshops and committees. Ability to deal effectively with a diverse range of learners and to use information technology as a pedagogical and professional tool.

A commitment to collaborate with other faculty to develop a shared vision of the future. Experience in program assessment.

PREFERRED QUALIFICATIONS:

Evidence of leadership ability, a record of creative program development and on-going scholarly work, and support for collaborative learning through integrated



Postdoctoral Fellow in Center For Complex Networks and Systems Research

The Center for Complex Networks and Systems Research (CNetS.indiana.edu) has one open postdoctoral position to study critical processes in networks of networks. The appointment starts in August 2018 for one year and is renewable for another year, subject to funding and performance. The salary is competitive and benefits are generous.

The postdoc will join a dynamic and interdisciplinary team that includes computer, physical, and cognitive scientists. The postdoc will work with Prof. Filippo Radicchi (homes.soic.indiana.edu/filiradi/).

Minimum Qualifications:

The ideal candidate will have a PhD in Physics or Applied Mathematics; a strong background in analysis and modeling of complex systems and networks; and solid programming skills necessary to handle big data and develop large scale simulations.

Salary: Commensurate with qualifications and experience.

Rank: Postdoctoral Fellow (RSP)

Appointment Type: Twelve-month non-tenure track appointment subject to satisfactory performance and funding; Potential to be extended annually for a maximum term of 2 years, subject to performance and funding. Position is currently funded for two years.

Apply Online at: <https://indiana.peopleadmin.com/postings/5833>

Special Instructions: Interested applicants should upload a letter of interest, CV, and contact information for three professional references using above application link.

Questions may be sent to filiradi@indiana.edu

For Best Consideration Apply By: June 1, 2018

Ideal Start Date for position: August 1, 2018

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.

lecture and lab activities. Previous academic administrative and/or industrial experience. Experience as an ABET visitor and/or with ABET accreditation standards. The ability to successfully develop relationships and interact with external university constituents in construction, business, and technology and to establish relationships internally. Interest in collaborating both within and outside of the university in the development and delivery of instruction. Skills in working in a rapidly developing regional comprehensive university with a focus on creating a student-learning environment among diverse academic disciplines.

HOW TO APPLY:

Please visit Eagle Jobs at <https://jobs.fgcu.edu> for posting details, EEO/AA policies, and application instructions.

DEADLINE:

This posting will remain open until filled. Applicant reviews will begin on August 1, 2018.

Gustavus Adolphus College

Assistant Professor of Computer Science

Gustavus Adolphus College invites applications for a tenure-track position of Assistant Professor of Computer Science to begin September 1, 2019. We seek candidates who have an earned doctorate in computer science (or a closely-related discipline), but will consider candidates who have achieved ABD status. The department is considering applicants with prior experience teaching programming either in a classroom or laboratory setting and will have the ability to teach introductory computer science courses.

Visit <http://gustavus.edu/jobs> for application instructions.

Review of applications will begin on October 19, 2018, and continue until the position is filled.

EOE Employer/Disabled/Vet

Idaho State University

Assistant/Associate Professor, Computer Science (1917, 1920)

Idaho State University invites applications for a tenure-track position (full-time, 9 months) in Computer Science at the Assistant or Associate level. The appointment will begin August 2019 and is based on our Idaho Falls campus. This position will be affiliated with the Idaho State University Polytechnic Campus and offers the opportunity to work with researchers at the Idaho National Laboratory.

Visit <https://isu.csod.com/ats/careersite/JobDetails.aspx?id=490> for details and to apply.

Lawrence Berkeley National Laboratory

NERSC Exascale Science Applications Postdoctoral Fellow (NESAP) - 85287

Berkeley Lab's NERSC Division has an opening for an Exascale Science Applications Postdoctoral Fellow. We are looking for highly motivated postdocs to join the NERSC ExaScale Application Readiness Program (NESAP), funded by the US Department of Energy Office of Science. Fellows will be working in multidisciplinary teams composed of computer, computational, and domain scientists that

will transition codes to the Cori system and produce mission-relevant science that truly pushes the limits of high-end computing.

Apply at <http://50.73.55.13/counter.php?id=135621>

McMaster University

Post-Doctoral Researcher Position

A post-doctoral researcher position is available in the Data Science Lab and the Wireless System Research Lab, McMaster University, Canada to develop novel algorithmic and system solutions to multi-camera target tracking and activity recognition. The position is for two years and is renewable for a 3rd year based on funding availability.

The postdoc researcher will join a dynamic team of researchers in data management, mobile computing, and multi-sensor fusion, and work alongside industry engineers. McMaster University is located in Hamilton, ON, an hour drive to Toronto downtown. It is a part of the Ontario high-tech corridor, and a vibrant hub for ICT.

Further details about the position and how to apply are available at:

http://www.cas.mcmaster.ca/~rzheng/PDF_ad_CV.html

National Science Foundation (NSF)

Multiple Program Director Positions

The National Science Foundation's Directorate for Computer and Information Science and Engineering, Division of

Information and Intelligent Systems (CISE/ IIS), seeks candidates to serve as Program Directors for two to four years under Intergovernmental Personnel Act (IPA) assignments. Individuals eligible for an IPA assignment include those from state and local governments; private and public colleges and universities; Indian Tribal governments; federally funded research and development centers; and qualified non-profit organizations involved in public management; where such assignments would be of mutual benefit to the organizations involved. Growing interest in artificial intelligence, data science, human-computer interaction, and related disciplines makes this an exciting time to join IIS at our new headquarters in Alexandria, Virginia.

For details and requirements please visit:
<https://www.nsf.gov/pubs/2018/iis18001/iis18001.jsp?org=NSF>

Northeastern University

Data Science Director

The College of Computer & Information Science and College of Engineering invite applications for the position of Assistant, Associate, or Full Teaching Professor & Director of the Data Science Program beginning Summer or Fall 2018. This is a full-time, benefits-eligible, non-tenure track position. Primary responsibilities include teaching and overseeing all aspects of the professional MS program in Data Science. The Program Director will provide overall coordination of program offerings and

assist in developing teaching schedules on a semester by semester basis; Will direct the Admissions Committee in reviewing applications for admission to the program; Advise and monitor students' performance, and review their academic records to determine eligibility for graduation. The Program Director will also teach three courses per year. This position reports to the Associate Deans of the Graduate Programs in the College of Computer and Information Science and College of Engineering.

Key Responsibilities of the Program Director include:

Administration and Curriculum Coordination: Interact with industrial and government agencies on behalf of the program; identify resources; Work with CCIS and COE faculty advisory board to review and revise program as needed; Coordinate staffing of approved program courses and other approved program positions, and resolve program space needs and issues; Evaluate faculty effectiveness; Hire full and part-time teaching faculty to teach in the program; Manage and coordinate all academic activities, including the creation of and grading of the program entrance examination; Provide overall coordination of program curriculum; Assist in developing teaching schedule on a semester by semester basis; Direct admission committee in reviewing applications for admission to the program; Develop and implement, in collaboration with the Office of Enrollment Management, innovative

marketing, recruitment and retention strategies to meet enrollment objectives; Represent the program internally at various college and inter-university functions; Oversee the hiring of program PT and FT/NTT faculty.

Student Services and Advising: Advise students regarding curriculum matters; Work with CCIS Graduate Student services on managing the academic probation and academic suspension process—monitor student performance at the end of each semester; Review reading/research/project/thesis course approval forms; Work with graduate school Associate Dean on student conduct and disciplinary matters; Manage graduation clearance process for IA students.

Candidates must hold a PhD in Computer Science or related field by the start date. Teaching experience at the graduate level strongly preferred. The rank of appointment at either the Assistant Teaching Professor, Associate Teaching Professor, or Full Teaching Professor will be determined on prior teaching experience and will be discussed with candidates during the interview process. Successful candidates will have demonstrated an expert grasp of knowledge of the field at all levels and be creative in their approach to teaching in an environment of cooperative, interdisciplinary and experiential education. Strong written, oral and interpersonal skills are required in order to communicate effectively with students in person and online.

For more information about the College of Computer and Information Science, please visit <http://www.ccis.northeastern.edu>, and for the College of Engineering, please visit <http://www.coe.neu.edu/>.

Please submit a cover letter of interest highlighting teaching accomplishments and relevant professional experience, a curriculum vitae, and the names and contact information of at least three references.

Compensation is commensurate with qualifications and includes an outstanding benefits package.

Northeastern University is an Equal Opportunity, Affirmative Action Educational Institution and Employer, Title IX University. Northeastern University particularly welcomes applications from minorities, women and persons with disabilities. Northeastern University is an E-Verify Employer.

Northwestern University EECS

Postdoctoral Research Associate

The Hester lab at **Northwestern University EECS** is hiring a postdoc focused at the intersection of systems, signals, human factors, and health. The postdoc will work closely with the lab director and collaborators across the University on mobile systems projects. This is a unique position where the postdoc will be able to immediately make an impact by:

- Leading current projects heading to IMWUT / UbiComp, SenSys, and MobiSys

- Collaborating across disciplines to solve grand problems; including shadowing physicians at Northwestern Medicine
- Starting an independent research program with the mentorship of Prof. Hester and others; including proposal writing for NIH and NSF
- Mentoring capable graduate and undergraduate students

To apply, please email a cover letter, CV, and research statement to Prof Josiah Hester.

Details: <http://josiahhester.com/cv/join.html>

Occidental College

Assistant or Associate Professor of Computer Science

Position Summary:

The Department of Computer Science at Occidental College invites applications for a faculty position at the Assistant or Associate level in Computer Science. We seek a computer scientist with a strong interest in building Occidental's newly formed Computer Science major and who can contribute to its connections to other disciplines. While all areas of computer science will be fully considered, we have a preference for candidates with research interests in hardware, software systems (such as operating systems, databases, and networking), computer graphics, data science, or security.

The department mission is to foster interdisciplinary interactions around computation for faculty and students; expose a diverse group of students

and faculty to techniques and tools of computer science, including the benefits and ethical concerns in applications; support students and faculty in cutting-edge computational research; and build department activities around high impact practices such as student research, community-based learning, international experiences, peer mentorship, and interdisciplinary approaches to learning.

Occidental College is a nationally-ranked small liberal arts institution situated in Los Angeles. Occidental is located in the culturally-rich neighborhoods of Eagle Rock and Highland Park, near Caltech, the Jet Propulsion Laboratory, the Natural History Museum, and other major research institutions. The College is committed to academic excellence in a diverse community and supporting interdisciplinary and multicultural academic programs that provide a gifted and diverse group of students with an educational experience that prepares them for leadership in a pluralistic world. We, therefore, strongly encourage applications from candidates who will further Occidental's mission of excellence and equity in their teaching, scholarship, and/or service.

Qualifications, Duties And Responsibilities:

Applicants should have a Ph.D. in Computer Science or related field, and a strong commitment to educating undergraduates through teaching and research. The successful candidate is expected to:

1. teach introductory and advanced courses in computer science;

2. offer additional courses in computer science to enhance our current offerings;
3. develop a rigorous research program involving undergraduates;
4. advise students across the College who may be interested in computing;
5. teach in the freshman cultural studies program;
6. participate in regular service to the department and the College.

Application Instructions:

Applicants should submit the following:

1. a cover letter detailing your interest in teaching in a liberal arts environment;
2. a statement of teaching philosophy that includes a discussion of your demonstrated commitment to, past evidence of, and future plans for creating equitable opportunities for learning and mentoring especially for underrepresented students;
3. teaching evaluations, evidence of effective advising, or other data, if available;
4. a statement of research interests and experience, including how students will participate in and benefit from your research;
5. a curriculum vitae; and
6. three confidential letters of recommendation (request writers to send separately).

Electronic application materials should be addressed to Dr. Kathryn Leonard, Chair, Computer Science, and sent by email to compsearch@oxy.edu. Review of applications will begin on September 16, 2018.

Occidental College is an Equal Opportunity Employer and does not unlawfully discriminate against employees or applicants on the basis of race, color, religion, sex, sexual orientation, gender identity, gender expression, pregnancy, breastfeeding or related medical condition, national origin, ancestry, citizenship, age, marital status, physical disability, mental disability, medical condition, genetic characteristic or information, military and veteran status, or any other characteristic protected by State or Federal Law.

We strongly encourage all underrepresented candidates, especially women and persons of color, to apply.

Occidental College

Full-Time Adjunct Instructor in Computer Science

Occidental College is seeking applicants for a 1-year, full time Adjunct Instructor who will teach the following four courses (a combined 3/3 load) during the 2018-2019 academic year, starting in late August 2018.

Fall 2018: Fundamentals of Computer Science is an introductory course for beginners in computer science, covering variables, branches, loops, and basic OOP in Python, but also briefly introduces Java, HTML, and CSS. The course has two three-hour lab sections in addition to three hours of lecture, for a total of nine hours of contact a week. This course and its labs count as 2 teaching units.

Fall 2018: An upper division elective to be chosen by the successful candidate. This course counts as 1 teaching unit.

Spring 2019: Fundamentals of Computer Science and its labs.

Spring 2019: Mathematical Foundations for Computer Science is a course for students who prefer not to take Linear Algebra and Discrete Math. It is a one-semester course with 4-week units on each of logic and intro to proofs, linear algebra, and statistics. This course counts as 1 teaching unit.

Applicants should have a Master's degree in computer science or a related field, with PhD and college-level teaching experience preferred. Applicants should submit a curriculum vitae, statement of teaching interests and experience (maximum two pages), and a list of references to the Chair of Computer Science, Kathryn Leonard (leonardk@oxy.edu), with the subject "Computer Science Adjunct Application."

Review of applications will begin immediately and will continue until the position is filled. Applications from all qualified candidates may be kept on file for future semesters.

Occidental College serves a diverse body of students, a diversity which is reflected in the enrollment in computer science courses. Women, persons of color, and minorities are strongly encouraged to apply. Please direct all questions about the position to Kathryn Leonard.

Occidental College is an Equal Opportunity Employer and does not discriminate against employees or applicants because of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, genetic information, marital status, sex, gender, gender identity, gender expression, age, or sexual orientation or any other characteristic protected by State or Federal Law.

Queen's University

Multiple Full-time Faculty Positions in Management Analytics

Smith School of Business at Queen's University (Kingston, Ontario, Canada) invites applications for multiple tenure-stream positions in Management Analytics (formerly, Management Science and Operations), with preference for entry (Assistant Professor) level, and with a preferred starting date of July 1, 2019. At least one position will focus on Operations and Management Science, and at least one position will focus on Machine Learning and Artificial Intelligence; scholars with both methodological and conceptual interests in the topics (e.g., Ethics in AI) are invited to apply.

Qualifications

Candidates must have a PhD, or be near completion. The successful candidate will exhibit strong potential for innovative and high quality scholarly research leading to top-tier peer-assessed publications, as well as for outstanding teaching contributions and an ongoing commitment to academic and pedagogical excellence, in support of the School's various public and private programs. The successful candidate will also be expected to make contributions through service to the School, the University, and/or the broader academic community.

Compensation

Salary will be commensurate with qualifications and experience. Appointees have access to substantial internal funds both for research and course development through Smith School of Business Research Program and our Faculty Development Fund.

The School also provides faculty members with support in their applications to external research granting agencies such as the Social Sciences and Humanities Research Council of Canada, among others. Smith School of Business faculty members have been quite successful with external research grant competitions.

Institution

Queen's University has a long and rich tradition of academic excellence, dating back to a royal charter granted by Queen Victoria in 1841. Smith School of Business is one of the world's premier business schools, with an outstanding reputation for innovation and quality. Our MSc and PhD programs in Management attract highly qualified research-oriented students in many fields of study. Our undergraduate Commerce program has among the highest entrance standards in Canada and is widely viewed as the country's best undergraduate business program. Queen's has gained international recognition for its MBA and executive education programs and is fully accredited by AACSB and EQUIS. Smith School of Business is also home to centres focused on analytics, corporate governance, entrepreneurship and innovation, and social impact. The learning environment at Queen's is supported by outstanding library and computing facilities (e.g., <https://cac.queensu.ca/>) More information can be found at: <https://smith.queensu.ca/index.php>, and general information about our faculty members is here: https://smith.queensu.ca/faculty_and_research/index.php

Management Analytics group

The Management Analytics group (formerly,

Management Science and Operations Management) is comprised of strong researchers with particular expertise in revenue management and pricing, sustainability, energy markets, supply chain management and the interface of operations and marketing. Group members hold top editorial board memberships and have won multiple prizes and awards.

The Management Analytics group is at the forefront of the Analytics/Big Data/AI revolution with a portfolio of highly successful programs delivered out of the Smith location in downtown Toronto. These include the highly regarded Masters in Management Analytics (MMA, https://smith.queensu.ca/grad_studies/mma/index.php), North America's first Masters in Management of Artificial Intelligence (MMAI, https://smith.queensu.ca/grad_studies/mmai/index.php), delivered jointly with Geoffrey Hinton's Vector Institute for Artificial Intelligence (<https://vectorinstitute.ai>), and multiple Executive Education programs in Analytics.

The group is also actively involved in industry collaborations, primarily in financial services, through the Scotiabank Center of Customer Analytics, <https://smith.queensu.ca/centres/scotiabank/index.php>, and is otherwise tightly embedded in Toronto's booming Analytics/AI scene.

The Cit(ies)

Smith School of Business operates in two locations:

Our main campus is in Kingston, Ontario – a unique Canadian city of 125,000 with a distinct blend of history, recreation, industry

and learning. Situated on the shores of Lake Ontario, Kingston offers unique waterfront living with many recreational and cultural opportunities. It is within a 2h train ride (~2.5-3h drive) to the commercial, industrial and political hubs of Toronto, Montreal, and the nation's capital, Ottawa, and a thirty-minute drive from the international bridge linking Ontario and upstate New York. The city is also the origin of the historic Rideau Canal system – a UNESCO International Heritage site. For more information please see: <https://www.cityofkingston.ca/explore/about-kingston>

Our second location is in downtown Toronto, where much of the Management Analytics group's activities take place. As demonstrated by various international rankings and reports, Toronto is one of the best cities in the world to live and work. For more information please see: <https://www.toronto.ca/city-government/data-research-maps/toronto-progress-portal/world-rankings-for-toronto/>

How to Apply

The effective date of the appointment will be July 01, 2019, but is flexible.

The University invites applications from all qualified individuals. Queen's is committed to employment equity and diversity in the workplace and welcomes applications from women, visible minorities, Aboriginal peoples, persons with disabilities, and LGBTQ persons. All qualified candidates are encouraged to apply; however, in accordance with Canadian immigration requirements, Canadian citizens and permanent residents of Canada will be given priority.

The University will provide support in its recruitment processes to applicants with disabilities, including accommodation that takes into account an applicant's accessibility needs. If you require accommodation during the interview process, please contact: Kevin Bissonette at kevin.bissonette@queensu.ca. Academic staff at Queen's University are governed by a Collective Agreement between the University and the Queen's University Faculty Association (QUFA), which is posted at <http://queensu.ca/facultyrelations/faculty-librarians-and-archivists/collective-agreement> and at <http://www.qufa.ca>.

To comply with Federal laws, the University is obliged to gather statistical information about how many applicants for each job vacancy are Canadian citizens / permanent residents of Canada. Applicants need not identify their country of origin or citizenship; however, all applications must include one of the following statements: "I am a Canadian citizen / permanent resident of Canada"; OR, "I am not a Canadian citizen / permanent resident of Canada". Applications that do not include this information will be deemed incomplete. Your application cover letter must include one of these two citizenship statements.

Applicants should submit:

- A cover letter (including one of the two statements regarding Canadian citizenship/ permanent resident status specified in the previous paragraph)
- A current Curriculum Vitae (including a list of publications)
- A statement of current and prospective research interests

- Evidence of research, such as copies of sample publications, working papers, or a dissertation proposal
- A statement of teaching interests and experience (including course outlines and evaluations if available)
- Three letters of reference

Deadline for applications: August 15, 2018

Note: only selected candidates will be contacted for interviews.

Submitting your application

Please send all documents in the application package electronically as PDFs to Dr. Jay Handelman, Associate Dean, Faculty, recruiting@business.queensu.ca.

Saint Mary's College of California

Adjunct Faculty, Math & Computer Science

Analysis of Algorithms (MA/CS 174) covers basic notions of the design and efficiency of computer algorithms, nonnumerical algorithms for sorting and searching and numerical algorithms. Underlying data structures are examined.

This course meets on Tuesday and Thursday from 8:00 - 9:35 am during the 2018 fall term.

Candidates must hold a Masters degree (or above) in Computer Science or closely related field and should have a record of successful teaching at the undergraduate level.

Interested applicants must apply online.



THE CITADEL

THE MILITARY COLLEGE OF SOUTH CAROLINA

Visiting Position in Computer Science

The Department of Mathematics and Computer Science invites applications for a visiting faculty position in computer science at the Assistant Professor level for the 2018-2019 academic year. Minimum qualifications include completion of all work toward a Ph.D. in computer science except possibly the dissertation (ABD). In addition, candidates should demonstrate a commitment to excellence in teaching, research, and service, and they should display the core values of The Citadel: honor, duty, and respect. Candidates from all areas of computer science are encouraged to apply, especially those with strong backgrounds in cybersecurity.

Located in beautiful Charleston, S.C., The Citadel is a fully accredited, public, comprehensive, co-educational college with a student body of 2300 undergraduate and 1000 evening and graduate students. The Citadel has been designated as a National Center of Academic Excellence in Cyber Defense Education by National Security Agency and Department of Homeland Security. The department has 16 full-time faculty members covering the areas of mathematics, statistics, and computer science. The department offers B.S. and M.S. degrees in computer science, a graduate certificate in cybersecurity, and minors in computer programming, management information systems, and cybersecurity. Teaching responsibilities include undergraduate courses in computer science for majors and minors and graduate-level courses in our joint Master of Science program with the College of Charleston. A normal teaching load is nine to twelve hours per week with small class sizes.

The Citadel encourages faculty scholarship and professional development. Salary and fringe benefits are competitive, and other benefits include convenient parking and access to the Citadel Beach House located on the Isle of Palms.

Applicants should submit a letter of application, curriculum vita, copies of transcripts, a statement of teaching philosophy, and at least three letters of reference. All application materials should be submitted online at The Citadel Careers web site, <http://careers.peoplepage.com/743/career/visiting>. If you have any questions or concerns while applying at the Citadel Careers web site, please call The Citadel's Human Resources Office at 843-953-6922.

Questions about the position may be directed to Dr. Shankar M. Banik, Chair, Computer Science Search Committee, Department of Mathematics and Computer Science, The Citadel, 171 Moultrie Street, Charleston, SC 29408, phone: 843-953-5039, or email: shankar.banik@citadel.edu. Review of applications will begin on July 15, 2018, and will continue until the position is filled.

Applications from women and minorities are especially encouraged. The Citadel is an affirmative action/equal opportunity employer actively committed to ensuring diversity in all campus employment.

Southern Illinois University Carbondale

Chair (Professor) Department of Computer Science

Chair (Professor) Full-Time, Department of Computer Science, Southern Illinois University Carbondale, effective 7/1/2019 or earlier, if possible, for the selected candidate.

See SIU Carbondale employment website for more details at <https://affact.siu.edu/ap.php>, COS-383.

SIU Carbondale is an Affirmative Action/ Equal Opportunity Employer of individuals with disabilities and protected veterans that strives to enhance its ability to develop a diverse faculty and staff and to increase its potential to serve a diverse student population.

All applications are welcomed and encouraged and will receive consideration.

Suffolk University

Visiting Assistant Professor of Computer Science

The Department of Mathematics and Computer Science at Suffolk University invites applications for a full-time Visiting Assistant Professor of Computer Science for the 2018-2019 academic year. Applicants should have a Ph.D. in Computer Science in hand by the September start date.

We are looking for someone with evidence of teaching excellence who is able to teach a variety of undergraduate Computer Science courses, including core courses in computer science. Experience with the

use of technology in the classroom is required. The successful candidate will also demonstrate a willingness to engage as a member of our team of computer science faculty in departmental and college service activity, such as course and curriculum development and student supervision.

Application should be made through the Suffolk HR website and should include the following elements: 1) letter of application; 2) CV; 3) copy of graduate transcripts; 4) statement of research and teaching interests; and 5) three professional letters of reference, which should be submitted electronically to Harpreet Kaur, HR Employment Coordinator at hkaur2@suffolk.edu.

Review of applications will begin immediately, with a final application deadline of August 15, 2018.

Suffolk University is a private, comprehensive, urban university located in downtown Boston, and is an equal opportunity employer committed to a diverse community. Candidates from underrepresented groups are encouraged to apply. To learn more about Suffolk University visit our website at www.suffolk.edu.

Application Link: <https://app.jobvite.com/j?cj=oSxU7fwa&s=https://cra.org/>

SUNY Korea

Assistant/Associate/Full Professor and Lecturer Positions

The Computer Science Department of SUNY Korea (<http://www.cs.sunykorea.ac.kr/>) invites applications for tenure-track and

Lecturer positions, to start in Fall 2018 or Spring 2019.

(A) Tenure-Track Faculty Position: An excellent faculty member is sought at all levels in all core areas of computer science. The position will be tenured or tenure-track at SUNY Korea, and will carry an affiliated faculty position with the Computer Science Department at Stony Brook University – State University of New York (SUNY), Stony Brook, NY (<https://www.cs.stonybrook.edu/>). Applicants should hold a PhD in Computer Science or closely related area and exhibit a strong commitment to research and teaching.

(B) Lecturer Position:

An excellent full-time lecturer is sought at the junior or senior level. The candidate is expected to teach introductory and advanced CS undergraduate and possibly graduate courses. It is possible for an excellent candidate to be converted into tenure-track at SUNY Korea at a later time. Engaging in research is encouraged but not mandatory. Applicants should hold a PhD or MS in Computer Science or a closely related area and exhibit a strong commitment to teaching. The SUNY Korea CS department offers BS, MS, and PhD degrees and is tightly integrated with the highly ranked CS department at Stony Brook University. The academic degrees awarded at SUNY Korea are identical to those of Stony Brook University, and the language at SUNY Korea is English.

SUNY Korea (<http://www.sunykorea.ac.kr/>) is located in the new master-planned city of Songdo, Korea, hosting both global organizations and multinational

corporations. Incheon international airport is just 20-minutes away and Seoul with its fascinating blend of Asian cultures is less than 1 hour away.

More information about the positions can be found at <https://sunyk.cs.stonybrook.edu/about-us/career/> and applicants should apply at <https://hiring.cs.stonybrook.edu/> (Select "SUNYK" for "Site"). Review of applications will start immediately and will continue until the positions are filled. Applications from non-Korean citizens, women, and minorities are encouraged.

Texas A&M University - Corpus Christi

Visiting Assistant Professor in Computer Science

Job Description:

Texas A&M University-Corpus Christi, College of Science & Engineering is seeking applications for a Visiting Assistant Professor position in Computer Science to begin fall 2018. The basic job requirements are teaching undergraduate and graduate level courses.

The Computing Sciences Department has undergraduate (BS in Computer Science and Geographic Information Science) and graduate (MS in Computer Science and Geospatial Surveying Engineering, Ph.D. in Geospatial Computing Sciences) programs with about 500 students and 23 faculty members. The undergraduate degree programs are accredited by ABET, Inc. The undergraduate and graduate programs are taught face-to-face and online. For more information on the Department, Programs, College and the University, please visit <http://www.csci.tamucc.edu>.

Required Qualifications:

1. Ph.D. in Computer Science or a closely related field at the time of appointment.
2. Ability to communicate effectively with an ethnically and culturally diverse campus community.

Preferred Qualifications:

1. Experience in teaching at undergraduate and graduate levels.
2. Experience teaching courses with more emphasis on programming.

TO APPLY:

http://hr.tamucc.edu/Job_Opportunities/

The George Washington University

Postdoctoral Research Scientist

The *X-Computing Lab* in the Department of Electrical and Computer Engineering at The George Washington University seeks applications for a postdoctoral research scientist to pursue and support cutting-edge research in computer systems and cybersecurity. This is a full time, multi-year, renewable position. The successful candidate will have earned a PhD in Computer Science/Engineering, and have a strong research record in one or more of areas: computer systems (operating systems, distributed systems, GPUs, etc.), computer security, and machine learning (deep learning, predictive analysis, anomaly detection, etc.).

To apply, visit: <https://www.gwu.jobs/postings/52348>.

Questions regarding the position can be directed to Prof. Howie Huang at howie@gwu.edu.

The Ohio State University

Department Chair

Department of Computer Science and Engineering

The Department of Computer Science and Engineering at The Ohio State University seeks candidates for the position of Department Chair. The Chair will drive the department forward towards its mission and set a vision for its growth, in alignment with the College's strategic plan.

Applicants must have a doctoral degree in Computer Science & Engineering or closely related field, as well as experience leading in and contributing to diverse learning environments. Previous leadership experience in an academic setting and budget oversight experience are desired but not required. Applicants should demonstrate experience mentoring students and junior faculty. In addition to such experiences, a successful applicant must possess a commitment to and demonstrated record of excellence in research, and a commitment to excellence in teaching. This position requires strong communication skills and excellent judgment, with the ability to manage multiple priorities in a fast-paced environment and work collaboratively with the college leadership.

Applications will be accepted until the position is filled. An initial review of applications will begin September 1, 2018. Additional details and application

instructions are available at <https://academicjobsonline.org/ajo/jobs/10869>

The Ohio State University is an equal opportunity employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation or identity, national origin, disability status, or protected veteran status.

The University of Alabama at Birmingham

Assistant Professor (non-tenure track)

The Department of Computer Science (CS) at the University of Alabama at Birmingham (UAB) is seeking candidates for a non-tenure-track Assistant Professor (teaching faculty) position, to begin Fall 2018. For additional information about the Department, please visit: <http://www.cs.uab.edu>.

Candidates with teaching expertise in all core computer science topics are sought, with preference given to Programming, Algorithms and Data Structures, Computer Architecture, Networking, and Software Engineering. UAB has made a significant commitment to teaching and teaching innovation in Computer Science. Candidates must consequently have strong teaching credentials preferably in a diverse range of areas and ability to advance the teaching strengths of the Department, including application of new results in CS education, establishment of new curricula and labs, online teaching, acquirement of educational grants, and participation in accreditation activities, student recruitment and advising.

The CS Department at UAB offers PhD, MS, BA and BS programs. The Department has a strong research focus, and a strong commitment to teaching, service and outreach. The PhD, MS, BA and BS enrollments are on the rise, with the goal of growing these programs significantly over the next several years. Research and educational funding is expanding significantly, and the Department plays a leadership role in Cyber Security and Data Science. Collaborations with UAB's medical enterprise are strong and growing, with many opportunities for faculty to participate in interdisciplinary work.

The candidate should have a PhD in Computer Science or a closely related field. Applications should include a curriculum vitae, a statement of teaching experience, philosophy and teaching innovation, and at least three references. Applications and all other materials should be submitted through UAB's portal at People Admin: uab.peopleadmin.com

Review of candidates will begin immediately, and the search will continue until the position is filled.

UAB is an Equal Opportunity/Affirmative Action Employer committed to fostering a diverse, equitable and family-friendly environment in which all faculty and staff can excel and achieve work/life balance irrespective of ethnicity, gender, faith, gender identity and expression as well as sexual orientation. UAB also encourages applications from individuals with disabilities and veterans. A pre-employment background investigation is performed on candidates selected for employment.

The University of Hong Kong

Tenure-Track Faculty Position – Big Data

Applications are invited for Associate Professor / Assistant Professor, full-time positions tenable from 1 January 2019. Applicants should have a Ph.D. degree in Computer Science, Computer Engineering, or a related field, with research areas related to big data. Applicants should have a strong commitment to research and teaching. A solid track record in research is essential. Preference will be given to applicants who have applied research experience in big data, especially big data system development or big data analytics experience in domains such as internet data, financial data, market customer data, public services data and social science and humanities science research data.

More information can be found at: <http://jobs.hku.hk/jd.php?id=201800962>

Application and enquiries should be sent to recruitment@cs.hku.hk

The University of Hong Kong

Tenure-Track Faculty Position – FinTech

Applications are invited for Associate Professor/Assistant Professor, full-time positions tenable from January 1, 2019. Applicants should have a Ph.D. degree in Computer Science, Computational Finance, Statistics or a related field, with research interest in one of the following areas: security and privacy issues in financial applications, emerging technologies related to finance such as blockchain,

cryptocurrency, e-payment, data analytics related to finance, computational and quantitative finance, and any area related to financial technology. Applicants should have a strong commitment to research and teaching. A solid track record in research is essential.

More information can be found at: <http://jobs.hku.hk/jd.php?id=201800963>

Application and enquiries should be sent to recruitment@cs.hku.hk

The University of Western Ontario

Limited-Term Appointment in Computer Science

The Department of Computer Science at Western University invites applications for a full-time Limited-Term faculty appointment at the rank of Lecturer or Assistant Professor, depending on qualifications and experience, to participate primarily in the delivery of Computer Science undergraduate programs. The appointment is expected with a flexible start date of September 1. The successful candidate will be appointed as a faculty member in the Department of Computer Science. The initial appointment will be up to 5 years in duration and is renewable. The rank and salary will be commensurate with the successful applicant's qualifications and experience.

This position has an 80% Teaching and 20% Service workload distribution. Teaching duties will include up to 3.0 full course equivalents over a twelve-month period, while Service duties will include program coordination,

departmental, faculty, university and professional committee work, as appropriate.

Requirements

- PhD in Computer Science or a relevant discipline
- Experience teaching at the postsecondary level

Assets:

- Excellence in undergraduate classroom teaching, as evidenced by, but not limited to:
 - Innovative undergraduate course, curriculum, or laboratory design and evaluation
 - Outstanding teaching evaluations
 - The effective implementation of technology in curriculum delivery
 - The use of teaching methods that enhance student engagement and learning
- Experience in providing high-impact learning experiences for undergraduate students
- Interest and/or experience in the scholarship of teaching and learning
- Training in pedagogy or teaching at the university level

Western University offers a full range of academic and professional programs for over 32,000 undergraduate and graduate students. General information about Western can be found at www.uwo.ca. In addition, the Teaching Support Centre at Western University (<https://www.uwo.ca/tsc/>) is an excellent resource for developing best practices in teaching and learning. Western

Computer Science is the second largest program in the Faculty of Science and one of the fastest growing programs Western.

The university campus is in London Ontario, a city of 410,000, located midway between Toronto and Detroit. With parks, river valleys, tree-lined streets, and bicycle paths, London is known as the "Forest City". London has a reasonable cost-of-living, and boasts an international airport, galleries, theatre, music and sporting events (see <http://www.london.ca/about-london>).

Candidates are invited to submit a letter of interest, a curriculum vitae, and a teaching dossier that includes evidence of teaching effectiveness and a statement of teaching philosophy to the address below. Please also arrange to have the names and contact information for at least three academic references sent in confidence by email or to the address below.

Dr. Hanan Lutfiyya
Department of Computer Science
Western University
1151 Richmond St
London, ON, N6A 5B7
E-mail: hlutfiyy@uwo.ca

Please ensure that the form available at: <http://www.uwo.ca/facultyrelations/faculty/Application-FullTime-Faculty-Position-Form.pdf> is completed and included in your application submission.

Applications will be accepted until the position is filled. Review of applications will begin on July 15, 2018. We thank all applicants for their interest, but only those selected for an interview will be contacted.

Positions are subject to budget approval. Applicants should have fluent written and oral communication skills in English. The University invites applications from all qualified individuals. Western is committed to employment equity and diversity in the workplace and welcomes applications from women, members of racialized groups/visible minorities, Aboriginal persons, persons with disabilities, persons of any sexual orientation, and persons of any gender identity or gender expression.

In accordance with Canadian Immigration requirements, priority will be given to Canadian citizens and permanent residents. Accommodations are available for applicants with disabilities throughout the recruitment process. If you require accommodations for interviews or other meetings, please contact dianne@csd.uwo.ca.

Two Sigma Labs

Research Scientist

Are you an extraordinary researcher with a passion for taming data? Do you focus on clarifying questions before seeking answers? Do you prefer teamwork over going it alone?

Two Sigma Labs performs formal, academic-style research to help drive technological innovation internally and externally. We engage the academic and professional communities, and apply leading-edge knowledge and insights to the company's top challenges. We extend the state of the art in key areas for the company, and we publish our results (see research.twosigma.com). As a highly

collaborative research team, we always seek internal and external partnership.

In the past few years, we have produced research results in parallel and distributed computing, domain-specific languages and runtimes, statistics, hardware security, and data mining. Some of these have had a profound impact on how Two Sigma does business and have established us as experts and leaders in the community.

We are currently interested in growing our research footprint in areas including:

- Everything data (from the implementation of novel data management systems to the principles of statistical data analysis)
- Machine learning
- Concurrent computing
- Languages
- Systems

Requirements include:

- A PhD in Computer Science or another quantitative field
- Publications in top research venues
- Interest and ability to implement proofs of concept
- Innate curiosity and resourcefulness
- No finance experience is required.

If you love collaborating on deep technical challenges that make an impact, please follow [this link](#) to apply now.

Two Sigma Labs is located in New York City's historic Soho neighborhood, known for its cast-iron buildings, art galleries, and fine dining.

University of Massachusetts Lowell

Lecturer - Computer Science

The Computer Science Department at The University of Massachusetts Lowell invites applications for a full-time, non-tenure-track faculty position at the rank of Lecturer to start in the Fall Semester of 2019. Primary responsibilities are to provide high-quality teaching and service to the Department. This position is renewable annually, potentially leading to an appointment as Senior Lecturer following six consecutive years of outstanding performance evaluations. The teaching load will be three courses per semester.

Minimum Qualifications (Required):

- Applicants must hold a doctoral degree in Computer Science or a closely related discipline
- Experience and demonstrated excellence teaching Computer Science at the undergraduate level are required

Special Instructions to Applicants:

To learn more or to apply, please visit: <http://explorejobs.uml.edu/lowell/en-us/job/494519/lecturer-computer-science>

The University of Massachusetts Lowell is an Equal Opportunity/Affirmative Action, Title IX employer. All qualified applicants will receive consideration for employment without regard to race, sex, color, religion, national origin, ancestry, age over 40, protected veteran status, disability, sexual orientation, gender identity/expression, marital status, or other protected class.

University of New Orleans

Assistant Professor

The Department of Computer Science at the University of Orleans invites applications for several tenure-track positions at the rank of Assistant Professor. We are primarily looking for applicants whose expertise would extend and complement existing strengths within the department. Candidates with expertise in machine learning, big data, environmental informatics, security and privacy, are especially encouraged to apply.

To apply, visit: <http://www.uno.edu/jobs/1654.aspx>

The University of New Orleans is an Affirmative Action / Equal Employment Opportunity employer. We do not discriminate on the basis of race, gender, color, religion, national origin, disability, protected Veteran status, age if 40 or older, or any other characteristic protected by federal, state, or local law.

University of Southern Denmark

Assistant Professor in Computer Science

The Department of Mathematics and Computer Science at the University of Southern Denmark (SDU), Odense, invites applications for a position in computer science, in the data science group, at the level of assistant professor. The position will start in the first half of 2019. An appointment as assistant professor lasts for three years, and contingent on successful completion of a lecturer training programme and a positive performance evaluation, a position for associate

professor is normally opened after the three years, for which the assistant professor can apply.

The successful applicant is expected to have a PhD in computer science and a strong track record of research at a high international level. To extend our competences in data science, we are seeking applicants in the following areas:

- machine learning and data mining
- exploratory data analysis (e.g., data visualization, explainable AI)
- databases (e.g., efficient/approximate index structures, MapReduce-like frameworks)
- multimedia data analytics (e.g., efficient similarity search for big/complex/multimedia data)
- prescriptive analytics (e.g., data-driven optimization, decision making in stochastic environments)

In addition to research the applicant must be able to teach and advise in computer science at all levels (undergraduate through PhD) as well as teach in a broad range of core computer science areas at the undergraduate level.

Fluency in English is required. Knowledge of Danish is not a prerequisite for application. More English than Danish is used when teaching in computer science, and more than half of the faculty members in computer science are foreigners. However, the primary administrative language at SDU is Danish so the hired candidate who is interested in continuing to an associate professor position should acquire Danish skills within a few years.

For a hiring on the level of assistant professor, the expectations on the applicant's track record, within research, teaching, and attraction of funds, is based on an academic age of one to three years past the PhD degree.

Deadline: 1 September 2018.

Please see the full call, including how to apply, on www.sdu.dk.

University of Virginia

Research Scientist

The Center for Research on Intelligent Storage and Processing in Memory is seeking a Research Scientist, for a term of up to three years, to pursue and support research on hardware, software, and applications driving the state of the art in memory and storage systems. The candidate will join a team of multiple faculty and a large group of PhD students working in this area, spanning the departments of Computer Science and Electrical & Computer Engineering. The candidate will report to Prof. Kevin Skadron, but will have the opportunity to collaborate broadly, and will also have opportunities to help in leadership of the Center.

The responsibilities of this position consist of leading and publishing an independent research project, helping advise other graduate students in the Center, helping prepare technical presentations, reports, and proposals, and identifying/leading new research opportunities. In helping coordinate center-wide activities, the research associate will have guidance and support from Prof. Skadron, as well as support of the Center staff.

The Research Scientist is expected to have a strong research record in computer architecture or processor design relevant to memory or storage systems, be self-directed, exhibit leadership skills, select appropriate research problems and techniques, exhibit strong writing and communication skills, be able to mentor graduate students, and be able to work with other teams.

The candidate must have a PhD in computer science or a related field. The start date is flexible. To apply visit [Jobs@UVA](#) and search on posting [0623536](#). Complete a candidate profile online and attach a cover letter, CV, research statement, and names of at least three references. Applicant review will begin July 15, 2018. The position remains open until filled.

UVA assists faculty spouses and partners seeking employment in the Charlottesville area. To learn more please visit <http://provost.virginia.edu/dual-career>. For more information about UVA and the surrounding area, please visit <http://uvacharge.virginia.edu/guide.html>.

With one of the highest graduation rates of minority undergraduate students and one of the highest percentages of women engineering students among public universities, UVA is fundamentally committed to increasing the diversity of its faculty and staff. UVA is an affirmative action and equal opportunity employer. We welcome nominations of and applications from women, members of minority groups, veterans and individuals with disabilities. We also welcome others who would bring additional dimensions of diversity to the university's research and teaching mission. We believe diversity is excellence expressing itself through every person's perspectives and lived experiences.

United States Naval Academy

One-year Assistant Research Professor

The Electrical and Computer Engineering Department at the United States Naval Academy is seeking applicants to fill a one-year Assistant Research Professor position with the possibility of renewal. The ideal

applicant will have experience conducting research in the area of emerging memory technologies, emphasizing commercially viable (within 10 years) technologies suitable for High Performance Computing (HPC) applications. Applicants with a strong record of scholarly activities and publications in all areas of computer engineering will be considered, including but not limited to emerging memory architectures, computer architecture, cyber security, parallel computing, distributed systems, storage systems, and embedded systems.

For more information about this position and how to apply please visit the USNA position announcement at <https://www.usna.edu/HRO/jobinfo/CompEng-AsstResearchProf.php>

Vienna University of Technology

Full Professor of Machine Learning

Announcement of an open position at the Faculty of Informatics, TU Wien, Austria

Full Professor of Machine Learning

The TU Wien (Vienna University of Technology) invites applications for a Full Professor position at the Faculty of Informatics.

The successful candidate will have an outstanding research and teaching record in the field of Machine Learning, which investigates and develops methods that provide computing systems the ability to automatically learn / improve from experience and to infer or recognize patterns using data, whether for exploratory purposes or to accomplish specific tasks. All areas of machine learning will be considered, covering theoretical foundations, systems, and enabling technologies for machine learning. Methods of interest include, but are not restricted to: statistical machine learning, supervised learning, unsupervised learning, reinforcement learning, deep learning, probabilistic

modelling and inference, data analytics and mining, optimization, cognitive systems, neural processing.

We offer excellent working conditions in an attractive research environment in a city with an exceptional quality of life.

For a more detailed announcement and information on how to apply, please go to: <http://www.informatik.tuwien.ac.at/vacancies>

Application Deadline: October 1, 2018

Vienna University of Technology

Full Professor of Ubiquitous Computing

Announcement of an open position at the Faculty of Informatics, TU Wien, Austria

Full Professor of Ubiquitous Computing

The TU Wien (Vienna University of Technology) invites applications for a Full Professor position at the Faculty of Informatics.

The successful candidate will have an outstanding research and teaching record

in the field of Ubiquitous Computing and focuses on next generation ubiquitous computing systems and their application in authentic real world settings. Particular research topics of interest include sensor-rich environments; interactive and smart spaces; new interaction paradigms; Internet of Things; mobile and context-aware computing; awareness and privacy; and tangible, situated and embodied interaction.

We offer excellent working conditions in an attractive research environment in a city with an exceptional quality of life.

For a more detailed announcement and information on how to apply, please go to: <http://www.informatik.tuwien.ac.at/vacancies>

Application Deadline: October 22, 2018.