

Computing Community Consortium Quarterly Activities Report 1JAN09 - 31MAR09

The activities summarized in this report are categorized by the five CCC goals.

Goal: Bring the computing research community together to discuss, prioritize and envision our future research needs and thrusts.

Activities: Visioning workshops, talks and articles, CCC blog, CCC website, Computing Research highlight, visionary talks, NetSE

Visioning workshops funded through the RFP process

(In many cases, additional information is available on the CCC website.)

Robotics

The lead for this effort is Henrik Christensen of Georgia Tech, heading a steering committee of 15 individuals.

A report of the roadmap to the congressional robotics caucus is currently scheduled http://www.nsf.gov/news/news_summ.jsp?cntn_id=114686 for May 21st. CRA/CCC is working with our communications consultants to ensure maximum dissemination of the prepared roadmap.

Cyber-physical systems

The lead for this effort is Jack Stankovic of UVa.

An additional workshop in the cyber-physical systems area has been planned for this spring.

New Forms of Industry – Academy Partnership in CPS Research; May 19, 2009

This by-invitation-only workshop is organized to discuss the unique needs and challenges of industry – academy partnership in Cyber Physical Systems (CPS) research.

Background

Broad-based technological and economic drivers have been rapidly transforming industrial products into Cyber-Physical Systems (CPS), in which computing and networking is deeply and inextricable integrated with physical system components and processes. This industrial transformation is pervasive in all systems industries from human- to societal-scale and spans a wide range of industrial sectors from transportation to energy and to health-care. CPS establishes a hugely important new role for Networking and Information Technology (NIT)

and defines new classes of challenges for Computer and Information Science and Engineering.

A crucial element of the CPS initiative has been the strong industrial support from a diverse group of companies. At the National Industry Roundtable in May 2007, the participants pointed out that CPS is a fundamental concern for the future competitiveness of their industries and they face fundamental scientific and technology challenges in the design of their next generation systems. The discussions made abundantly clear that CPS is a real, emerging and defining scientific and technology challenge of the 21st century.

Objectives

The objective of the Workshop is the discussion of industry - academy partnerships and collaboration in CPS research. The discussions should take into consideration the following challenges:

- a. There is a traditional distinction between academic and industrial R&D research: academic institutions conduct precompetitive, long term research funded mostly by government, while industry is engaged in short term, self-funded (IR&D) or contract (CR&D) activities.
- b. The separation of academic and industry research is counterproductive in CPS due to the strong need for new fundamentals to address the significant application pull. Industrial applications continuously produce a host of unsolved problems that are hard and real. Alignment of academic research and industry needs serves the interest of both communities.
- c. Existing forms of industry- academy research coordination often have reduced effectiveness because of barriers caused by size, legal constructs, and governance issues.

Expected Outcome

The expected outcome of the Workshop is a set of recommendations for effective forms of industry/academy collaborative research that can address the challenges above. Findings and specific recommendations will be summarized in a White Paper that will be distributed to Government Agencies and made accessible to the public.

Organizers

Janos Sztipanovits, Vanderbilt University Co-Chair
Don C. Winter, Boeing Co-Chair
John Baras, University of Maryland
David E. Corman, Boeing
Thomas E. Fuhrman, GM
Marija Iljic, CMU
Dimitris Ioannou, George Mason University
Clas A. Jacobson, UTRC
Bruce Krogh, CMU

P.R. Kumar, University of Illinois (UIUC)
Srikanta Kumar, BAE Systems
Edward A. Lee, UC Berkeley
Insup Lee, University of Pennsylvania
Alexander H. Levis, George Mason University
William P. Milam, Ford
Aloysius Mok, University of Texas at Austin
George Pappas, University of Pennsylvania
Raj Rajkumar, CMU
Lui R. Sha, University of Illinois (UIUC)
John A. Stankovic, University of Virginia
Andrew M. Vandivort, Raytheon
Bennett C. Watson, LM

Big-Data computing

The leads for this effort are Randy Bryant from CMU and Thomas Kwan from Yahoo!

CCC co-sponsored the original set of workshops to bring together academic and industry researchers (Yahoo! was the other co-sponsor). This work has continued without direct CCC contributions but with the direct engagement of those who ran the CCC visioning workshops. Most recently, Yahoo! has announced that it will partner with four universities to advance cloud computing systems and applications research. The four institutions are: the University of California at Berkeley, Cornell University, the University of Massachusetts at Amherst, and Carnegie Mellon University. From the press release:

“Yahoo! is dedicated to working with leading universities to solve some of the most critical computing challenges facing our industry,” said Ron Brachman, vice president and head of Yahoo! Academic Relations. “The ability to access and analyze massive data sets is becoming increasingly crucial to the advancement of Internet-related computer science and cross-disciplinary research. By expanding our university-facing cloud computing program to partner with more universities, we hope to catalyze data-intensive computing research, furthering our commitment to the global, collaborative research community advancing the new sciences of the Internet.”

One Learning Community per Student: Global Resources for Online Education

The lead for this effort is Beverly Park Woolf of UMass-Amherst, heading a steering committee of six individuals.

Computing technology plays an increasingly important role in the advancement of education through computational models, reasoning, experimentation and implementation of mobile and ubiquitous pedagogical software. Computation is also growing as a basis for education in core ideas as well as simulations and data management. GROE will influence computing research funding strategies in all these areas, with the intention of accelerating improvement in education at all levels.

Immediate topics of interest include: partnerships, services and tools for learning based on improved understanding of human cognition; improved human-computer interaction for individual productivity (e.g. incorporating human speech and gesture); networking, mobile and ubiquitous computing to support collaboration and create seamless social learning; predictable and robust repositories of learning services and assessment tools; and enhanced software and hardware for personal computer literacy. This process will also address such issues as the business case for education, strategies for distributed intelligence that can be coordinated into common learning activities, means for blending real and virtual worlds, and open questions about how people learn.

First workshop scheduled for April 2009.

System-level, Cross-layer Cooperation to Achieve Predictable Systems from Unpredictable Components

The leads for this effort are Andre De Hon of Penn, Heather Quinn of LANL, and Nicholas Carter of Intel, heading a steering committee of 12.

The Cross-layer Reliability (RelXLayer) visioning process will address the fact that we will no longer be able to reliably design or manufacture fault-free hardware systems. As the critical dimensions of devices, such as transistors and wires, used to implement computer systems shrink to only a few nanometers, rates of transient faults, permanent defects, and variation between devices on the same die are expected to increase to the point where today's fault-tolerant approaches will no longer be practical. Instead, computer systems will need to adopt a model in which each layer in the abstraction hierarchy - applications, O/S, architecture, circuits - is prepared for the layer below to transmit bad data and in which all of the layers in the hierarchy cooperate to deliver correct operation in spite of faults, variations, and other effects. Exacerbating this challenge is the need to continually reduce net energy per operation while providing this protection.

The first workshop was held in March 2009. The second workshop is scheduled for July.

Envisioning National and International Research Infrastructures for Multidisciplinary Empirical Science of Free/Open Source Software

The leads for this effort are Walt Scacchi (University of California, Irvine), Kevin Crowston (Syracuse University), Megan Conklin (Elon University), and Greg Madey (Notre Dame University).

This initiative is just getting launched. The organizers will hold an international workshop and supporting meetings focused on developing a strategy for establishing and sustaining a national and international research infrastructure supporting empirical studies of free/open source software (FOSS, or sometimes FLOSS) by academic and industrial researchers in different disciplines. The activities build from recent research

meetings on FOSS repositories and the emergence of shared research infrastructures that support multi-disciplinary studies of FOSS development.

ICT for Development: A New Grand Challenge for Computer Science

The leads for this effort are Tapan Parikh (UC Berkeley), Lakshmi Subramanian (NYU), Bill Thies (MIT), and Muneeb Ali (Princeton).

This initiative has been approved but initial workshop plans have not been formulated yet.

Broader-Themed Workshop

Computing Research that Changed the World: Reflections and Perspectives

This Symposium took place as scheduled on March 25, 2009, in the Members Room of the Library of Congress. The objective was to raise the visibility of computing research with federal policymakers. The website <http://www.cra.org/ccc/locsymposium.php> contains all information with highlights given here.

Sessions and Speakers:

Introductory Session: Changing the World

Ed Lazowska (University of Washington)

Session 1: The Internet and the World Wide Web

Why We're Able to Google

Alfred Spector (Google)

The Magic of the "Cloud": Supercomputers for Everybody, Everywhere

Eric Brewer (University of California, Berkeley)

Human Computation

Luis von Ahn (Carnegie Mellon University)

Session 2: Evolving Foundations

Security of Online Information

Barbara Liskov (Massachusetts Institute of Technology)

Learning to Improve Our Lives

Daphne Koller (Stanford University)

Global Information Networks

Jon Kleinberg (Cornell University)

Session 3: The Transformation of the Sciences via Computation

Supercomputers and Supernetworks are Transforming Research

Larry Smarr (University of California, San Diego)

Computing and Visualizing the Future of Medicine

Chris Johnson (University of Utah)

Zooming In On Life

Gene Myers (Howard Hughes Medical Institute)

Session 4: Computing Everywhere!

Sensing Everywhere!

Deborah Estrin (University of California, Los Angeles)

Pixels Everywhere!

Pat Hanrahan (Stanford University)

Robots Everywhere!

Rodney Brooks (Massachusetts Institute of Technology/Heartland Robotics)

There were six congressional honorary co-sponsors: Congressmen Bart Gordon, Ralph Hall, Daniel Lipinski, Vern Ehlers, and Rush Holt, and Senator Jay Rockefeller.

We had 111 attendees (some partial) not including CRA staff. The attendees included congressional staff, Congressman Lipinski, staff from every relevant federal agency, policy makers, computing researchers and a specially invited group of young “anticipated leader class” new computing researchers (taken from Sloan Fellows and Microsoft Faculty Fellows).

Unquestionably the day was a grand success with high praise for everything from the logistics to the content.

The symposium was extensively covered in the CCC, ACM and other blogs and will be reported on in the June CACM.

At this point all presentations have been made available on the website.

We are generating “one-pager” summaries of each talk for general use - booklet on computing research, recruiting materials, etc.

Video of each presentation is almost ready to go up on the website. The video is made freely available for non-commercial purposes (teaching, recruiting, etc.)

Talks and Articles

Talks

Ethics for All, Dave Waltz, AAAI Presidential Panel, Asilomar, CA, 21FEB0

CCC Blog

01APR09 Library of Congress symposium slides are up!
29MAR09 More on “Computing Research that Changed the World”
26MAR09 My Day at the Library of Congress
20MAR09 The Mystic Arts of Emergency Informatics
15MAR09 A Symposium on “Computing Research that Changed the World”
21FEB09 Does Better Security Depend on a Better Internet?
17FEB09 The Case for 4D Immersive Holographic Spaces
15FEB09 What is a “Better Internet”?

11FEB09 Update on CCC Robotics
09FEB09 “Today’s Research is Tomorrow’s Infrastructure”
01JAN09 Nominations Sought for New CCC Council Members

CCC Website

The CCC website continues to be fleshed out with content. For each workshop sponsored by CCC, we are collecting and posting:

1. Lead for effort
2. CCC Council liaison for this effort
3. Lead(s) for this workshop (may be same as overall lead, may not be)
4. CCC Council liaison for this workshop (may be same as overall liaison, may not be)
5. Vision for this workshop (one-pager)
6. Local Arrangements (location, dates, etc.)
7. Agenda/speakers
8. Meeting Materials (slides, talks, webcasts)
9. Participants
10. Highlights (one-pager or so)
11. Blog post to highlight these highlights
12. Final Report including next steps and any requests to CCC for additional support/effort

Computing Research Highlights

09FEB09 MIT's Sixth Sense
26FEB09 Epidemiologic Model Shows Potential for Wireless Infection Spread and Prevention

Visioning talks at March 9th CCC Council meeting

1. Prabhakar Raghavan, Yahoo!, “Hard Science Problems at the Core of the Web”
2. John Tang, Microsoft Research, “Social Media:Future or Fad in Supporting Collaborations?”
3. Nick McKeown, “Open Programmable Mobile Internet 2020 Briefing”
4. Chip Elliot, BBn, “GPO Briefing”
5. Ellen Zegura, GT, “NetSE Briefing” via phone
6. Drew Endy, Stanford, “Coputnig the Future of Biology & Biotechnology”

All talks have been posted at <http://www.cra.org/ccc/399CCC.php>

As well we have posted all previous visioning talks given at CCC Council meetings.

NetSE update

The goal continues to be a report that can be used by the community to motivate research thrusts. During this quarter we have come very close to concluding this report.

Research Support for Fresh Ph.D.s

The CCC has taken the lead in a new effort to ensure the research productivity of young members of the computing research community by developing a proposal, Computing Innovation Fellows, to fund a reasonably large number of new Ph.D. recipients over the next year. The need for doing so is palpable due to the economic climate - both universities and industry are unable to hire the research/teaching talent that they require. Peter Lee, CCC Council member and incoming CRA Board Chair, leads the effort and Andy Bernat, Ed Lazowska, Anita Jones, Bob Sproull, Fred Schneider, Susan Graham and Ran Libeskind-Hadas of the Council are co-PIs or senior personnel; CRA Board members Robert Schnable, Andrew Chien and Rangachar Kasturi are also co-PIs or senior personnel. The proposal was submitted to NSF on March 26th.

The “One-Pager” for the project follows.

Computing Innovation Fellows Project: CIFellows

The Computing Community Consortium and the Computing Research Association, with funding from the National Science Foundation, announce a program for new PhD graduates to obtain one-to-two year postdoctoral positions at host organizations including universities, industrial research laboratories, and other organizations that advance the field of computing and its positive impact on society. The goals of the CIFellows project are to retain new PhDs in research and teaching and to support intellectual renewal and diversity in the computing fields at U.S. organizations during the current economic situation.

PROJECT DESCRIPTION

This project will provide grants to approximately 60 new PhD graduates in Computer Science, Computer Engineering, Information Science, and closely related fields. Grants will provide funding for one year of work with a mentor at a host organization. Awardees will be eligible to apply for a second year of funding.

The project seeks to involve many organizations and sub-disciplines in order to encourage cross-flow and broad participation. In particular, it is anticipated that no more than two CIFellows will be awarded to graduates of the same institution and that no host organization will host more than two CIFellows. It is expected that the project will involve approximately 50 different organizations.

Each CIFellow must have a mentor at a host organization. CIFellows may engage in research, teaching, and/or other activities, such as public policy work, that contribute to the advancement and vitality of computer science and allied disciplines.

ELIGIBILITY

A CIFellow must have completed all requirements for graduation from a U.S. PhD program between May 1, 2008 and August 31, 2009. The PhD must be in Computer Science, Computer Engineering, Information Science or a closely related field. Preference will be given to U.S. citizens and permanent residents, but others will be considered.

AWARD SIZE AND DURATION

Awards will be for \$75,000 salary for 12 months with approximately \$25,000 for fringe benefits and a \$15,000 allowance for moving, travel, and discretionary expenses. Host organizations will receive indirect costs at the 25% rate. The 12-month assignment must begin by November 1, 2009.

<http://cifellows.org>

Goal: Communicate these challenges, needs and thrusts to the broader national community.

Activities: CCC blog, Computing research highlight, communications support, essays highlighting the promise of computing research, symposium

CCC Blog

See above

Computing Research Highlight of the Week

See above

Communications support

CCC and CRA have jointly engaged Xenophon, a communications consulting firm, to advise us on ways to create a bolder public presence for the computing field.

Computing Research Initiatives for the 21st Century

A set of essays produced under CCC leadership to highlight the promise of computing research is available at <http://www.cra.org/ccc/initiatives>; all of these were provided to (*and actually read by!*) members of the transition team.

Broadband policy

We have been particularly active in attempting to inform federal broadband policy under the stimulus initiative, an effort launched during the transition team period but intensifying during this quarter.

Cybersecurity policy

Following up on one of our transition team white papers, members of the CCC Council played central roles in interactions between the computing research community and Melissa Hathaway, the individual in charge of the new administration's 60-day review of the nation's cybersecurity strategy.

Broader-themed workshops

Computing Research that Changed the World: Reflections and Perspectives
As discussed above

Goal: Create within the computing research community more audacious thinking.

Activities: Visioning workshops, talks and articles, CCC blog, CCC website, Computing research highlight, visionary talks, symposium

These activities, each of which was discussed above, are each designed to encourage participants and others to think about deep visions within computing research.

Goal: See the ideas developed in (1) and (3) turn into funded research programs and/or instruments.

Activities: working with the Cyber-physical infrastructure effort, working with Big-Data activities, research support

The cyber-physical systems effort is the furthest along in engaging with other federal agencies due to its connection across all areas. We are also working to engage CPS with industrial research funding sources, striving to build a consortium supporting the effort.

The big-data effort continues to be a collaboration of NSF with companies; during this quarter Yahoo! announced a new partnership.

Research Support for Fresh PhDs; see above

Goal: Increase the excitement within computing research and use that excitement to attract students of both genders and all ethnic groups into computing research careers.

Activities: CCC blog, Computing research highlight, symposium, research support

CCC Blog

See above

Research Highlights

See above

Broader-themed workshops

Computing Research that Changed the World: Reflections and Perspectives

As discussed above, we are making the presentations and videos widely available for use in teaching and recruiting. The talks are ideal for conveying the excitement of computing to a broad audience as they are not specialist talks.

We also have video of the four demonstration projects that were highlighted at the closing session and will make them available.

We intend to produce a booklet based upon one-page summaries of the talks. This will also be provided in source form so that institutions and individuals can use it as is most appropriate for them.

Research Support for Fresh Ph.D.s

See above

Assessment Activity and Strategic Plan Development

Considerable progress was made on a Self-Assessment document during December, and on a very substantially revised Strategic Plan in January and early February. This progress was thwarted by the need to focus intensively on issues related to broadband stimulus (coordination of a white paper to NTIA from the research and education sector), cybersecurity (coordination of a 30-person teleconference with Melissa Hathaway), establishment of a Postdoc program using stimulus funds, and the March 25th Library of Congress symposium. Each of these activities repeatedly required very substantial leadership and engagement by most of the key members of the CCC Council, particularly Ed Lazowska, Susan Graham, Peter Lee, Fred Schneider, and Andy Bernat. We reviewed the Strategic Plan at our Council meeting on March 9, and expect to have a draft ready for review shortly.

Network Science and Engineering Research Plan

We have been closely involved with NSF in moving the NetSE report towards conclusion. At this point, a solid draft of the synthesis chapter is complete and has been sent out to the workshop chairs for their comments; it is being revised and will be sent then to a broader audience.

Council Membership

When the Council was originally constituted, the newly appointed members were randomly assigned one-year, two-year or three-year terms in order that there be overlap as individuals rotated off/on. At the end of December, the terms of Jones, Karp, Sproull, Andrews and Sutherland expired. In January, Jones, Karp and Sproull were re-appointed; and Stephanie Forrest UNM, Chris Johnson Utah, Frans Kaashoek MIT, and Ran Libeskind-Hadas HMC, were added to the Council.

Operational Matters

1. Council conference calls took place generally bi-weekly for discussion of issues.
2. Calls between the CCC leadership and NSF CISE leadership took place generally bi-weekly for discussion of issues.
3. A team from NSF Division of Grants and Awards visited CRA in November 2008 to review CRA procedures and records. The review ending with a closing of the file.