

Department of Computer Science

Atanasoff Today

2010-2011

Alumni Newsletter



Getting Ready for Competition! 18 CS and SE students participated in the fall 2010 Regional ACM Intercollegiate Programming Contest (sponsored by the ACM and IBM) in Lincoln, Nebraska. See page 11!

**Also inside: Chris Johnson faculty profile (p 8);
ABC Reconstruction in new, Computer History Museum exhibit (p. 13);
Recruitment and Retention Committee raising awareness of computational thinking (p. 14);
Matt Good, Kingland Systems, alumni profile (p. 18)**

ALL SCIENCE IS COMPUTER SCIENCE

Atanasoff Today

Atanasoff Today is published once a year for the alumni, friends, and faculty of the Department of Computer Science at Iowa State University, an academic department in the College of Liberal Arts and Sciences.

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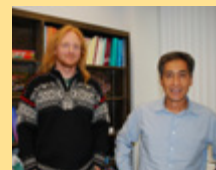
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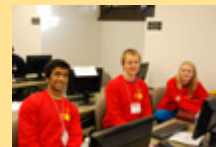
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Message from the Chair

Greetings alumni, friends, and faculty! Thanks to all of you who help to make this department an excellent place to learn, work, and grow. Like past issues, this edition of Atanasoff Today highlights some of the people and the work that they do to support those goals of learning and working in computing. We are very proud of our latest NSF CAREER Award winners, Guang Song and Ting Zhang, and look forward to seeing both of them flourish in their respective areas of bioinformatics and computer theory.

I am also pleased to congratulate Dr. Vasant Honavar on his recent IPA appointment as Program Director for the Information Integration and Informatics Program of the Intelligent Information Systems Division of the Computer and Information Sciences and Engineering Directorate at the NSF. I have no doubt that Dr. Honavar will be an exceptional member of the NSF staff, as he has proven to be in many areas within our department, the college, and the university.

As always, we have a great deal of research going on in the department, but this issue highlights some of the efforts towards teaching, not only in our university, but also in the state of Iowa. I hope you all take the time to read about our recruitment and retention committee, who have been working to raise awareness about the importance of computing in education at K-12 levels. In many schools in Iowa and across the country, students are not exposed to computational thinking, and are not aware of how computing affects their everyday lives. This team of faculty are working to change this, and expose K-12 students to the possibilities and opportunities open to them with careers in computer science and software engineering.

We have new developments in the history of the department and computing in general, with Jane Smiley's new biography of John Atanasoff. Her book is accessible and great to read, quite informative about how the first digital computer came to be, and covers the controversies and personalities that affected the recognition of John Atanasoff as the inventor of the first electronic digital computer. This book has been published in October - just prior to the opening of a new exhibit at the Computer History Museum in Mountain View, California - the ABC Reconstruction. The ABC Reconstruction (many say "replica," although there cannot be a true replica), will be on display starting in January, as part of a comprehensive exhibit on computing history. Be sure and put a visit to this exhibit on your calendar - you have at least five years to make it to Mountain View!

Finally, my special thanks go to those friends and alumni who have been financially supportive of the department in the past year, in particular, Kingland Systems, who supported the ACM ICPC teams in their trip to Lincoln this fall, and all of the companies and individuals who support our student scholarship program: Caterpillar, John Deere, Principal Financial, Lawrence P. Beninga, Arthur A. Collins, Thomson Reuters, Boeing, Union Pacific, Charlie & Barb Hunt, and all of the donors who contribute to the General CS Scholarship Fund.



Introducing the CS External Advisory Board

With great pleasure, I would like to introduce our readers to our new External Advisory Board on page 12 of this issue of Atanasoff Today.

Like you, the members of this board have strong ties to computing at Iowa State. We look forward to working with them to further improve the planning and execution of our mission and strategic plan.

The CS External Advisory Board is: John Paule, Tom Miller, John Gustafson, George Strawn, and Ron Wolf

Faculty & Staff News and Awards



Hridesh Rajan Honored at LAS 2010 Fall Convocation

Hridesh Rajan was honored at the 2010 LAS Convocation with the LAS Early Achievements in Research Award. Rajan obtained his PhD in computer science from the University of Virginia in 2005. His primary area of research is software engineering with specific focus on programming language design and implementation. Rajan has made significant contributions in several research areas recognized by the scientific community and research foundations like NSF, from where he has obtained several grants including the prestigious CAREER award. Dr. Rajan also recently won an NSF award to improve modularization and reasoning mechanisms for Aspect-oriented programming languages, which is a longstanding challenge.

Jin Tian Advances to Associate Professor

Jin Tian was also recognized at the 2010 Convocation for his promotion to Associate Professor. Tian is also an NSF CAREER Award winner (2004) for his work in artificial intelligence and machine learning, with focus on graphical models, Bayesian networks, probabilistic reasoning, and causal inference. His long term research goal is to build theoretical foundations for causal modeling and reasoning that will facilitate building intelligent systems capable of operating autonomously in dynamic and uncertain environments, and to develop causal inference tools that will have applications in diverse fields such as statistics, economics, and the health, social, and behavioral sciences.



Chris Johnson Named 2010-11 Miller Faculty Fellow

Chris Johnson has been named a 2010-2011 Miller Faculty Fellow for his proposal, *Modeling Reality: Bringing Market Relevance to an Undergraduate Curriculum in Interactive 3-D Gaming and Computer Graphics*. The proposal developed out of educational needs Johnson identified while preparing a new course in computer graphics (Computer Science 336X), offered for the first time in fall 2010. The fellowship will provide resources to bring established game developers to campus to share industrial perspectives and to acquire licenses for software used in the production of mainstream graphics applications. "This is a brand new course," says Johnson, "and it's important that students get from it the skills that will give them a competitive edge in the job market."



Undergraduate Advisor Gloria Cain Receives Professional and Scientific Staff CYtation Award

Gloria Cain, undergraduate advisor for Computer Science and Software Engineering, is the recipient of a CYtation award from the ISU Professional and Scientific Council. The CYtation Awards recognize staff members who go above and beyond the call of duty, do something extraordinarily well, or make a significant difference to others through the performance of their jobs. "I was really surprised when I got the email about the award," Cain stated. "I think it is a pretty fantastic honor." Cain was nominated for the CYtation award by computer science faculty member Dr. Gurpur Prabhu. "Gloria has always performed above and beyond her role as academic advisor and made a very real difference in the lives of hundreds of students who have fond memories of her," he says. Congratulations to Gloria on a well deserved honor!

Jack Lutz Contributing to Turing Centenary Volume

Professor Jack Lutz has agreed to contribute to the book *Alan Turing: His Work and Impact*. This book will be a compilation of many of Turing's most important papers, accompanied by commentaries from present-day scientists. The book is planned for release in late 2011, in time for the 2012 centennial of Turing's birth. Alan Turing (1912-1954) was the primary founder of the theory of computation. He is also famous for leading the breaking of the Nazi Enigma code, his work on the design of early computers, his early writings on artificial intelligence, and deep work in mathematical logic, probability theory, and mathematical biology.



Vasant Honavar Accepts Post as New Program Director for the National Science Foundation

Computer Science Professor Vasant Honavar will be on assignment as Program Director for the Information Integration and Informatics program of the Intelligent Information Systems Division of the Computer and Information Sciences and Engineering Directorate of the National Science Foundation. Honavar said, "This assignment will give me an opportunity to learn more about NSF programs, and work with colleagues at NSF and the broader academic research community to identify and develop some new research thrusts."

The department will miss Dr. Honavar's presence. However, while his responsibilities with the NSF will place him in Arlington, Virginia for much of the academic year, Honavar remains committed to students and collaborators and his research program at ISU. Dr. Honavar plans to travel back to Ames about once every three weeks or so and while he is in Arlington, hold regular research meetings with his students and collaborators using Skype.

"I don't think much will change for us," stated Fadi Towfic, one of Honavar's PhD students in the Artificial Intelligence Research Lab. "Dr. Honavar is always accessible to students. And, we are all very excited about this, not only for the department, but the entire university."

"It is a good investment of the department," said Dr. Carl Chang, Computer Science Chair. "We appreciate the professional development opportunity for one of our most productive professors" continued Chang, "and we fully expect that Dr. Honavar will shine in this assignment; the experience that he will bring back from his assignment at NSF will benefit the department and the university, and his work at the NSF will greatly benefit the computing research and educational community and the computing profession at large."

Vasant Honavar and Collaborators Receive Funds for Applied R&D in Predictive Data Mining and Artificial Intelligence for Medical Informatics

Vasant Honavar, Professor of Computer Science and Director of the Center for Computational Intelligence, Learning, and Discovery, and collaborators Craig Fontenot (an ISU alumnus), and Peter Demitry of Collaborative Health Solutions (CHS), LLC, Austin, TX, have received a 2011 Grow Iowa Values Fund Grant of \$109,243 from the State of Iowa (to be matched dollar for dollar by CHS, LLC) to pursue R&D efforts in Health Informatics.

The Grow Iowa Values Fund award will enable Honavar and his collaborators to pursue research on advanced data analytics, information integration, and predictive data mining for healthcare applications. This work is aimed at taking advantage of the anticipated widespread adoption of electronic medical records, together with emerging standards, to develop and apply sophisticated knowledge representation and inference techniques and statistically based machine learning algorithms for patient-centered care, optimized diagnosis and treatment protocols, and studies of effectiveness of specific treatments and medical procedures aimed at reducing the cost while improving the quality of healthcare. Honavar's research team will tackle many research challenges, including ensuring the privacy and confidentiality of patient data while enabling the analysis of such data for improving the quality of healthcare. A possible outcome of this collaboration between Honavar's group and Collaborative Health Solutions, LLC is the establishment of a subsidiary of CHS, LLC in Ames, Iowa.



Department Reaches Out with International Partnerships

Department Chair Carl Chang visited Korea in spring 2010 to finalize a partnership with Kookmin University (KMU), located in Seoul, Korea. KMU has 23,000 students, and offers both undergraduate and graduate degrees. ISU and KMU have entered into an agreement for a new dual undergraduate "2+2" degree program in computer science, and a dual "4+2" graduate degree program in computer science. Under this agreement, qualified undergraduate or graduate students from KMU who have completed part of their studies at KMU, and meet the admission requirements at ISU are eligible for dual computer science degrees through both universities. In addition to the degree programs, the department and KMU will also participate in faculty exchanges, joint research programs, and joint outreach programs. "These kinds of arrangements will increase the diversity of our undergraduate student population and improve educational experiences for undergraduates from all over the world in working with students who come from a different cultural background. The ability to work in a multi-cultural environment has become essential to our future graduates as the computer and information industries are increasingly becoming global enterprises," says Chang, who encouraged the agreement with KMU. This belief is shared by Sung Woo Lee, President of KMU, who seeks to foster internationalism and a respect for multiculturalism at his institution. "Internationalizing educational opportunities has been emerging as a global trend," Chang states. The department hopes to continue making international connections with universities around the globe.



Guang Song

Guang Song, Ting Zhang Receive NSF CAREER Awards

Dr. Guang Song, Assistant Professor of Computer Science and faculty member of the Baker Center for Bioinformatics and Biological Statistics and the Bioinformatics and Computational Biology (BCB) Graduate Program, has received an NSF CAREER award for his project on building a computational framework for mapping ligand migration channel networks and predicting molecular control mechanisms. The objective of this project is to map out the ligand migration channel networks inside proteins and determine the molecular control mechanisms by which these channels are regulated dynamically. To overcome the limitations that existing methods face, the project will develop and employ a novel, efficient computational framework that draws one of its inspirations from path planning in robotics, as a ligand's migration in a dynamic protein resembles closely a mobile robot's navigation in a dynamic environment.

Dr. Ting Zhang, Assistant Professor of Computer Science, has received an NSF CAREER award for his project on advanced decision procedures for words, trees, and lists. As complex computer systems become ever more pervasive in our society, especially with the increasing deployment of multi-core processors and clusters of servers in the nation's cyber infrastructure, the demand to advance techniques on program analysis and verification is more intensive. Logic-based reasoning techniques divide into two categories: general-purpose theorem proving and specialized decision algorithms. Theorem provers, enjoying a high degree of inference completeness, can prove sophisticated properties but require human guidance in general. On the other hand, decision algorithms, though confined within specialized domains, can automatically discharge a large amount of constraints. It has long been a challenge to combine the merits of the two kinds of techniques to produce a new generation of analysis tools that can handle a wide range of constraints with a high degree of automation.



Ting Zhang

Bioinformatics

David Fernández-Baca and Oliver Eulenstein Awarded a National Science Foundation Grant for Algorithms Research

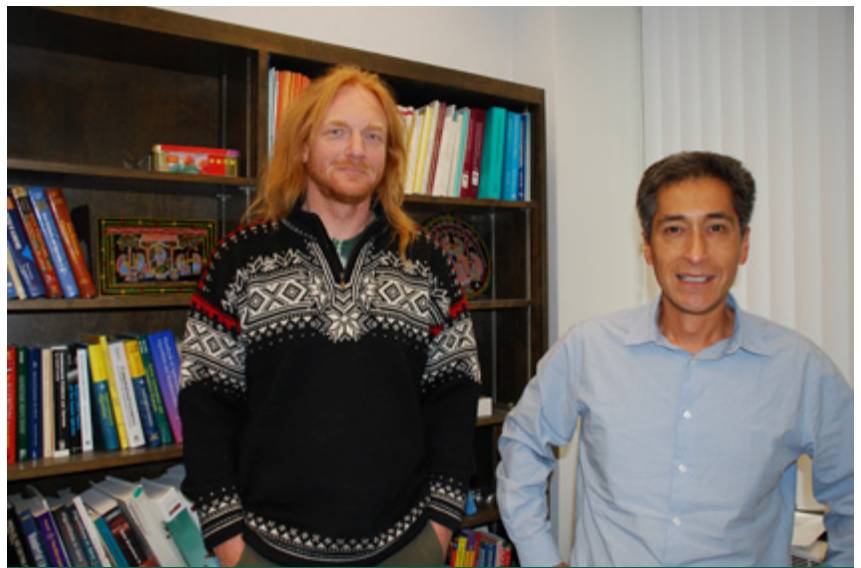
David Fernández-Baca and Oliver Eulenstein have been awarded an NSF grant for their project “Algorithmic Foundations of Phylogenetic Tree Reconciliation.” The award is for a total of \$450,000 over three years.

Phylogenetics deals with one of the fundamental problems in science, namely, discovering how the organisms around us evolved to their present state. The history of their evolution—that is, their genealogy—is represented by a phylogenetic tree. Research in phylogenetics has provided us with valuable insights into a host of issues in biology, ecology, and medicine, and promises even more. Phylogenetic trees have helped us to understand the diversification patterns of mammals and the evolution of the human retina; they have also enabled us to estimate the time at which the first flowers originated. Phylogenetic trees are a rich source of information for comparative analysis. Thus, molecular biologists rely on them to understand the function of genes in particular organisms by contrasting these genes to similar ones in closely related species. In addition to these broad evolutionary questions, phylogenetic trees are used by ecologists to estimate the degree of biodiversity in a geographical region, which allows them to analyze rates of species extinction. Conservation biologists use phylogenetic trees to identify biodiversity hotspots, and to respond to global climate change. In medicine, phylogenetic trees model disease progression and help to analyze virus transmission. Nowadays, phylogenetics is being applied beyond the confines of biology, to understand the development of human language and even political systems.

The multitude of insights and promises provided by phylogenetics bring along with them challenging computational problems. Fernández-Baca and Eulenstein are addressing these challenges by developing algorithms, software, and mathematical tools to construct phylogenetic trees effectively. For this they will tackle one of the major obstacles to assemble such trees accurately from genomic data: the sparseness of the

coverage. That is, the same genetic information may not be at our disposal for all species. This can happen because a gene may not have been sequenced for a species of interest or the gene may simply be absent from that species. The impact of sparseness on the accuracy of phylogenetic tree reconstruction is known to be significant. On the other hand, lack of accuracy can seriously limit the value of any insights gained through phylogenetic analysis. To get around this issue, Fernández-Baca and Eulenstein will study a variety of methods that assemble phylogenies by combining smaller trees for subsets of the species into a single supertree. Building supertrees involves reconciling conflicts among the input trees with regard to the placement of species. Fernández-Baca and Eulenstein will treat the reconciliation problem as one of finding a supertree that is as close as possible to the input trees. Among other things, their results will enable biologists to identify the possible occurrence of complex evolutionary events such as gene duplication and subsequent loss, and horizontal gene transfer.

Fernández-Baca and Eulenstein’s work will benefit from their longstanding collaboration with members of the evolutionary biology community. In particular, the theoretical research supported by this grant will synergize with their other major project, funded by the Tree of Life (AToL) program of the National Science Foundation’s biology division, which involves the development of search and retrieval methods for phylogenetic tree databases.



Oliver Eulenstein (left) and David Fernández-Baca (right)

Faculty Profile: Chris Johnson



Computer Science Lecturer Chris Johnson finds his own inspiration from many places, and uses that to inspire our students. His fall 2010 class in computer graphics is the first in the department geared towards students interested in becoming computer game developers. "We are starting a new set of courses on computer graphics and game development. Since the program is completely new and since our state does not have a strong presence in these sectors, I wanted to make sure students in these courses heard some input from the "real world," he says. Johnson is getting support for bringing real-world experience into the classroom through his 2010-11 Miller Faculty Fellowship, *Modeling Reality: Bringing Market Relevance to an Undergraduate Curriculum in Interactive 3-D Gaming and Computer Graphics*.

The 2010-11 Miller Faculty Fellowships, awarded through the Provost Office at ISU, provide faculty with opportunities to enhance their scholarly work in the undergraduate academic programs of the university and to develop innovative approaches to enhance student learning. Faculty have up to twelve months to meet the goals of their Fellowship project. "This project enables us to bring in a handful of speakers to campus and share stories from the front-lines of industry. Many computer science departments around the country are turning to gaming courses primarily as a means to increase enrollments. And many do not have faculty qualified to teach these courses. This shallow trick is a disservice to students. Through this fellowship, I'm hoping to show the viability of this new curriculum by piquing industrial interest and providing students authentic learning experiences," states Johnson.

The Miller Fellowship is not his only award this year. Johnson partnered with Design College Associate Professor Anson Call for a Motorola Foundation grant to offer students from any discipline the experience of developing a game from the conceptual level, through game development, to the marketing level. The Motorola Foundation grant helped to launch the ISU Game Development Competition (ISUGDC: <http://www.cs.iastate.edu/~cjohnson/gamecomp/>) at Iowa State. "I see a lot of students who come to computer science because they love gaming. Almost every non-homework question I receive is from a student who's developing a game. Anson and I wanted to harness and reward that creative energy, as well as knock down some institutional barriers between our departments. Developing a game draws skills from art, technology, and business, and we modeled that by requiring teams be comprised of students from at least these three areas. One thing that is very exciting about this competition is that it is completely open-ended. We are not telling the students what to build or giving them a bunch of hoops to jump through. The idea is entirely their own. As an educator, I am dismayed when students limit their learning to the activities I assign to them. We won't have that problem here."

Witnessing the interest in game development among his students has inspired Johnson to extend that interest. "I'm keen on seeing how game development impacts our learning of science and math. For example, I find physics makes much more sense when I have to recreate it from the ground up in the virtual worlds I build. Just because I'm subject to its laws doesn't mean I understand how it works. In fact, history has shown that our intuition as observers or consumers is often wrong. But when we suddenly put ourselves



Chris holds CS Open Lab each week for students interested in developing independent projects.

into the role of creator, we come full face with our misunderstandings. We feel more responsibility when we are creators - we can't blame anything or anyone else if our worlds fall to ruin. A lot of folks are trying to use game *playing* to teach. I think game development can produce a greater return, and I'd like to find out more."

That greater return is being felt by students in Com Sci and Soft E, particularly those who participate in Johnson's "open lab," a scheduled lab that any student can attend to get help on their independent projects. Open lab projects have included developing apps for iPhone/Android platforms, and RingPong, a version of Pong in which balls travel around computers that are arranged in a circle. Students in Computer Science 227, Java Programming, are also being exposed to concepts related to game development, in particular computer graphics and data visualization. "My research interests are in computer graphics and data visualization, and I'll admit many of my assignments in general programming

courses have a visual flair. This past summer we extracted contour lines on topographical maps using an algorithm called "marching squares," last fall we plotted travelogs in Google Maps, and this semester we are generating ball and stick models that are rendered in 3-D," Johnson comments.

Johnson's involvement with students is extended outside of the university to Iowa K-12 schools. An active member of the Computer Science Department Recruitment & Retention Committee, Johnson presents basic programming concepts to elementary, junior high, and high school kids around the state, and gives presentations to a variety of K-12 student groups that visit campus. "When I think back to my middle- and high-school experiences, I remember how mighty was the power of suggestion to my relatively blank mind. I'd adopt the attitude of whoever was around me that I respected. So, sometimes I think simply showing up and being excited about computing is all it really takes to get young people interested. But sadly, getting them interested isn't always enough. Once they go home, they're up against a few problems. First, there's a strange peer pressure to show little interest in any time-consuming intellectual activity. Second, few adults in their life positively model technological prowess. And third, modern computing devices are geared toward users and not developers."

"All of these problems can be difficult to overcome. The number of times I've heard someone say, 'Don't reinvent the wheel,' is too big to fit in a byte. Recently, I heard a counterargument to this statement - that we need to reinvent the wheel sometimes not because we need new wheels, but because we need new inventors. I feel like reinventing the wheel is how I got my start in computing: I wondered how something was done, so I tried to do it myself in code. The efforts paid off, and I very much feel like an inventor today. I'd recommend wheel-building to any aspiring computer scientist or software engineer," Johnson says.

His involvement in teaching and outreach in Computer Science does not stop Johnson from pursuing research as well. "I've just submitted a paper on a software tool that I developed for helping students in our large introductory course write code that meets its specification. Unlike an English paper, a programming assignment is very objective. If students deviate from the requirements, it hurts their score, slows down grading, and convinces instructors that assigning fewer homeworks will mean less headaches. In hopes to avoid all this, this tool informs students when they're deviating," he states. With teaching, research, and outreach part of every faculty member's set of responsibilities, Johnson does an admirable job in accomplishing all three by finding ways to combine his research interests with his teaching goals. More information about Johnson, including his efforts in teaching and research, as well as projects he has developed, can be found on his website, <http://twodee.org/>.



Chris partners with Design College faculty Anson Call (left) in the ISUGDCC, sponsored by their grant from the Motorola Foundation.

Software Engineering Program



SE student Taylor Anderson gets program advice from CS/SE undergraduate advisor Gloria Cain



David Weiss discusses how to manage project team dynamics in his fall 2010 course, Software Development Practices

The Software Engineering program is now in its 4th year, and the department graduated its first students from the program in spring 2010. "What students really like about the program is the flexibility with their electives. SE majors have 6 credits of SE electives, 12 credits of supplementary electives, and 3 credits of supplementary technology electives that they can use to customize their program," says Gloria Cain, advisor for SE students in the LAS College. "In addition," she states, "there is the senior capstone course, which gives them an authentic, real world problem in a company setting. They are able to work with real professionals, participate in conference calls and site visits for meetings, which gives them a very solid experience before they settle into their accepted jobs after graduation." Faculty member Simanta Mitra teaches the SE 491/492 Senior Design course, and works with partner companies to coordinate real world projects for the students.

Mitra teaches several SE courses, and comments, "Software Engineers need to place their focus on the entire software development process, including such things as software design, architecture, requirements, testing, just to name a few. Coding is just one part of that. Once students have data structures down, they can start taking SE focused courses, and that opens up their minds to the variety of things that you can do as a software engineer."

Mitra is teaching Software Testing - an integral part of software engineering. "This class is organized as labs. It has plenty of hands on experiences where students can walk through different methods of software testing - concurrency testing, web based testing, GUI testing and so forth. Since software testing is something that many students do when they first get a job, this course is critical to their success."

The SE Program is not just focused on undergraduates. Several offerings for graduate students and advanced undergraduates are also available. David Weiss, the Lanh and Oanh Nguyen Chair in Software Engineering, is teaching some new innovative courses that are quite different than courses in other universities. In regards to his newest course, SE 510, he says, "much of today's software development is accomplished by teams distributed around the world. Companies often have locations in North and South America, Europe, and Asia. Open Source contributors may be located anywhere. In such distributed development environments, different factors dominate the development process than when a team is located in one place, country, culture, and language. Students who complete this course will have the basic preparation for distributed industrial environments and will know what to expect when working in such environments. Few universities offer the chance to learn in such an environment."

Robyn Lutz is teaching SE 515, Software System Safety, a course that is related to Lutz's research in safety critical systems such as pacemakers, medical imaging devices, and spacecraft software. Lutz's work in software product lines engineering and software safety was also highlighted in the 2009-10 CRA-W Distinguished Lecture Series. This series brings faculty and industry researchers to campuses to encourage women and minorities to pursue graduate school in computer science and engineering. Lutz was also a 2009 finalist for the Technology Association of Iowa's Women of Innovation Awards in the Academic Innovation and Leadership category.

More information about the Software Engineering Program can be found at <http://www.se.iastate.edu/>.

ACM ICPC - Fall 2010

Six teams participated in the fall 2010 ACM ICPC Regionals in Lincoln, Nebraska during the first weekend of November. Congratulations to all of our teams, in particular the freshmen team of Soumik Mukherjee, Kyle Long, and Megan Lavey. Also, special thanks go to team advisor Simanta Mitra, undergraduate student advisor Gloria Cain, and undergraduate secretary Cindy Marquardt for coordinating the trip and arranging transportation for the students, and to Kingland Systems for sponsoring the trip.



Support for ISU students to participate and attend the fall 2010 ACM Regionals was provided by:  **KINGLAND**
S Y S T E M S



(L-R): students Kevin Wells (SE), Brad Pugh (CS), and Konstantyn Kononenkov (CS)



(L-R): CS students Donald Nye, Adam Reineke, and Jeff St. Clair



(L-R): Matt Tough (SE), Dane Seaberg (ECpE), and Rob Lourens (SE)



(L-R): CS students Jacob Freemyer, Zachary Brown, and Stephan Jossie



(L-R): CS students Joyanne Lietch, Spencer Morrison, and Matthew England



(L-R): Freshmen team Soumik Mukherjee (CS), Kyle Long (ECpE), and Megan Lavey (CS)



From left to right: John Paule, Tom Miller, John Gustafson, George Strawn, and Ron Wolf
Computer Science External Advisory Board Established

The department established a new CS External Advisory Board in spring 2010 to assist the department in developing plans for future programs and initiatives. Members with a prior relationship with ISU and the Computer Science department were invited from industry to serve on the new board. Noted below, all have at least one of their degrees from ISU. "Things change so fast in our field," stated Carl Chang, department chair. "This is a group of highly distinguished practitioners who can help the department maintain awareness of industry trends, and help us to gain insight into how we can shape our strategic planning for the future. We are excited to work with them." The group met in spring 2010 during VEISHEA week to get to know each other and develop an understanding of how the CS department works. There were no shortage of ideas presented once these two goals were met, including for example, suggestions about how to collaborate with other units both inside and outside of ISU, and where industry could collaborate with the department to improve undergraduate and graduate student success. The group plans to meet once each year in the spring, with electronic discussions on particular topics taking place throughout the academic year.

The CS External Advisory Board is:

John Paule (B.S. Computer Science, 1978): John worked for many years with IBM in a variety of sales, marketing, and management positions that specialized in the financial services industry. Later, he became Technology Vice President for FBL Financial Group. Now retired, John is an active community leader in West Des Moines, working with several non-profit organizations.

Tom Miller (B.S. Computer Science, 1972): Tom has been working for Microsoft in a variety of capacities, on projects including Windows NT (now Windows 7), Windows Cache Manager, and Microsoft Exchange Server and SQL Server. Outside of Microsoft, Tom has traveled across the world in support of programs with Save the Children. He also participated in a Jimmy Carter Habitat for Humanity build in Chiang Mai, Thailand.

John Gustafson (Ph.D., Applied Mathematics, 1982): John is currently Director of Intel Labs Santa Clara. Well known in High Performance Computing, John won the inaugural Gordon Bell Award in 1988, and the IEEE Computer Society's Golden Core Award in 2007. A leader on the ABC reconstruction project, John has maintained strong ties to ISU, most recently through his membership on the CS External Advisory Board.

George Strawn (Ph.D., Mathematics 1969): George Strawn has a long and distinguished career in computer science, much of which was developed as faculty here at Iowa State. George has served as Director of the Computation Center, Department Chair of Computer Science, has held several faculty appointments, and now serves as Director of the National Coordination Office for the Federal government's multiagency Networking and Information Technology Research and Development Program.

Ron Wolf (M.S., Computer Science, 1976): Over the last 20 years Ron has been a Technology Executive and hands on practitioner in eight San Francisco Bay Area startups as well as for dozens of consulting clients ranging from the Fortune 100 to raw startups with big ideas. Ron has provided business strategy, requirements gathering, product design, product marketing, project management, and technical advice to clients in the SOA, SAAS, database, cloud, and media server spaces.



ABC Reconstruction Travels to the Computer History Museum in Mountain View, CA



Clifford Berry and the original ABC Computer



The ABC Reconstruction

The ABC Reconstruction (also referred to as the ABC Replica), housed in ISU's Durham Center since 1999, moved out of Durham Center in spring 2010 and is now under lease to the Computer History Museum in Mountain View, California. The lease is for five years.

The ABC Reconstruction will be part of a new exhibit, "Revolution: The First 2000 Years of Computing" opening in January 2011 on the museum's first floor. An online exhibit will also be on display at <http://www.computerhistory.org/exhibits/revolution/>.

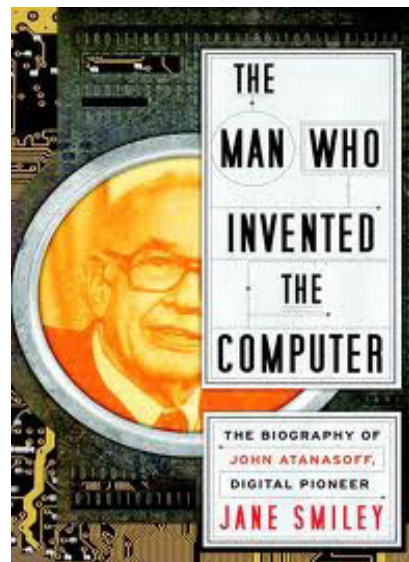
The Computer History Museum (CHM) is home to the world's largest collection of artifacts related to the history of computing and includes hardware, software, documents, ephemera, photographs and moving images. The CHM seeks to preserve a comprehensive view of computing history, one that includes the machines, software, business and competitive environments, personal recollections, and social implications of one of humankind's most important invention, the computer.

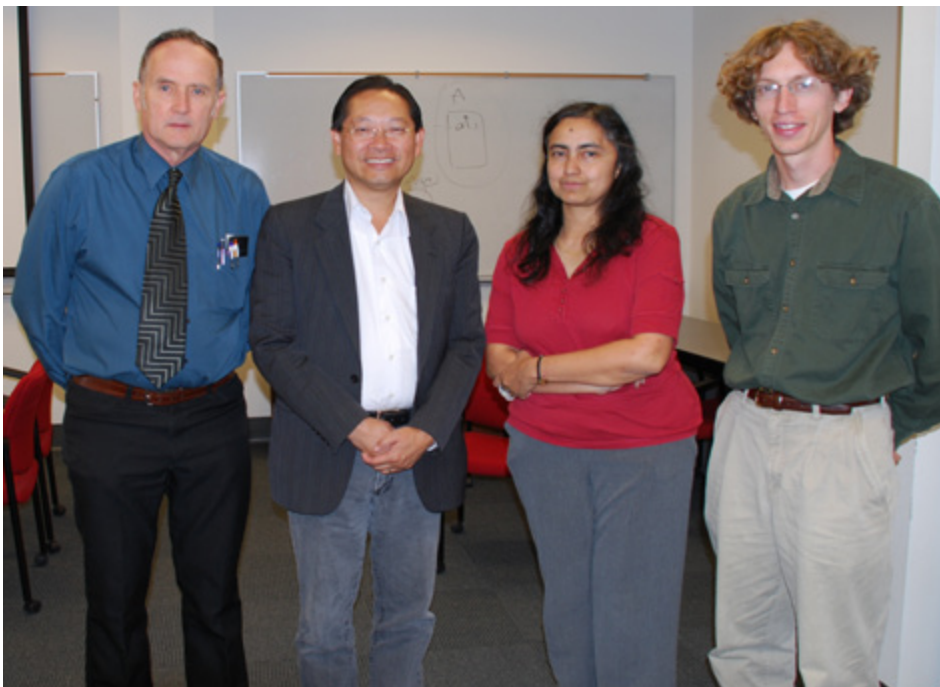
The ABC Reconstruction project team included (in alphabetical order:) Jennifer Augenstein, David Birlingmair, Del Bluhm, Skip Derra, John Erickson, Jeff Etringer, John Gustafson, Terry Herrman, Jerry Musselman, Alvin Read, Gary Sleege, Harold Skank, and Joel Snow. The ABC Reconstruction was unveiled at Supercomputing '96 (held at the University of Pennsylvania), and has also traveled around the country, including an exhibit at the Smithsonian Institution.

Jane Smiley, former English faculty at ISU, Publishes New Biography of John Vincent Atanasoff

Jane Smiley, Pulitzer Prize winning author and former Professor of English at ISU has recently published a new biography of John Atanasoff. *The Man Who Invented the Computer: The Biography of John Atanasoff, Digital Pioneer*, is not just a biography of Atanasoff, but also a review of how the first digital computer came to be, and how World War II affected the progress of research and development in computing during the war years and after. Key players noted in this new biography, in addition to JVA, include Alan Turing, Tommy Flowers, Johann Von Neumann, and of course John Mauchly and J. Presper Eckert, among others.

Other well-known books that precede this new biography include Alice Rowe Burks' *Who Invented the Computer: The Legal Battle that Changed Computing History* (2003), and Clark R. Mollenhoff's *Atanasoff: Forgotten Father of the Computer*. (1988). Another excellent source of information on JVA, the ABC, and the ABC Reconstruction is our own Parks Library Special Collections. Visit the John V. Atanasoff Collection and Papers on the 4th floor, next time you are in Ames!





Recruitment & Retention Committee

**Assisting Iowa Public
Schools, Teachers,
Parents, and Students
in Advancing the
Central Ideas,
Concepts, and Career
Opportunities in
Computer Science**

The R&R committee is: (left to right): Les Miller, Johnny Wong, Soma Chaudhuri, and Chris Johnson. Missing from photo: Wallapak Tavanapong

Student recruitment is a critical issue for all academic departments, but especially so for the Computer Science department. Because most public schools lack any courses in computer science or software development, young people have little exposure to the field or its dynamic and diverse career opportunities. A group of faculty, often working hand-in-hand with current students, are committed to bringing awareness of the opportunities open to middle and high school students in Iowa.

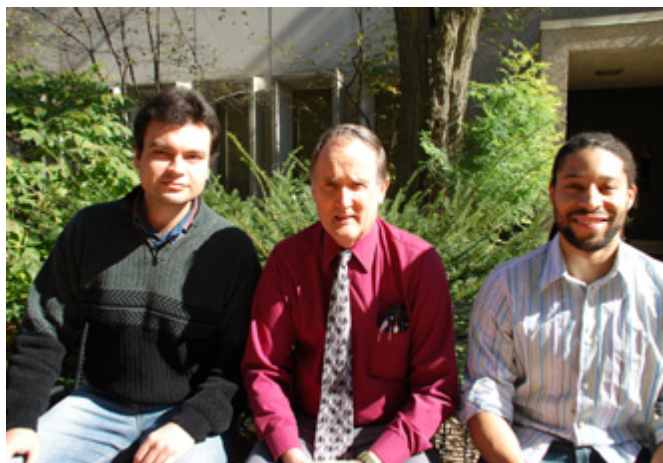
Many of these opportunities occur right on campus. OPPTAG, a university program for talented and gifted K-12 students, holds workshops during the school year that bring those students to campus. In spring 2010, Chris Johnson held OPPTAG workshops where K-12 students got a chance to take apart components inside a computer tower, look at the devices they found inside, and learn about how those parts worked together.

Several faculty on the Recruitment & Retention Committee participate in Taking the Road Less Traveled: A Career Conference for Girls, (sponsored by the ISU Program for Women in Science & Engineering), in which female K-12 students come to the university for a full day to attend workshops that describe career and research opportunities in STEM fields.

Finally, faculty and students at ISU are finding their own ways of demonstrating the importance of computational thinking and showing the opportunities available to students if they choose computing as their field of study. Some of those efforts are highlighted here.

Teaching Java in Perry, Iowa

Professor Les Miller (center) and his graduate students Georgi Batinov (left) and Kofi Whitney (right) travel weekly during the school year to Perry, Iowa to teach Java programming to any student, at any level, who is interested in learning. "We even have an adult from the community who has expressed interest in attending our group sessions. Of course, we are happy to have anyone who wants to learn." comments Professor Les Miller, whose networking with administrators at Perry High School led to the program.





Soma Chaudhuri Offers Discrete Math to High School Students

Many high schools do not offer computer science classes, and when a student's courses in algebra and geometry are complete, they typically advance into calculus. While calculus is the typical progression for these students, it is not the only option. Dr. Soma Chaudhuri offers her Com Sci 330 - Discrete Mathematics course to high school students as another branch of mathematics that also gives students exposure to ideas and concepts in computer science. "This is a way for students to make a connection to computer science," Chaudhuri reports. "The students told me that they had never had to do formal proofs before and they actually enjoyed it. Also, they didn't realize that this sort of math (discrete math instead of continuous math in calculus) had such a strong connection to computer science." The course is offered as university credit for the students, many of whom have already taken calculus. While Chaudhuri does not reduce the course content, she does make an effort to highlight computer science applications with high schoolers. "Students taking Com Sci 330 at ISU have already taken computer science courses as part of their major, so they do not need that emphasis like the high school students do." Chaudhuri's efforts have helped to demonstrate the value and opportunities available in the computing disciplines.

Teaching the Road Less Traveled

Each year, the ISU Program for Women in Science and Engineering host the Taking the Road Less Traveled Conference for Girls, a program that offers concrete demonstrations of science and technology career opportunities for women students, who are underrepresented in STEM fields across the U.S. Wallapak Tavanapong, Robyn Lutz and Soma Chaudhuri offer sessions on computing careers, with a focus on careers that put less stress on stereotypical programming jobs and more on how computers have pervaded all industries. While it is thought that many girls are turned off by the idea of computer science due to its "geek" association, computer science offers women a career choice in which they can pursue almost any interest outside of computing, through computing. "I had always wanted to be a doctor, but my home country had college placement exams where you did not always get placed in the program of your first choice. I ended up in computer science, but that turned out to be good," says Dr. Tavanapong. "My work in computer science focuses on improving medical imaging tests like colonoscopy. So, really, my career in computer science allows me to work within the medical field, with medical professionals who share my research goals."



Above: Dr. Tavanapong and Dr. Lutz present a wide variety of career options in CS at The Road Less Travelled Conference for Girls.

Below: Chris Johnson holds a PicoCricket lab session for the Road Less Travelled participants.

Family Nights at Public Schools and Libraries

The R&R Committee is presenting "Family Nights" at local schools and public libraries, to introduce elementary and junior high students to programming concepts through MIT's Scratch, a programming language developed by the Lifelong Kindergarten Group at the MIT Media Lab. Scratch allows students to create their own digital art, stories, and games that they can collaborate with others to create, and share with others online. Students can also play with PicoCrickets, an interactive device they can program. PicoCrickets play sounds and light up according to how they are programmed, and are suited especially towards young developers in elementary school.



Student News

Computing Students Master the Mainframe

Three computer science students and one from computer engineering took part in the 6th annual IBM Master the Mainframe contest in fall 2010. According to the contest website, today's mainframes are growing in popularity and require a new generation of mainframe experts. This contest is designed to equip students with basic skills to make them more competitive for jobs in the enterprise computing industry. All four students made it through the first round and are advancing to the second round. Each round of the contest increases in difficulty. "These types of contests give students additional experience in a fun, competitive environment," stated Simanta Mitra, CSE Club advisor and coordinator for the ACM ICPC Contest. In addition to experience, students participating in the IBM Master the Mainframe contest can win prizes, including t-shirts, i-pads, and pre-paid debit cards. Congratulations to our students and good luck in round 2!



Right to left: Jamin Hitchcock (CpE), Dan Rediske (CS), Amanda Ranard (CS), and Mike Patrick (CS) all advance to the second round of IBM's 6th annual Master the Mainframe Contest.

Computer Science/Software Engineering Club Continues to Offer Opportunities to Students

The Computer Science/Software Engineering Club (CSE Club) is a student organization dedicated to providing opportunities to students. 2010-11 CSE Club President Rob Lourens comments on the activities for this fall and spring. "The CSE Club is planning several types of activities this year. We have representatives from several companies, such as Kingland, Cargill, and Microsoft, lined up to talk. We'll have speakers on technical topics too. For example, in just a few weeks, we'll have a presentation on Microsoft XNA - a set of tools for developing Xbox games. We are also planning social events for CS/SE students to meet others and hang out. Last week we had fun eating pizza, tie dying, and playing frisbee in front of the library. "

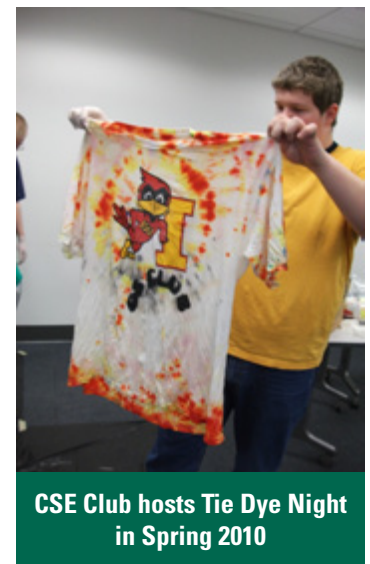


Dane Seaberg gets ready for competition at the 2009 ACM ICPC Regionals

As with every year, the CSE Club is active in recruiting and training students who are interested in the ACM ICPC Programming Contest. "We've been working hard to prepare for the ACM programming contest, and we have had several practice contests here at ISU. We are also encouraging students to sign up for the ISU Game Development Competition (<http://www.cs.iastate.edu/~cjohnson/gamecomp/index.php>)."

Anyone is welcome to attend CSE Club meetings. This year's meetings have hosted around 20-25 students. They are a great opportunity for students to meet representatives from industry, who are often

seeking students for internships. "We often have company representatives come speak to the club - sometimes we ask them to come, and sometimes they ask us." Lourens also states, "I think that students could benefit a lot from attending CSE Club events. You'll meet students who are in your classes, or older students who have advice about the classes you're taking. You'll have the chance to talk to people who work in the software industry, and hear what it's like to be a programmer in 'the real world.' You could learn about CS/SE related topics that you wouldn't get in any of your classes. Also, we often have pizza..." Students interested in joining CSE Club can send an email to csclub@iastate.edu or visit the club website at <http://csclub.cs.iastate.edu/>.



CSE Club hosts Tie Dye Night in Spring 2010

Evan Balster, CS Undergraduate Junior, Presents His Work at the 2010 Tokyo Game Show

Computer Science junior and independent game developer Evan Balster was invited by the organizers of Sense of Wonder Night (SOWN) to the Tokyo Game Show 2010, which ran September 16-19, 2010. The goal of the SOWN event is to discover new game ideas that will catch people by surprise and give them a "Sense of Wonder," and spotlights game developers whose designs are particularly experimental and creative. He presented his project, Infinte Blank (infiniteblank.com), a creative game where the players draw the world.

An online game supported by donations, Infinite Blank is, according to Balster, "a free, non-competitive, creative environment that is accessible to anyone. There are a lot of people out there who are creative, but keep that creativity private because it is hard to show people, and be subject to criticism. I wanted to create something for people who like to draw, but aren't necessarily great at drawing, in an environment where skill is secondary to participation and expression." The game was inspired by the very things that inspired Balster to develop in the first place. "Ever since I was a kid, I liked the idea of a video game as a place where I could do whatever I wanted. This is embodied in Infinte Blank."

"Visiting Tokyo was a lot of fun, and I did get a chance to run around the city a little bit. Networking there was a good way to find opportunities, but I have to keep in mind that the work comes first." Balster intends on entering Infinte Blank in the Independent Games Festival, to be held in San Francisco in March 2011. After graduation, Balster intends to continue his work as an independent game developer.



PhD Candidate Jivko Sinapov Wins Best Paper Award at IEEE ICDL 2010

Jivko Sinapov, Computer Science PhD candidate with a co-major in Human-Computer Interaction (HCI), is the recipient of a Best Student Paper Award at the 9th IEEE International Conference on Development and Learning (ICDL) for his paper "The Odd One Out Task: Toward an Intelligence Test for Robots," co-authored by his advisor, Dr. Alexander Stoytchev (ECpE). The 9th IEEE ICDL (held August 18-21, 2010) brought together leading researchers in robotics, machine learning, neuroscience, and developmental psychology, in order to gain new insights about learning and development in natural organisms and robots.

Artificial Intelligence Research Laboratory Demonstrates Biology/Computing Concepts for the Road Less Traveled Conference for Girls in Spring 2010

The Recruitment & Retention Committee is not the only group seeking to raise awareness of computing careers in the department. The Artificial Intelligence Research Laboratory hosted sixteen young women (middle school girls aged 8-12) who participated in the spring 2010 "Taking the Road Less Traveled" conference, held on April 15 by the Iowa State University Program for Women in Science and Engineering. Fadi Towfic (a fourth year Ph.D. student) and Rasna Walia (a first year Ph.D. student) introduced their work on computational approaches to modeling and analysis of biomolecular networks and characterization and prediction of macromolecular interactions. The presentations emphasized the transformative role of computing and computational thinking in the sciences and the need for obtaining adequate exposure to mathematics and related analytical fields at the high school level, in order to pursue majors in sciences or engineering at the college level and beyond.



Fadi Towfic demonstrates computational approaches to modeling.



Alumni Profile

Matt Good, Software Architect, Kingland Systems

Matt Good graduated from ISU with his Computer Science degree in 2000, and is now a Software Architect with Kingland Systems in Clear Lake, Iowa. His current project is acting as Development Lead for Kingland's 360 Data Platform team, which is a software product that provides data management services and capabilities to large financial services and auditing organizations.

"As Development Lead, I am primarily responsible for ensuring that our 360 Data Platform software is designed, developed, and deployed according to the vision that has been positioned for the current release. As part of that responsibility I am involved in reviews of every work product for the software, including requirements, designs, and all code reviews. Additionally, I help with 'shepherding' the software through the different phases of our Software Development Lifecycle, ensuring our adherence to CMMI processes. Lastly, I am responsible for personnel management as well as assisting with technical sales support for winning new business for the company."

One of Matt's favorite things about his position at Kingland is the opportunity to be involved in many things. "Since Kingland Systems is a smaller company of approximately 150 employees, we have that opportunity to not only become technical specialists, but to develop well-rounded career skills, furthering our involvement in all aspects of a project. Right now, I really enjoy being in a reviewer and decision-making role on a project."

Another aspect of the job that both Matt and the CS Department enjoy is his role as a recruiter for Kingland, which means he gets to visit ISU for the Career Fair, class presentations, and take part in events for career development for interns. "All of this involvement brings a new challenge to every day," he says. "Since we do have the opportunity to be involved in many different things and have many responsibilities for the company, task prioritization can be a challenge - ensuring not only that the tasks are accomplished in the correct order, but with the highest quality. A more specific challenge about my job is schedule estimation - predicting when a software component will be complete and ready for testing. My current 360 Data Platform project has had the difficulty of integrating with an enormous amount of new and previously unused technology, which makes schedule estimation very difficult. When estimation is difficult, the other sides of the Project Management Triangle (scope and resources) are affected and some difficult decisions regarding the project often have to be considered."

Matt reflects upon his own time here as a student as one of finding the right balance of skills. "In Computer Science, the balance between theory and practical programming language skills developed a good problem solving foundation that has helped me throughout my 10 working years since graduation. Other, soft-skills requirements of Liberal Arts and Sciences, such as advanced English and Speech courses, have helped me develop into a well-rounded employee and have offered me the capability to find a nice balance between technical and soft skills, which enable growth within my career."

He advises current students to do everything possible to attain a software development internship, as this kind of internship helps to complement the skills learned from the Computer Science degree and will make the graduate a more desired full-time candidate for many employers. "Additionally," he comments, "working hard and focusing on getting good grades in the team project courses in the curriculum offer well-rounded project skills that can be an asset when working towards both internships and full-time positions. Lastly, my belief is that every software developer throughout a 30+ year career will work with databases at some point, so proper focus on database and advanced database courses would help prepare the student for this particular aspect of a software development career."

Many

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