We’re very excited that in addition to gender equity, our results are beginning to show knowledge transfer, “CU Research Associate Professor Alexander Repenning remarks quietly. Modest words from a professor whose research and inventions are inspiring boys and girls across the country to explore game design and wade into the technical world of computer science. Repenning is discussing the Scalable Game Design Initiative that is part of National Science Foundation-supported research in a collaborative project called iDREAMS. The project brings together CU-Boulder’s Department of Computer Science, School of Education, Science Discovery and Upward Bound outreach programs, resource-diverse K-12 school districts in several states, and community college students in a great collaborative effort to determine if a successful program to harness the motivation middle school students have for video games can be widely scaled up to teach computational thinking. Initial efforts point to success.

As a pioneer in end-user computer programming, Repenning has long sought to bring about a revolution of thought about how we teach the subject. “There has been an explosion in end-user delivery and devices, such as smart phones, the Internet, and laptops, many in the hands of young students. But the approach to teaching programming has not changed and many school districts have simply given up. At the same time, studies are demonstrating...
Greetings to our CS alumni and friends,

A year has passed since our last newsletter. I am delighted to report exciting things that have happened in the department.

One of the most exciting changes in the department this year was the accreditation of our undergraduate program by the Accreditation Board for Engineering and Technology (ABET). This accreditation is retroactively effective from October 1, 2008 and will last until September 30, 2016. This is good for our students as some employers and scholarships programs require that students have degrees from accredited programs. It is also good for the department because it provides a process to monitor and enhance the quality of the undergraduate program.

This year several of our faculty have received prestigious awards. Our recently hired Assistant Professor Bor-Yuh (Evan) Chang received an NSF CAREER Award. Evan obtained his PhD from UC-Berkeley in 2008 and joined the department in 2009. His research is in the area of programming languages and program analysis. Professor Dirk Grunwald was appointed as the Wilfred and Caroline Slade Endowed Professor in the College of Engineering and Applied Science, recognizing his tremendous contribution to computer science research and education. Professor Emeritus Hal Gabow was awarded the 2010 SIGACT Distinguished Service Prize by the ACM Special Interest Group on Algorithms and Computation Theory. The prize is given every other year to an individual who has made substantial service contributions to the Theoretical Computer Science community. Professor Martha Palmer, who has a joint appointment with Computer Science, Linguistics, and the Institute of Cognitive Science, received a Boulder Faculty Assembly Award for Excellence in Research. You can read about these and many other impressive achievements by our faculty in the awards section of this newsletter. In May 2010, the department celebrated the retirements of Professors Gary Nutt and Skip Ellis, both of whom made huge contributions to the department.

Both our faculty and students continue to do meaningful work with immediate and future impact in our Colorado community and the world beyond. Current CS research activities are helping to improve and redefine the way we approach health care, emergency response, education, and more. Many of these projects are featured in the pages to follow. As we look ahead to the future, our department continues to grow with new initiatives, facilities, and faculty. A large grant from the National Science Foundation and additional support from the university paved the way for Professor Henry Tufo and his team to establish a research computing facility with a Dell supercomputer, which currently ranks at #45 among the world’s fastest 500 supercomputers. The machine has 15,648 cores and runs at 152 teraflops per second for the benchmark problems.

The dean of the College of Engineering and Applied Science recently approved a search for at least two faculty positions in the coming year in two areas of focus. The first, cyber-physical systems, is broadly defined as a research area involving computer systems interfacing with an external physical environment. The second, human-centered computing, will strengthen our department’s ability to respond to the increasing demand for computing skills across the campus in the interdisciplinary areas of information and communication technologies.

I hope you enjoy the newsletter, and please keep us posted on your personal and career achievements.
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that enrollment in technology and computer science programs is declining at colleges and universities."

Research by Repenning and others indicates that many students, especially girls and underrepresented minorities, have already formed negative attitudes about programming by the time they reach middle school. Currently, most middle school computer classes consist of instruction in the use of multi-media applications. While this may be useful in its own right, it does not advance or transfer computational thinking concepts, many of which are the bedrock for future programming and engineering career tracks whose graduates would help to fill the gap of information workers.

"Programming is hard and boring."

This was often the prevailing attitude heard in classrooms as Repenning first introduced his AgentSheets software environment to schools in the 1980s. At the time, programming instruction consisted of the teacher handing out a program, which students typed into a compiler and then debugged. The obstacles of computer language and syntax often overshadowed any instruction in logic, design, or computer science concepts. It wasn’t long before computer programming was relegated to after-school computer clubs, self-selected by students already interested.

In the 1990s, the world saw the advent of Visual Programming Languages. With the inclusion of Visual AgenTalk, CU’s Repenning pioneered the creation of a language that novices could use to program via manipulation of visual program language elements. However, the first generation of visual languages could only create simplistic programs and were soon outgrown by their users. In the case of AgentSheets, though, Repenning insisted on maximizing the ease of visual language components but refused to sacrifice any of the tool’s capability or potential. AgentSheets users, he determined, would be able to begin with simple visual programs, but would never be limited when they wanted to implement more complex systems such as scientific simulations or even artificial intelligence based applications.

Through the multi-disciplinary Center for Lifelong Learning and Design in the Department of Computer Science, the visual version of AgentSheets was introduced to middle schools around Boulder and Denver and was used for undergraduate programming projects and graduate research as well. These experiences allowed the AgentSheets team to improve and refine the visual language aspects to unprecedented capabilities. In 1996, Repenning recruited investors and founded a company, AgentSheets, Inc., to turn the software into a robust, commercial product. AgentSheets research concepts are licensed from the university, and in turn, research grants, such as iDreams and others, receive a tested, commercial-grade product with professional support that can be confidently placed in schools. Curriculum developed as part of the iDreams research is free and available publicly. For 14 years, AgentSheets users around the world have included users as diverse as elementary students and NASA scientists. AgentSheets, Inc., Repenning, and the AgentSheets software have been the recipients of many awards worldwide.

Scalable Game Design: Applying Flow Theory to Motivate Students

Repenning has long applied the scaffolding approach suggested in the Flow theory by Csíkszentmihalyi. Flow theory suggests that people are motivated to continue in their tasks if they are supported by materials that make the task just easy enough that some success can be obtained, but still sufficiently challenging to sustain their interest and facilitate skill acquisition. Could the same principles that went into AgentSheets software be applied to bringing computational thinking to middle schools?

This approach was named Scalable Game Design, where scalable refers to both broadening participation to all middle school students and deepening participation as students progress from game creation to scientific simulations. Initially, the project addressed the question: Would the motivation students had for creating video games motivate them to learn more? In this second year, the research has gone a little farther, asking if students could learn enough computational thinking to begin deeper participation.

Taking this flow approach of Scalable Game Design to mainstream middle schools required a capable team. Dr. David Webb of the CU School of
Education, a co-principal investigator on the iDreams project, signed on to evaluate student motivation and learning as the project was unrolled. Additionally, CU’s Science Discovery and Upward Bound programs were brought on board for their experience in outreach to challenged and remote areas. Four types of school districts were identified and enrolled: technology hub—a resource rich, technologically capable district; inner-city—a district challenged with issues of universal accessibility regarding gender and ethnicity; rural—very large, non-urban districts with issues of integration and uniformity; and remote/tribal—remote districts that serve Native American reservations.

The iDreams project sought to create educational ecologies that build local resources and remote technological support infrastructure. Experienced technology hub teachers instruct teachers from less advantaged regions and community college students support remote teachers in classrooms. Each summer, teachers from diverse areas in many states gather in Boulder for the “Summer Institute,” a two-week teacher training intensive to prepare them for the Scalable Game Design classroom.

Promising Results

With one year left, the results thus far have been impressive. Scalable Game Design courses are now being offered in schools in all of these diverse districts as part of their core curriculum. Greater than 52 percent of the participating students are girls, and approximately 63 - 83% of all participants say they are motivated to continue studying game design or computational science elective courses. Repenning and his team envisioned reaching 1,200 students in the three years of the project, but 1,300 students participated in the first semester. To date, nearly 4,000 students have been reached after just a year and a half.

Additionally, several interesting innovations have been realized. In January of 2010, Repenning released a new programming framework called Conversational Programming as part of AgentSheets 3.0. Conversational Programming makes the logic consequences of visual programming decisions more apparent through visual communication from the compiler to the programmer. This new breakthrough in the science of visual programming fosters creativity, as unintended consequences can often be the gateway for new understanding and programming ideas. Other visual language work often seeks to make programming more accessible by limiting possible language element combinations.

In conjunction with Webb, the team also is realizing new methods of evaluating and measuring the transfer of computational thinking concepts through the Scalable Game Design approach by developing a Computational Thinking Pattern framework, survey, and semantic analysis and visualization tool. These work on the basis that computational thinking concepts in games such as Frogger, PacMan, etc., are certainly known a priori. Student programs can be evaluated for the use and mastery of computational thinking concepts such as cursor control, absorption, collision, transportation, diffusion, and hill climbing.

Success stories truly show the nature of the learning ecology encouraged by the program. A teacher and co-director of the Girlstart program in Austin, Texas, attended the Summer Institute in June and trained instructors in July. By August, girls in the Girlstart summer camps not only learned to program the Frogger video game in the introductory module, but had progressed to modeling environmental effects of the BP Gulf oil spill as well. Quest Academy, a magnet school in Dacono, Colorado, uses Scalable Game Design to teach computational thinking, and it encourages older students to assist teachers in the classrooms of younger students, providing mentoring and teacher support.

In Ft. Lupton, Colorado, an inspired teacher combined language arts and technology with results of engaged, excited students and better communication and understanding between students of different ethnicities. Ft. Lupton Middle School has been named 2011 National Middle School of the Year by the National Association of Middle School Principals. The school’s principal, Melanie Patterson, attributes the award to initiatives like Scalable Game Design, which is now part of the math curriculum. Three public schools in Aurora, Colorado, report increased student engagement and less classroom disruption. The project is now spreading to school districts in South Dakota, Wyoming, Alaska, and outreach programs in several states.

Professors Repenning and Webb and their team look forward to a new year with the project and are pursuing a follow-on grant with NSF to explore exciting new developments creating adaptive and scalable learning environments.
Computer Science
Colloquium Series Expanded to Showcase Tech Advancements

If you're in the Boulder area, come early and come often for a front row seat at our departmental colloquium series, which has gained a vibrant following in recent months. A long-standing tradition in the Department of Computer Science, the Computer Science Colloquium series occurs weekly during the fall and spring semesters on Thursdays 3:30-4:30 p.m. and is an opportunity to learn about the latest and greatest happenings in our field. This year we have broadened participation in the series by actively inviting members of the Boulder and Denver tech communities to join us as speakers and audience members. With exciting speakers and our new external focus, the colloquium has received a significant boost in attendance.

SPEAKERS: With topics from across the breadth of the computer science field, the colloquia promise something for everyone interested in basic research and applied problems. During the fall semester we hosted distinguished speakers from NEC Laboratories, University of Illinois Urbana-Champaign, University of California-Berkeley, Rutgers University, University of Houston, University of Virginia, J.D. Power and Associates, BBN Technologies and the Max Planck Institute. This spring semester we are hosting speakers from Rally Software Development, Carnegie Mellon University, University of North Carolina, University of Toronto, University of Texas, Modular Robotics and many others.

COLLOQUIUM EXPANSION: Associate Professor Leysia Palen, who coordinates the series, hopes to continue to expand our speaker program. The vibrant tech community in our region provides a wonderful opportunity for outreach that we hope will assist both the university and our larger community. One of the ways in which alumni and friends of the university can help is to make donations to support this growth of the colloquium series. Contact Professor Palen (Leysia.Palen@Colorado.EDU) if you would like to help.

We continue to welcome those in the Boulder and Denver area to attend our weekly colloquia. We'd love to see you back on campus! To receive announcements, subscribe to our mail list at www.cs.colorado.edu/events/colloquia/mail. You can also view the schedule online at http://www.cs.colorado.edu/events/colloquia/current/.

Alumni Surveys
We Need You to Fill These Out as Part of Our Program Accreditation

By Ken Anderson

The Department received ABET accreditation in Fall 2010 (see article on page 20). An important aspect of accreditation is the need to determine how well our BS degree program in Computer Science is meeting our program outcomes and objectives. Program outcomes are those skills and characteristics that we claim our graduates possess at the time of their graduation. Program objectives are those skills and characteristics that we claim our graduates possess three to five years after graduation.

To assess whether our degree program is achieving these goals, we rely on the feedback we receive through surveys administered by the College of Engineering and Applied Science. Our alumni have three opportunities to provide feedback to our department via formal surveys: the Senior Survey administered to our graduates a few weeks before they leave CU, the Postgraduate Survey administered to our graduates six months after graduation, and the Alumni Survey administered to our alumni four years after they graduate. We use the first two surveys as the primary means to assess whether our program outcomes are being met satisfactorily, while the third survey is our primary means of determining whether we are successfully meeting our program objectives.

Good response rates are essential to the effectiveness of these surveys. We urge you to participate if you are asked to complete one of these surveys. Your constructive feedback will help us improve the quality of our undergraduate program.

PLEASE SUPPORT OUR EFFORTS FOR EXCELLENCE BY TAKING THE ALUMNI SURVEYS AND SHARING YOUR VALUABLE FEEDBACK!
Doug Sicker Appointed to FCC (continued from page 1)

networks and technologies of today and tomorrow,” says FCC Chairman Julius Genachowski. “His technical expertise will help the FCC pursue policies that spur investment, create jobs, promote innovation, and advance our nation’s global technology leadership.”

Sicker is currently working on a broad range of topics at the FCC, including open internet design, spectrum efficiency, experimental licenses, merger actions, accessibility for the disabled, network measurement, privacy, security and more. He says that the challenge is “promoting public policy in a way that considers the many competing interests, all while ensuring investment and innovation in our nation’s networks and computing infrastructure. It isn’t enough to simply be technically correct.”

“It always surprises me just how many issues the FCC addresses and the impact this has on our country’s communications infrastructures and services,” says Sicker. “One issue that occupies a great deal of Sicker’s time is working with the Chairman’s Office and other offices and bureaus developing rules to ensure that the Internet remains an open, innovative environment that encourages investment and free speech.

A second issue on which Sicker has focused much of his energy is developing methods for encouraging the best use of our nation’s radio frequency spectrum. A priority in Sicker’s work in this area is to encourage the adoption of opportunistic spectrum usage in the form of cognitive radio networks. He recently worked on experimental licensing rules that allow researchers to more easily access radio frequency bands for wireless networking experiments.

Yet another important area of focus is reliability and public safety, including work on the allocation of the 700 MHz spectrum for the broadband public safety network; the investigation of next-generation E911 to incorporate new modes of communication, such as instant messaging and VoIP for calling emergency services; and the enhancement of the security and reliability of the nation’s networks.

Sicker’s research interests at the University of Colorado include network and wireless systems, network security, and telecommunications policy. His research has been funded through the National Science Foundation, Defense Advanced Research Projects Agency (DARPA), the Federal Aviation Administration and a number of private-sector companies. He most recently received a quarter-million-dollar NSF grant, “Self-Organization Based Control for New Generation Networks.” Through Sicker’s collaboration with CU Professors Dirk Grunwald and Tim Brown, CU-Boulder has become a national leader in “cognitive radio” networks and the security implications of next-generation wireless networks.

Much of Sicker’s work involves innovative perspectives on how privacy can be maintained on the internet, while at the same time exploring how people use anonymous networks. Considering emerging technology’s impact on society in the development of new technologies is imperative in his research.

“Doug is one of the most productive faculty members in the department,” says Xiao-Chuan Cai, professor and chair of the Department of Computer Science. “We’re thrilled that he’s using his expertise to serve not only the University, but also the country in this important role.”

Doug has also been at the forefront of CU’s Interdisciplinary Telecommunications Program, developing a set of new ideas sometimes called the ‘Colorado School of Communications Policy.’ “It is a great honor for Doug Sicker to be named the FCC chief technologist,” says Tim Brown, director of this program. “The ITP faculty have been active participants in shaping national communications policy, which has been the subject of a lively national discourse.”

In October 2010, the FCC announced the formation of the Technological Advisory Council, comprised of experts who will “help the Commission identify areas of innovation and develop technology policies supporting the nation’s competitiveness and job creation in the global economy.” Sicker will work closely with the TAC chairman in developing a work program and addressing communication technology’s role in driving job creation and economic growth.

Sicker finds the new appointment challenging and engaging, working long days and weekends in a never-ending whirl of meetings and brainstorming sessions, crafting public policy. He is hoping for a few days off before the next presidential election to visit some of Washington, D.C.’s famous monuments with his family. “I’ve never been so busy in all my life,” Sicker admits, “but this is only a reflection of the important work currently in front of the Commission, and having this opportunity to shape the future of the Internet and our nation’s communications needs is an honor.” He adds that his “only regret is that we can’t move the FCC to Boulder,” and that he “greatly misses Colorado, the university and (his) students, friends, and colleagues.”
We see articles in the news about Electronic Medical Records and the latest mobile gadget to help us lose weight. Could you briefly tell us about the current state of health informatics?

Unfortunately, the news reflects the current state of health informatics—there are those in the medical establishment viewing their medical data and then the general public separately managing their own health information. The information sets that each of the two groups have are mostly disjoint—each group with its own information silos—unless they make a concerted effort to work together and share information.

The problem of multiple information silos gets even more complicated because most healthcare facilities do not have Electronic Medical Records (EMRs) that can share data with other EMRs. For example, if you traveled to Florida on a vacation and had to go to an out-of-network or non-HMO affiliated hospital emergency room, the Florida hospital would not be able to electronically access your records in Colorado. There are a lot of efforts under way to increase the interoperability of EMRs, such as the Regional Health Information Organizations and Health Information Exchanges, but we are not there yet.

Likewise, the general public has numerous challenges with communicating and disclosing health information. Even healthy people receive a lot of paperwork from healthcare providers and insurance companies, and this information exchange becomes unwieldy once a person becomes ill. In one of our studies, we met an older adult couple that transported two-drawer filing cabinets with all of their health information between their summer and winter homes to ensure that they had all of the information they needed so their healthcare providers could care for them properly. Even the most high-tech gadgets that aid in weight loss suffer the problem of information transfer between user and healthcare providers, with printing out paperwork often still the only option.

There are some solutions for chronically ill populations to monitor parts of their health (e.g., blood glucose monitors wirelessly communicating with healthcare providers and pills that send out a pulse when digested to document adherence). However, these systems are not widely available or readily adopted. In some cases, the systems are in prototype phases (e.g., the pulse pills) and need more research and evaluation before they can be introduced to the general public. In addition, these systems are usually not explicitly linked with the information that healthcare providers have on a specific patient in the EMR, so again there is a data transmission problem.

As you can see, there are a lot of interesting challenges ahead.
Haven't computer scientists already solved all of these challenges? Aren't you talking about a simple matter of databases, networks, security, and human-computer interaction?

The technical people who designed the systems of today knew the computing concepts that could quickly solve some of these issues; however, they were not integrated into the systems. Why? Well, we have to remember that the use of technology in healthcare extends beyond computer science. Researchers and practitioners must consider the health, social, clinical, ethical, policy, legal, human factors, and financial implications whenever something is introduced into healthcare. Thus, although at first glance some of the issues may seem easily solved with some computing concepts that have been around since the 1960s, the issues are much more complex when everything is taken into account. This is one of the benefits of learning about informatics -- people learn how to be the bridge between the different fields and to better understand the implications of introducing new technology.

What are some of the challenges you and your lab are working on?

My Wellness Innovation and Interaction Lab investigates how to design applications that can engage general public participation in the Health Information Feedback Loop. In the figure at right, we see that individuals fluctuate throughout their lives between various states of good and bad health. When they are in bad health, they typically go to a healthcare provider and receive care, and either alone or with the assistance of a care facility they move back into better health. Some populations see healthcare providers regularly for preventative health measures, providing continual information to providers about their health cycles. However, some subsets of the population, especially low socioeconomic status populations, cannot access these preventative measures that complete the health information feedback loop.

We are working on a number of projects to help individuals in this feedback loop.

Starting in the bottom portion of the feedback loop, we collaborated with Indiana University to use information communication technology to empower Chronic Kidney Disease (CKD) patients to monitor their fluid and nutrient intake. This helped patients comply with their treatment regime and supported them in their lives.

We recently completed a project with the University of Colorado Denver Anschutz Medical Campus to develop a Personal Health Application that communicates with an interoperable Personal Health Record (PHR). This will assist older adults with complex medication regimes communicate their medication lists and concerns to healthcare providers.

We currently are working with the University of Colorado Wardenburg Health Center to evaluate how information generated by individuals/patients can be integrated into healthcare provider workflows and the center’s EMR. Undergraduate student Christopher Schaeff-bauer found that the EMR system used by the center does not support how providers want to document care. From a technical perspective, EMRs are just a database, network, and interface form, but in reality, EMRs must support provider workflows and facilitate communication between the patient, other providers, and healthcare facilities.

Another one of our projects, Health Bridge, is investigating how low socioeconomic status families would like to monitor and communicate about their health to other family members and healthcare providers. This project broadens the scope of the Health Information Feedback Loop by acknowledging that many individuals are involved with and impact someone's health.

A final project we have been collaborating on with researchers at Kyonggi University in Korea is an application that assists people—especially caregivers—in identifying medications through image recognition. In the current prototype, people can take a picture of their medications and the application will provide them with the name of and information about the medication.

Continued on p. 10

Health Information Feedback Loop Overview

Each line depicts information exchange. The line between an individual in good health going to a healthcare provider is dotted because not all subsets of the population do this type of activity.
You mentioned that your lab is helping the Wardenburg Health Center by evaluating its EMR. What other public service activities do researchers in your lab do?

For the Health Bridge project, the three students involved in the project also volunteer weekly at the Bridge Project community center in Denver tutoring children. We find that it helps to have an ongoing relationship and presence with people in the community instead of just popping in to conduct a study and then not seeing anyone in the community for a couple of months. In the last year, they have volunteered approximately 70 hours.

In addition, Christopher Schaefbauer held a workshop last summer during CU’s High School Honors Institute to teach high school students about health informatics and how important usability is when designing health applications.

You teach a Games for Health course for first year undergraduates and upper level students. How does Games for Health play into your research?

I became interested in Games for Health when I realized how time-consuming and input-intensive health monitoring could be. When we evaluated different prototypes for the Dietary Intake Monitoring Application, some participants did not want to use the application even though they could not effectively monitor their health without it. Indeed, when I tested the applications before releasing them, I had to set alarms to remind myself to input what I ate … and sometimes I really did not want to do it. So that got me thinking: How could we make monitoring fun? If some chronically ill individuals refuse to use an application, how could we expect healthy people to monitor their health with technology? After reading about some of the successes with physical activity games, I started exploring games for health through these classes.

The students in these classes think of incredible designs and implement high quality prototypes. Some students are motivated by what they think will be fun (e.g., Tetris-like bike

What is your vision for the future of health informatics?

I envision a future where there are multiple communication paths between healthcare providers, individuals, families, and communities.

Ideally, individuals would be able to collect information about their everyday lives—everything from their dietary intake to their mood to their physical locations—and reflect on the data to help them understand how it impacts their health. The systems would have to be designed to ensure a person looking at the data doesn’t make incorrect assumptions based on their preconceptions (confirmation bias). They could then easily share the data with trusted parties and healthcare providers through PHRs or social networking applications to receive personalized, actionable feedback that can improve their health. These input and output mechanisms would be able to accommodate the technology available to the population, time constraints, privacy expectations, and disabilities.

From a clinical perspective, I envision interoperable EMRs that can receive not only “official” information from other care facilities and pharmacies, but also information from the individual and community. This information would be abstracted and visualized so that the care provider could easily understand how all of the factors interplay into the individual’s health. The EMR would also facilitate better communication among providers and between providers and patients.

Researchers and practitioners are working on this vision, but we need more great minds to help us attain it.
Colorado’s recent Fourmile Fire disaster brought the devastation of emergency close to CU’s own community. As the disaster broke out, students in CU-Boulder’s Project EPIC crisis informatics lab were able to begin collecting data from Twitter. The lab watched as the #Boulderfire hashtag gained prominence, and the Twitter community organized information, interacted with mainstream media, and identified trustworthy information and sources to assist in individuals’ requests for information and help.

Deemed the most expensive fire ever in Colorado, the Fourmile Canyon Fire devastated more than 6,000 square miles and destroyed 169 homes west of Boulder in September. For Project EPIC, which researches how information generated by emergency responders and members of the public is disseminated and coordinated through the use of social media, the disaster provided a wealth of information and a testing ground for use of Twitter technology in crisis response.

The lab gathered over 19,000 tweets with the #boulderfire hashtag and identified some interesting trends related to information dissemination, behaviors, and online community organization through preliminary analysis of the collected data. In order to gain further information on the views of the most active Twitter users during the crisis, the lab hosted an afternoon roundtable discussion in the weeks following the fire where members of the community, public information officers, and representatives from CU were able to review and reflect on the emergency.

The roundtable discussion was a positive step towards fostering open and inclusive conversation between all stakeholders in this kind of emergency situation. “When disaster strikes there are myriad issues local officials need to contend with. Handling inquiries from the public is just one aspect of a very complicated and demanding time,” said Associate Professor Leysia Palen, director of Project EPIC. “In the case of the Fourmile Canyon Fire, public information officers did not just have the local community to assist, but also the influx of calls from parents and others who were naturally concerned about their students at CU. These types of competing demands are often not visible to the general community, but have an enormous impact. It was heartening to see how people at the roundtable were able to understand how others handled the demands on their time, verified their sources, and responded to misinformation.”

Discussion centered around three areas: information gathering, that is, how the participants collected and verified information telling them about the fire and its progress; information distribution, which relates to how participants made decisions about what information to disseminate and “retweet;” and tools used, which focused on what types of input media were used, and how participants accessed them throughout the emergency period.

Response from the roundtable group was positive, with interest shown in maintaining these channels of communication between community members and officials to provide support for future events. Project EPIC is planning to incorporate the information gained through the social media communication of this local tragedy into its ongoing research.
CR-GENI-Cognitive Radios for GENI
Spiral II and GENI-Small: Deploying
ENiWiMAX in Colorado
BBN TECHNOLOGIES | $29,820 & 140,000
DIRK GRUNWALD
Dirk Grunwald has received two grants for wireless networking through the NSF program for Global Environments for Networking Innovation (GENI). One award funds a joint project with Rutgers University and a private company to develop a highly capable “cognitive radio” that can operate between 60-6000 MHz. These radios will allow computer scientists to explore ways to make use of the TV White Spaces spectrum and innovate new ways to share radio spectrum. The second project involves setting up a WiMAX base station for use by researchers around the world via the GENI Orbit framework. This provides a high-speed wireless testbed for researchers working on mobility, propagation models and mobile computing applications.

Guided Assembly of Computational Robotic Materials
COMPUTING RESEARCH ASSOCIATION | $139,875
NIKOLAUS CORRELL & DUSTIN REISHUS
The goal of this research is to investigate novel algorithms for self-assembly of structures using a few intelligent building blocks that coordinate the assembly of a large number of passive ones. Trade-offs on the computational, sensing, actuation and communication abilities of the building blocks will be studied using the Tile Assembly Model.

Statistical Inference and Machine Learning for Complex Networks
J. S. MCDONNELL FOUNDATION | $417,000
AARON CLAUSET, CRISTOPHER MOORE (UNIV. OF NEW MEXICO) & MARK NEWMAN (UNIV. OF MICHIGAN)
This collaborative JSMF grant funds the development of novel statistical and computational algorithms for automatically detecting and characterizing complex structure in large-scale network data, and to apply these tools to discover fundamental principles of network organization.

Validating Architectural Simulators Using Non-linear Dynamics Techniques
NATIONAL SCIENCE FOUNDATION | $12,000
AMER DIWAN & ELIZABETH BRADLEY
This REU supplement will allow two undergraduates to participate in ongoing research that addresses the dynamical (and often chaotic) behavior of computer hardware and software.

Rehabilitation Engineering Research Center for the Advancement of Cognitive Technologies
NATIONAL INSTITUTE FOR DISABILITY AND REHABILITATION RESEARCH | $24,120
CLAYTON LEWIS
This funding is a part of a large center (rercenter.org) that carries on a portfolio of research projects on technology for people with cognitive disabilities. Lewis’ participation includes development of standards and guidance for consumer projects, vocabulary enhancement, and collaboration technology.

Collaborative Research: The Alliance for the Advancement of African-American Researchers in Computing (A4RC)
NATIONAL SCIENCE FOUNDATION | $18,226
CLAYTON LEWIS
This funding supports CU’s participation in an alliance of historically black colleges and universities and research universities to build research participation. Over the last four years the project has supported ten summer interns to work on technology to support people with cognitive disabilities at CU.

Statistical Techniques for Verifying Temporal Properties of Embedded Systems
NATIONAL SCIENCE FOUNDATION | $249,000
SIRIRAM SANKARANARAYANAN & GEORGIOS FAINEKOS (ARIZONA STATE UNIV.)
This project will study the use of rare-event simulation techniques such as Monte-Carlo sampling and the Cross-Entropy Method for verifying timing properties of embedded systems. Traditionally, formal verification has relied extensively on the use of symbolic logic and automated theorem proving techniques for reasoning about programs. One of the goals of this project is to make connections between symbolic approaches and those based on sampling/rare-event simulations.

Verifiable Decision-Making Algorithms for Reconfiguration of Electric Microgrids
NATIONAL RENEWABLE ENERGY LABORATORY | $14,500
SIRIRAM SANKARANARAYANAN, EVAN CHANG & DIRK GRUNWALD
We are investigating decision-making algorithms for the feeder-placement problem for electric micro-grids. These algorithms are applying machine learning and Monte-Carlo sampling to search for optimal configuration (in terms of power supplied and cost of installation) in a micro-grid electric power system with renewable energy sources and power storage devices.

Formal Analysis of Human-Machine Interfaces to Cyber-Physical Systems
NATIONAL SCIENCE FOUNDATION | $450,000
SIRIRAM SANKARANARAYANAN & CLAYTON LEWIS
This project investigates formal techniques for testing user interfaces to medical devices. While model-based software testing focuses on finding errors in the functionality of software systems, the corresponding testing process for usability often involves expensive human-factors studies and often cannot be carried out early in the design process. This project investigates model-based approaches based on user-models that will enable such user testing earlier in the design process to predict common types of user errors.

EAGER: Self-Organization Based Control for New Generation Networks
NATIONAL SCIENCE FOUNDATION | $250,000
DOUG SICKER
This work develops a framework to describe the types of problems that Biologically Inspired Algorithm (BIA) can address in network control. The analysis focuses on
mutual interaction among layers in BIA-based networks. This includes analysis of interaction among layered SO-based control and establishment of a theory of layered architectures.

Temporal Relation Discovery from Clinical Notes  
NATIONAL INSTITUTES OF HEALTH | $1,500,000  
MARTHA PALMER, JAMES MARTIN & WAYNE WARD  
(Joint with the Harvard and the Mayo Clinic)  
This project investigates the use of natural language processing and machine learning methods to automatically extract timelines from electronic health records. The progression of disease is manifested as a series of events, symptoms, treatments, outcomes, etc. These are all tied to points along a patient’s timeline. The ability to automatically construct such individualized timelines, or parts of them, from clinical narratives holds the promise to impact the speed of translational research. Epidemiological studies will be aided by the aggregated data from cohorts of multiple patients. New relations or observations could be discovered by tracking clinical events over timelines. This eventually could lead to improved patient care.

Secondary Uses of Electronic Health Records  
DEPARTMENT OF HEALTH AND HUMAN SERVICES | $1,400,000  
MARTHA PALMER, JAMES MARTIN & WAYNE WARD  
(Joint with the Mayo Clinic)  
The goal of this research is to investigate novel approaches to the extraction of useful information from free-text electronic patient records. Natural language processing and machine learning approaches will be used to extract medically relevant entities, events and relations among them in a given patient’s record. The representations resulting from these algorithms will be used to improve the quality of individual patient care, and enable the analysis and discovery of large cohorts of patients with similar attributes.

Scalable Solvers for Fully Implicit Coupled Nuclear Fuel Modeling  
DEPARTMENT OF ENERGY | $312,000  
XIAO-CHUAN CAI  
The focus of the project is on the development of highly parallel domain decomposition techniques for the numerical solution of coupled systems of partial differential equations arising from nuclear fuel simulations on supercomputers with tens of thousands of processors.

Retirements  
CLARENCE (SKIP) ELLIS served on the Computer Science faculty from 1992 until his retirement in 2010. During his tenure at CU, Ellis’ research focused on Computer Supported Collaborative Work (CSCW), workflow, groupware, introductory computer science, and Java programming. The first African American to receive a PhD in Computer Science, Ellis received his doctorate from the University of Illinois, as well as a BS in Math and Physics from Beloit College. He has worked as a researcher and developer at IBM, Xerox, the Microelectronics and Computer Technology Corporation, Los Alamos Scientific Labs, and the Argonne National Laboratory. In addition to the University of Colorado, he has taught at Stanford University, the University of Texas, MIT, Stevens Institute of Technology and in Taiwan. During his later years with the department, Skip took several leaves of absence to work with the African Virtual University, a Pan African Intergovernmental Organization whose goal is to significantly increase access to quality higher education and training through the innovative use of information communication technologies. He is continuing that work in retirement.

GARY NUTT served CU-Boulder’s CS faculty from 1972 to 1978 and again from 1986 to his retirement in 2010. He received a doctorate from the University of Washington, under the supervision of Jerre Noe (an academic great grandson of Vannevar Bush). Nutt’s thesis addressed graph-based models for performance evaluation, an interest he pursued during his first term at CU. At various times in his research career, Nutt studied system performance, computer systems, architecture, operating systems, distributed systems, collaboration systems, modeling systems, visual languages, and real-time systems. His former doctoral students have served on the faculties at Ecole Nationale Supérieure des Télécommunications, University of Tennessee, Carnegie Mellon University, Worcester State University, Regis University, University of California at Santa Cruz, and University of Colorado. Nutt worked in industry from 1978 to 1986, thereby reflecting an entrepreneurial and commercial influence on his teaching and research during his second tenure on the faculty. Since retiring, he has been consulting and dabbling in entrepreneurial ventures; he spends his leisure time playing stringed instruments, lutherie, fly fishing, and a little hiking, biking, and golf.
Honors and Awards

Readers can find the latest news about department achievements at www.cs.colorado.edu/dePARTMENT/news

Faculty and Staff

Professor ELIZABETH BRADLEY was appointed to the Science Board of the Santa Fe Institute. The board, composed of distinguished scientists who have demonstrated an interest in and understanding of SFI programs, is responsible for advising on and evaluating SFI’s general scientific agenda. Bradley also represented the CU-Boulder faculty on the search committee which selected new head football coach, Jon Embree.

Professor Emeritus HAL GABOW was awarded the 2010 SIGACT Distinguished Service Prize by the ACM Special Interest Group on Algorithms and Computation Theory. The prize is given every other year to an individual who has made substantial service contributions to the Theoretical Computer Science community.

Along with Michel Goemans (MIT), Eva Tardos (Cornell University) and David Williamson (Cornell University), Gabow also received the Glover-Klingman Prize for the best paper of the year published in Networks: An International Journal. The paper was titled "Approximating the smallest k-edge connected spanning subgraph by LP-rounding."

Professor LAWRENCE HUNTER was named a 2010 International Society for Computational Biology Fellow. The ISCB Fellows Program honors members who have distinguished themselves through outstanding contributions to the fields of computational biology and bioinformatics.

Professor Emeritus CLARENCE (SKIP) ELLIS and Research Associate Professor ALEXANDER REPENNING were honored at the 2010 Telluride Tech Festival for their contributions to computer science. The Festival was founded in 2000 with the purpose of honoring individuals who are leaders in the field of technology and have contributed to the world as a whole.

Former Chair and Professor Emeritus BOBBY SCHNABEL was named a 2010 ACM Fellow for his achievements in advancing fundamental knowledge of computing. He was specifically cited for "leadership of the computing community in education and diversity, and for contributions to numerical optimization." Schnabel is currently dean of the School of Informatics at Indiana University.

Professor MICHAEL MOZER was recently honored by University of California, Merced cognitive science faculty with the 2010 Distinguished Cognitive Scientist Award. This award is made possible by a gift from the Glushko-Samuelson Foundation, which also funds the Mind, Technology and Society series on the UC Merced campus. Mozer is internationally known for pioneering work in connectionist modeling and is a leading expert on mechanisms of learning and cognition. His award presentation was entitled, "Improving Human Learning and Memory via Cognitive Models."

Undergraduate Program Advisor LESLEY MCDOWELL received the College of Engineering Employee Recognition Award for September. This award recognizes outstanding staff serving the college and is based on five criteria: attention to work culture, interpersonal relations, communications, service to the unit, and accomplishment of goals.

Assistant Professor SRIRAM SANKARANARYANAN was recently awarded a Faculty Early Career Development (CAREER) Award by the National Science Foundation. The program is a foundation-wide activity that offers the NSF’s most prestigious awards in support of the early career-development activities of those teacher-scholars who most effectively integrate research and education within the context of the mission of their organization. Sankaranarayanana’s project is titled “Automatic Analysis of Cyber Physical Systems: Bridging the Gap between Research and Industrial Practice.”

Students

Grad student ERIC WORDEN was inducted into Tau Beta Pi. The Engineering Honor Society was founded in 1885 to mark in a fitting manner those who have conferred honor upon their alma mater by distinguished scholarship and exemplary character as undergraduates in the field of engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in the engineering colleges.

Worden, along with Gregory Harrison, Jason Smith, Jonathan Brant, Dave Maynard, Tom Wonneberger (all of Lockheed Martin), also had the paper “Adaptive Artificial Enemy for Embedded Simulation” accepted at the Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC) 2010. Their research involves learning classifier systems (LCS) and evolutionary algorithms with respect to training. Embedded training and many training exercises played against constructive entities can tend to be repetitive,
with similar enemy actions occurring at similar times in the exercise. This research adapted the training environment with Evolutionary Algorithms with Genetic Programming (GP) and learning classifier systems (LCS). It has wide ranging implications from learning a particular student’s behavior, Course-Of-Action (COA) planning to After Action Reviews (AARs).

PhD student DAVID GNABASIK received the Graduate Alumni Scholarship for 2010. The scholarship is offered by the Office of Alumni Relations to one graduate student per graduate division each year.

A short paper by doctoral students NWANUA ELUMEZE, YINGDAN HUANG, JANE MEYERS and CS Professor MICHAEL EISENBERG won a “best paper” award at the 3rd IEEE International Conference on Digital Game and Intelligent Toy Enhanced Learning (DIGITEL 2010) held in Taiwan. The paper is entitled “Serious” Programming Made Cuddly: A Fully End-User-Programmable Stuffed Toy.

Undergraduate students KATHERINE CORNER and DOUGLAS STILLINGS were recipients of the 2010 Domino Award. The Domino Award is given annually to CU computer science students for an outstanding essay honoring the impact that other computer scientists have made on modern society. Essays were judged for their ability to clearly communicate how the honoree’s work set in motion a “series of dominos” that changed the world. The award was created by serial entrepreneur and CU computer science alumnus Herb Morreale (BS ’91) and Professor Clayton Lewis.

Sophomore ELIZABETH LOR was awarded an Emma L. Bowen Foundation fellowship to provide her support through scholastic achievement mentoring, direct work experience with an industry partner, and professional development workshops. The award includes summer internships each year she is in college and matching dollars to help pay for college expenses.

Graduate student NEETI WAGLE was awarded a Zonta International Amelia Earhart Fellowship. Established in 1938 in honor of the famed pilot and Zontian, the Amelia Earhart Fellowship is awarded annually to women pursuing doctoral degrees in aerospace-related sciences and aerospace-related engineering.

PhD student DAN KNIGHTS received a three-year ARCS (Achievement Rewards for College Scientists) Scholarship from the ARCS Foundation. The foundation provides scholarships to academically outstanding United States citizens studying to complete degrees in science, medicine and engineering, thereby contributing to the advancement of science and technology.

PhD student CALEB PHILLIPS spent last summer at the University of Waikato in Hamilton, New Zealand (where it was actually winter) as a fellow of the National Science Foundation (NSF) East Asia and Pacific Summer Institute (EAPSI). He worked with members of the WAND networking research group, studying a unique wireless network they have developed in collaboration with a startup company. The network provides Internet access to rural farms and small villages of the Waikato region using low cost commodity hardware, often powered by solar cells. The primary goals of EAPSI are to introduce students to East Asia and Pacific science and engineering in the context of a research setting, and to help students initiate scientific relationships that will better enable future collaboration with foreign counterparts.

A paper by graduate students KATE STAR-BIRD, AMANDA HUGHES and SARAH VIEWEG, along with Professor Leysia Palen, was nominated for the “Best of CSCW” award at the ACM 2010 Conference on Computer Supported Cooperative Work (CSCW 2010). The paper was titled “Chatter on The Red: What Hazards Threat Reveals about the Social Life of Microblogged Information.” Starbird and Vieweg are graduate students in the AT-LAS Program. In addition, a paper by Starbird and Palen, “Pass It On?: Retweeting in Mass Emergencies,” was nominated for best paper in the Proceedings of the Conference on Information Systems for Crisis Response and Management (ISCRAM 2010) held in Seattle.

A paper by PhD students DANISH KHAN and JANE MEYERS and Professor KATIE SIEK, along with Leah Haverhals, Steven Cali, and Stephen Ross of the University of Colorado School of Medicine, received a “Best Regular Paper Award” at the 1st ACM International Health Informatics Symposium held in Arlington, VA. The paper was titled “Designing a Personal Health Application for Older Adults to Manage Medications.”

CU Spirit

Prof. Dirk Grunwald’s student, Aveek Dutta, generated this “non-contiguous Orthogonal Frequency-Division Modulation waveform.” OFDMs have application to “cognitive radios”, which can change their transmission or reception parameters from one microsecond to the next, enabling more efficient use of the radio spectrum.
Lloyd Fosdick: Reflections from the Founding Chair of the Department of Computer Science at CU-Boulder by Liz Jessup

I spent a snowy November afternoon visiting with Professor Emeritus Lloyd Fosdick at his lovely Estes Park condo. Lloyd was founding chair of the Department of Computer Science at CU. The purpose of our conversation was to record history of the early days of computer science and of our department, as well as a bit of Lloyd’s personal story.

A vigorous 83-year-old, Lloyd just recently gave up biking in Rocky Mountain National Park. (I include that detail for those of you who remember the big mountain rides with Lloyd before he retired.) He now stays busy with hiking and volunteer work.

I report here mainly on my conversation with Lloyd, but some details were provided by Professor Emeritus Bill Waite, the University of Colorado Boulder Libraries Archives, and a handful of websites. If you’d like to get in touch with him, Lloyd can be reached at lloydfosdick@gmail.com.

— Liz Jessup

Education

Lloyd entered the famed Great Books program at the University of Chicago following his junior year in high school, completing an undergraduate philosophy PhD degree from that program in 1946 and a BS in Physics in 1949. While at Chicago, Lloyd played quarterback on a successful intramural football team, even though he says that he couldn’t see where he was throwing the ball. Games were played on Stagg Field while Enrico Fermi was at work building the first atomic pile in a building at the west end of the field.

Lloyd’s next steps were to earn an MS and a PhD in Physics at Purdue in 1950 and 1953, respectively. After completing graduate school, he moved on to the University of Illinois to work in the Control Systems Laboratory (CSL), which was allied with the Department of Physics. The University of Illinois was then part of the Midwest Universities Research Association (MURA), a consortium of universities combining resources to work on problems of accelerator science that operated from 1953 to 1967.

Serving the United States Army

Lloyd was eligible for the draft in World War II, but despite his 1A status, he was rejected because of colorblindness when he tried to enlist in the Navy. Student deferments subsequently kept him out of the Korean War until its end, when he was finally drafted into the Army after a year in Illinois. After eight weeks of basic training, he was transferred back to the CSL to complete his service.

While working at the CSL, Lloyd wrote experimental software for the ILLIAC (ILLInois Automated Computer) to track aircraft from radar reports. When his two years of Army service were complete, he moved on to the MURA research laboratory at the University of Wisconsin. There, he wrote an assembler called Murass for MURA’s IBM 704 because the 704 compiler required a magnetic tape drive that MURA could not afford. The tech report on Murass (which you can find online) explains that the program converted a simple set of commands into IBM 704 instructions and binary numbers and produced a deck of cards for the translation. Lloyd tells the story of a visit to IBM on Madison Avenue where he was not allowed into the machine room after an all-nighter working on the assembler until he “cleaned up” and put on a tie.

Murass was part of a competition between Argonne National Laboratory and MURA for a government contract to build an accelerator. After Argonne won the competition, the CSL faculty dispersed to their various institutions. At that point, Lloyd was hired by the Digital Computer Laboratory (DCL) at the University of Illinois, where he also held faculty positions in Mathematics and Physics and later in Computer Science. The DCL was the predecessor of the Department of Computer Science at Illinois, which was founded in 1964. The DCL was organized in 1949 with funding from the University of Illinois and the Army as part of the effort to build the ORDVAC (Ordnance Variable Automated Computer) and the ILLIAC. The ORDVAC was completed in 1951, and the ILLIAC was finished a year later. Both were Von Neumann machines, and both ran the same software. Lloyd wrote a book on programming the ILLIAC that was published in 1961.

CU Computer Science Founded

Lloyd’s first visit to CU happened in the summer of 1968 when he came to help his physics graduate student, electrical engineering professor Harry Jordan, finish his thesis. Lloyd and his wife Erica enjoyed Boulder, so they were happy to accept an invitation from CU’s Computing Institute to return in the summer of 1969. The Computing Institute, which was founded in 1962, was populated by faculty from the Departments of Psychology, Sociology, Physics, and Electrical Engineering who worked on applying computing technology in their fields.

Professor Emeritus Bill Waite remarks that, with its emphasis on “computer science + X,” the Computing Institute was 40 years ahead...
of its time. Beginning in 1964, the institute offered a number of graduate courses that bear little resemblance to our current offerings. Computer Applications in the Behavioral Sciences and Mathematical Theories in Psychology are two examples.

A group of CU faculty began work on a proposal to the National Science Foundation (NSF) for funds to start a computer science department in 1969. They asked Lloyd if he would consider coming to CU to serve as chair of the new department if the funding came. It did, and he ultimately accepted their invitation, arriving late in the summer of 1970.

**Early Years of the Department**

The Department of Computer Science began in 1970 as a graduate program only. There were two CS faculty members plus affiliates from Mathematics, Business, Psychology, and Sociology. The first offices were on East Campus before the grad student offices were abruptly moved to Carlson Gymnasium and faculty were relocated to Ketchum. Originally housed in the basement in a former psychology rat lab which still, unfortunately, smelled of rats, the faculty happily relocated to a better home on the first floor a short while later.

At its start, the Department of Computer Science was not affiliated with a college. It and the Department of Mathematics, which was also adrift, were given a year to choose homes. The decision was complicated by the effort of the Department of Mathematics, which was known to lead in the "old days." Lloyd considered a number of alternatives, but the only real choice was a move to the Engineering Center. The department, which was still part of Arts and Sciences, made the move in the mid-1970s. Then Chancellor Jim Corbridge supported this move and also urged the department to change its affiliation to Engineering by the late 1970s, the department was much better established, and Lloyd stepped down from his second term as chair in 1978. Under new leadership, the department joined the College of Engineering and Applied Science in 1980.

Lloyd returned for a third term as department chair beginning in 1985. He remarked that that term was different from the first two because the mature department had a different set of issues than it did in its early years. For one, there was a lot of pressure to seek ABET accreditation, but Lloyd opposed it. At that time, only weak CS departments pursued accreditation and they sought money from their administrations to meet standards of space and equipment. He wanted the department to have freedom to introduce new courses and make curricular changes, and he had concerns about drain on faculty. The ABET world has changed in the intervening years with the introduction of a more flexible CS society. Very high quality departments are now accredited, and our department joined those ranks in 2010.

**High-Performance Scientific Computing**

My own association with Lloyd began in 1989 when I joined the faculty as a new assistant professor. Lloyd was preparing to submit a proposal to NSF to fund the development of an undergraduate curriculum in high-performance scientific computing (HPSC) which was, at the time, a very innovative plan. He invited me to join the project. Together with two other collaborators, we developed a two-semester course sequence supported by a textbook, published by MIT Press, along with a laboratory manual.

The courses High-Performance Scientific Computing 1 and 2 were introduced at CU-Boulder in the 1991-1992 academic year. An updated one-semester course survives in today’s offerings. With his grand finale HPSC project complete, Lloyd retired in 1993.
Meeting the needs of an increasingly diverse population in the classroom is an ongoing challenge for 21st century educators. Interactive resources can greatly assist in capturing students’ interest and ensuring they understand difficult material, but for many teachers, finding these curriculum-enriching resources can be time consuming and difficult. Fortunately, a new curriculum customization tool is helping make digital images, animations, and inquiry activities to better engage middle and high school students in science a lot more readily available to Colorado teachers.

Funded by the National Science Foundation’s National STEM Education Distributed Learning program, the Curriculum Customization Service (CCS) is an integrated platform that helps K-12 teachers access interactive resources, customize curriculum and share their newly customized materials with other educators in their school district. In Colorado, several districts are already taking advantage of this tool developed by Digital Learning Sciences, a joint center of CU-Boulder and the University Corporation for Atmospheric Research. The CCS project is a joint effort led CU-Boulder Associate Professor Tammy Sumner and co-principal investigators Holly Devaul and Loretta Melhado (both of UCAR) and Edward Freeman and Patty Kincaid (both of DPS). The center includes graduate students from the Department of Computer Science who contributed to the CCS platform, applying their expertise to a pressing national problem: improving science education.

“Our vision was to create a teacher-friendly software tool that would help teachers to be more effective in their curriculum planning and classroom instruction,” says Sumner, who serves as executive director of Digital Learning Sciences.

The result of a participatory design process involving the National Science Digital Library and teachers from Denver Public Schools (DPS), the CCS service brings together a variety of previously-developed tools, services, and products that enhance teaching and student understanding. The tool was released in a field trial at the start of the 2009-2010 academic year to all 124 DPS middle and high school Earth science teachers. Preliminary results suggest the service offers a promising and scalable model for embedding educational digital libraries into teaching practices and curriculum planning.

“The long-term goal in this particular project is to give teachers the tools they need to be effective in engaging students in science. Teaching science is hard to begin with and when you throw in the added complexity of having a large range of knowledge, skills and abilities in the classroom, you absolutely have to think about how you customize your instruction to really energize all of your students,” says Sumner.

CCS is designed to promote purposeful planning, providing teachers with a customizable personal work space where they can search for, save, and share resources, including interactive digital library resources.
DPS teacher Tiffany Boody says CCS provides a centralized tool that has greatly reduced the time she spends randomly searching for resources on the Internet. The CCS platform allows teachers to share resources and develop discussions which might not otherwise occur due to varied schedules and physical distance.

“An unintended outcome of the project was the creation of a virtual professional learning community,” said Patty Kincaid, secondary science coordinator for DPS. “Resources from the digital libraries were tagged and shared so other district teachers could benefit from the planning and expertise, efforts, input and feedback (of teachers who had already used the service).”

One of the most popular features of CCS is the collection of animations that help kids visualize complicated Earth science topics. Jeff Miller, a member of the DPS teacher advisory board, says the CCS resources he used enabled students to ask more analytical and less knowledge-based questions of each other, the lab text and the teacher.

“Interacting with visuals ... kept students more engaged rather than skipping over the challenging sections or giving up,” Miller says.

Boody says her use of CCS visuals provokes vocal, enthusiastic responses, such as, “Wow … that totally made sense. Can we see it again?”

Expanded CCS resources to support middle school physical science topics will be deployed in DPS in the 2011-2012 school year. Also in 2011-2012, an NSF-funded replication study will be conducted to assess the efficacy and impact of the service in districts with different characteristics. More than 300 teachers from six school districts in Colorado, Utah, and Nevada will participate in the study.

“One of the big goals in K-12 is to give every student who graduates a solid science education so they at least have the option of moving on to college,” Sumner says. “As we strengthen high school graduation requirements, we need to give teachers the tools they need to actually make that possible. Hopefully, this service will be a useful tool for many teachers.”

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**Inspirational Teachers Recognizing K-12 Teachers Who’ve Inspired our Students**

The Inspirational Teacher Award recognizes those teachers who our students remember as being highly influential in convincing them to pursue higher education or who otherwise inspired in them a love of learning. Each fall, our first-year students are asked to submit nominations and the teachers they select receive an award certificate and a photo of the student here at CU. The Department of Computer Science’s Inspirational Teachers for 2010 are:

**Dan Felknor**
BROOMFIELD HIGH SCHOOL
Broomfield, Colorado
nominated by Nathaniel Pohl

**Jim Flanigan**
MOUNTAIN VISTA HIGH SCHOOL
Highlands Ranch, Colorado
nominated by Cory Hensen

**Richard Guenther**
SKYLINE HIGH SCHOOL
Longmont, Colorado
nominated by Kiran Pachhai

**Katie Lauver**
LANGHAM CREEK HIGH SCHOOL
Houston, Texas
nominated by Kenneth Sheedlo

**Pauline Patrick**
MINNETONKA HIGH SCHOOL
Minnetonka, Minnesota
nominated by Trevor Gaylord

**Regina Peyfuss**
D’EVELYN JR./SR. HIGH SCHOOL
Lakewood, Colorado
nominated by A. Samuel Pottinger

**Ken Sawyer**
RALSTON VALLEY HIGH SCHOOL
Arvada, Colorado
nominated by Brian Phipps

**Russ Skillings**
MOUNTAIN VIEW ELEMENTARY
Broomfield, Colorado
nominated by Justin Huffman

**Roberta Tanner**
LOVELAND HIGH SCHOOL
Loveland, Colorado
nominated by Thomas Brummet

**Dave Title**
NIWOT HIGH SCHOOL
Niwot, Colorado
nominated by Eliot Glairon

**Mark Zarn**
WESTMINSTER HIGH SCHOOL
Westminster, Colorado
nominated by Elizabeth Lor
**WHAT:** In the fall of 2010, the department’s Bachelor of Science degree program in computer science was accredited by the Accreditation Board for Engineering and Technology, otherwise known as ABET. Our department’s accredited status was backdated to October 1, 2008 and is effective to September 30, 2016.

**WHY:** ABET accreditation is an assurance that a university degree program meets the quality standards established by the profession for which it prepares its students. It also means that the department that manages that degree program has instituted processes to ensure that quality is maintained via annual reviews.

We sought accreditation for our degree program for a number of reasons. Our department has focused on the quality of our undergraduate degree for many years, starting with the move to add flexibility to the degree program in 2002, followed by the addition of curriculum-based tracks in 2007. In this light, accreditation is recognition that these efforts have produced a high-quality program.

More importantly for our students, degrees from accredited programs are often required by post-graduate options such as medical schools and law schools, and also allow our students to apply for more scholarships and awards, many of which require that the students be members of an accredited program.

For our faculty, accreditation means that we are focusing on normalizing the content and learning goals of each of our undergraduate classes, as well as documenting what worked and what didn’t each time a class is taught. This should enable smoother transitions when the instructor for a course is changed and provide students with a degree of confidence that courses will be taught consistently each academic year.

**HOW:** Achieving accreditation was a long and arduous process, eased by the department’s focus on the undergraduate program since 2001. The department formed an accreditation committee in the summer of 2008. That committee worked with the Undergraduate Committee to assess the state of the program, to understand both the strengths and weaknesses of the existing degree program and to identify the changes that needed to be made by fall 2009 to ensure that our accreditation efforts would be successful.

A curriculum-wide review was conducted by the undergraduate committee in fall 2008 that led to many small changes to various undergraduate courses including updated catalog descriptions, updated prerequisites and changes in course content. A course profile was created for each course that explicitly identifies the learning goals for each course. In addition, skills lists were developed for our foundational courses to ensure that faculty understand what skills are required by each course and what skills are produced by each course. These skills documents are what allowed us to adjust course prerequisites to ensure a smooth progression for students from course to course.

At the same time, the ABET and undergraduate committees developed a set of outcomes and objectives for the degree program. Our program outcomes document the skills and characteristics that our graduates have when they graduate, while our program objectives document what we want to be true of our graduates three to five years after graduation.

The results of these activities were documented by the ABET committee in a 300+ page self-study report that was submitted to ABET in the summer of 2009. In parallel, the faculty developed course dossiers for each undergraduate course that included the course profiles, but also copies of exams, assignments, FCQ scores, and other assessment-related information. These dossiers were then reviewed by the ABET team that came to visit our department in fall 2009. Our ABET reviewers were Prof. David Cordes from the University of Alabama, Prof. John Uhran from the University of Notre Dame, and Prof. David John from Wake Forest University.

This team met with faculty, students, staff, and alumni and reviewed both the self-study report and the assembled course dossiers. Our department’s hard work paid off when they found no significant problems with our program that led to both a positive review at the end of the site visit and full accreditation in fall 2010!

Many people in our department—faculty, staff, students, and alumni—participated in our accreditation efforts. Countless hours were invested in the process by the chair of the ABET committee, Prof. Gary Nutt and the chair of the Undergraduate Committee, Prof. Ken Anderson. They were supported in their efforts by the members of the ABET committee: Prof. Mike Eisenberg, Prof. Dirk Grunwald, Prof. Liz Jessup, Senior Instructor Bruce Sanders, Undergraduate Advisor Lesley
Congratulations to CU-Boulder Computer Science majors who completed senior projects in 2010:

MOBILE RESTAURANT BILL-SPLITTING SYSTEM
Tyler DeWitt, Benjamin Jacobson, Jonathan Meador, Marcus Seeland and Ryan Stout
Red Robin International | Boulder, CO

WEB-BASED COMMUNITY RADIO ADMINISTRATION
Thomas Buzbee, Bryan Callahan, Eric Freese, Stephanie Pitts and Timothy (Wil) St. Charles
KGNU Community Radio | Boulder, CO

HEALTH CARE EDUCATION USING SECOND LIFE
Michael Getz, Douglas Kumagai, Jonathan Loptien and Michael Niland
University of Colorado Denver
College of Nursing | Aurora, CO

AN ORIGINAL BIG FISH GAME
Ryan Dowell, Scott Hanes, Bethany Henrikson and Lucas Przygocki
Big Fish Games, Inc. | Seattle, WA

MACHINE LEARNING BASED OBJECT RECOGNITION
Nicholas Embree, Zachary Flower, Robert Naugle, Michael Russell and Diana Tamabayeva
TKO Enterprises, Inc. | Longmont, CO

INTERACTIVE DRAWING TOOL FOR SCIENCE ON A SPHERE
James Bailey, Brian Hallesy, Neal Robbins, Brandon Shelton and Garrett Shulman
University of Colorado at Boulder
Craft Technologies Group | Boulder, CO

INFLATABLE ICONS AS 3D WEB APP
Victoria (Tori) Gilbertson, Isaac Guerrero, Thomas Huber, Kyle Madruga and Tyler Manser
Google | Boulder, CO
AgentSheets, Inc. | Boulder, CO

DATABASE REPORTING AND WORKFLOW MANAGEMENT ON THE SALESFORCE.COM CLOUD
Jordan Baucke, Hampton Brown, Aaron Cephus, Jason Fussenegger and Lucas Greve
Amadeus Consulting Group, Inc.
Boulder, CO

3D SIMULATION FOR SATELLITE FLIGHT CONTROL, VERSION 2.0
Kyle Allaire, Daniel Dexter, Walter Mahfuz and John Martin
Laboratory for Atmospheric and Space Physics | Boulder, CO

COMMANDING, MONITORING, AND SYSTEM LOG PARSER FOR PAYLOADS ON THE INTERNATIONAL SPACE STATION
Peter Carr, John (JP) Ford, Benjamin Golden, Tyler Knappe and Sean Usher
BioServe Space Technologies | Boulder, CO

TRACER FIRE SCORING SYSTEM
Eryn Dahlstedt, Michael Pack, Garrett Reid and Sung Ryu
Sandia National Laboratories
Albuquerque, NM

SPACECRAFT MODEL INTERPRETIVE LANGUAGE CONVERTER
Jared Barnett, Ryan Carney-Mogan and Kyle Kermgard
National Aeronautics and Space Administration
Jet Propulsion Laboratory | Pasadena, CA

O3D-BASED 3D WEB GAME ENGINE
Scott Keller, George McCabe Jr., Stuart Reed, Erin Rowland and Michael Wally
Google | Boulder, CO
AgentSheets, Inc. | Boulder, CO

Interested in sponsoring a Senior Project?
Contact Bruce Sanders at Bruce.Sanders@Colorado.EDU
A partnership initiated by computer science Professor Bobby Schnabel is increasing the involvement of African American students in computing research at historically black colleges and universities and on the CU-Boulder campus. The Alliance for Advancing African American Research in Computing (A4RC) (www.a4rc.org), a project funded by the National Science Foundation’s Broadening Participation in Computing program, connects historically black colleges and universities (HBCUs) with research universities, encouraging students at HBCUs to pursue doctoral study in computer science by offering faculty connections and research opportunities. While some of the historically black schools have master’s programs, none offer PhDs, and the number of African American PhDs in computer science is very small.

The Department of Computer Science at CU-Boulder became involved with the A4RC program in 2006 when Schnabel, who also served as vice provost for academic and campus technology at CU-Boulder, connected CS faculty members Liz Jessup and Clayton Lewis with colleagues at North Carolina A&T University, the lead school in A4RC. A4RC uses a “pod” structure to support students’ interest in research. Each pod connects undergraduate students and faculty at an HBCU with faculty at a research institution to focus on a research topic of mutual interest. Throughout the academic year the students learn about the topic and develop pertinent skills that prepare them to serve as summer interns at the research institution.

CU-Boulder’s first intern in 2007 was from Norfolk State University in Virginia, where alumna Thorna Humphries (PhD CompSci ’00) is on the faculty. For the past three years the CS department has hosted summer interns from Jackson State University in Mississippi. The students have worked on Banga, a therapeutic mobile application for people with aphasia, a disorder that results from damage to portions of the brain that are responsible for language. The application was originally designed as a course project at the suggestion of Professor Gail Ramsberger, chair of CU’s Department of Speech, Language, and Hearing Sciences department. The Jackson State University students have shaped the evolution of Banga from a native Android application to a cross-platform HTML5 application that received its first trial use this past summer. The students’ work has been featured in poster presentations at the last three ACM ASSETS conferences on computing and accessibility.
Congratulations to our 2010 graduates who wrote theses at the bachelor’s, master’s, and PhD levels.

ANDERSON, ERIC WILLIAM (PhD)
Integrated scheduling and beam steering for spatial reuse

BAKER, CHRISTOPHER THOMAS (MS)
Modeling open source software communities

BARROW, BENJAMIN ORION (BS)
An edge matching approach for video motion estimation

BATES, ADAM ROY (MS)
Automated software license and copyright analysis

CARLSON, JAMES ARTHUR (PhD)
Surface wrapping: A deformable mesh approach to semi-automatic 3D volume segmentation

CER, DANIEL MATTHEW (PhD)
Parameterizing phrase based statistical machine translation models: an analytic study

CRUMLY, DANIEL LEE (PhD)
On the reliability of Newton’s method in the presence of singularity

DLIGACH, DMITRIY (PhD)
High-performance word sense disambiguation with less manual effort

ELUMEZE, NWANUA ONOCHIE (PhD)
Ambient programming

GALLAGHER, SUZANNE RENICK (PhD)
Graph connectivity: approximation algorithms and applications to protein-protein interaction networks

GASPARIAN, ANNA (PhD)
Developing a conceptual framework and application for “sketching” an interactive reporting tool

GOODRICH, JULIA KAREN (BS)
Phylogenetic pipeline for the detection of horizontal gene transfer

HURST, JONATHAN GEORGE (MS)
Parallelizing a data intensive lagrangian stochastic particle model using graphics processing units

KIREYEV, KIRILL M. (PhD)
Applications of distributional vector space models to modeling of psycholinguistic phenomena

KNOX, DAVID ALLEN (MS)
Efficient algorithms for large data sets of genomic sequences in microbial community analysis

KOOH, THOMAS GEORGES CYRILLE (MS)
Macs: A practical approach to mobile content sharing over ad hoc networks

KRUNIC, VELJKO (PhD)
Scalable software control of a million-element cyber-physical systems using graphics processing unit

LATIMER, KENNETH WILLIAM (BS)
A neural network model for object recognition in cluttered scenes using motion and binocular disparity

LEPTHIEN, WILLIAM VAN (PhD)
Dynamic behavior management in an entity-oriented software environment

MANGALATH, PRAFUL CHANDRA (PhD)
The construction of meaning—the role of context in corpus based approaches to language modeling

MARBACK, JONATHAN (PhD)
Supporting multiple users in single-stereo-pair immersive virtual reality environments

MYTKOWICZ, TODD D. (PhD)
Supporting experiments in computer systems research

NELSON, THOMAS HARRISON (MS)
Genetic algorithms with chaotic population dynamics

NOVINGER, MATTHEW THOMAS (MS)
COSE: crisis oriented search engine

OGREN, PHILIP VICTOR (PhD)
Coordination resolution in biomedical texts

PRESCOTT, MOSS LINCOLN (MS)
Speaking for the trees: a new (old) approach to languages and syntax

REICHENBACH, CHRISTOPH (PhD)
Program metamorphosis

REID, SAMUEL ROBERT (PhD)
Model combination in multiclass classification

SCHAEBBAUER, CHRISTOPHER LEE (BS)
Documenting for care: Evaluating an EMR for primary care providers

SCHENK, CHRISTOPHER BRENDAN (MS)
Finding event-specific influencers in dynamic social networks

SHARMA, ABHISHEK (MS)
An algebraic approach to the graph isomorphism problem

STIMPFLING, ROBERT DEREK (BS)
An evaluation of Go and Clojure

SUNDARAVEL, ANU SWAPNA (MS)
Improving access to space weather data via workflow and web services

WETZLER, PHILIPP GEORG (PhD)
Computational models of quality for educational digital resource assessment

WHITE, ELIZABETH KENDRICK (PhD)
Pattern-based extraction of argumentation from the scientific literature

YEE, GARY VINCENT (PhD)
Ordering and combinatorial effects of wireless optimizations in beam forming 802.11 WLANs

Where’s Mike?
Can you spot the CU Computer Science professor as members of the audience get their groove on with the chaotic dance at the Constructionism 2010 conference in Paris?

See p. 27 for the answer.
PING!  News from CS Alumni

It was great hearing from CU computer science alumni from around the world with the latest news on life, work, family, personal accomplishments, and adventure. Thanks to everyone for keeping in touch!
—Bruce Sanders, Senior Instructor  bruce.sanders@colorado.edu

’70s and ’80s

Dave Kasik (MS 1972) is a Boeing Senior Technical Fellow in Visualization and Interactive Techniques in Seattle. Tom Mastaglio (MS 1978, PhD 1990) is the CEO and co-owner of MYMIC LLC, an 80-person technology company headquartered in Portsmouth, VA and specializing in modeling and simulation software solutions and consulting services to support training and analysis applications. Primarily a defense contractor, MYMIC develops simulation-based solutions for logistics operations such as seaports. Bruce Sanders (MS 1978) is on the computer science faculty at the University of Colorado. He is currently enjoying communicating with his department’s alumni as he gathers updates for the upcoming newsletter. He notes that his department has lots of amazing alumni doing incredible things all around the world.

Jason Docken (MS 1985) is CTO for the Insurance Industry at TIBCO Software in Bozeman, MT. He recently published a paper on “Process Driven Modernization in Insurance”. Howard Foster (MS 1986) is now working on Bing Maps at Microsoft Boulder. After 30 years in industry, Andrew Halls (MS 1987) has changed gears and is now a kids’ ski instructor at Beaver Creek Resort. He also does a bit of iPhone app development to pay the bills!

’90s

Matt Leonard (BS 1990) is self employed and living in Hollywood, CA. A documentary he wrote and directed, “Burn on the Bayou”, won the “Audience Choice Award” for Best Documentary at the Show Me Social Justice International Film Festival last year and is in its second year playing on the Documentary Channel. The film tells the story of a group of volunteers who spent seven months working on the Gulf Coast after Hurricane Katrina. Steve Wreher (MS 1990, PhD 2002) is a Senior Manager at Cisco Systems in Boulder. His team owns Cisco’s VPN and other security clients. Bassam Saliba (BS 1990) is CEO of Equiom (www.equiom.com), a consulting and incubation firm with offices in Bellevue, WA and Boulder. He also co-founded and currently sits on the board of Moprise (www.moprise.com), a company specializing in mobile collaboration software. He recently joined the board of Balance Financial (www.balancefn.com), a startup focusing on building epayment solutions. Finally, he found time to get married. He and his wife, Laila, live in Kirkland, WA. Brian Walker (BS 1991) is a Senior Software Engineer at Tektronix in Beaverton, Oregon, where he has been since graduation. He recently presented a paper at the Pacific Northwest Software Quality Conference. He also enjoys cycling and was recently appointed to the Beaverton Bicycle Advisory Committee. Fred Ledbetter (ME 1991) has spent the better part of the last 18 years in Moscow—mostly with telecom companies (cellular and broadband) but most recently moving to Monitor Group, the Cambridge-based strategy and marketing consultancy. There is currently a push to modernize IT by the presidential administration which is starting to form a small “Silicon Valley” at Skolkovo. There has been an enduring need for professional marketing, which is where Ledbetter has spent most of his time in CMO and CCO type jobs.

Ying Xu (PhD 1991) is on the faculty of the Department of Biochemistry and Molecular Biology at the University of Georgia in Athens. Over the last 20 years, he has gradually transformed himself from a theoretical computer scientist (trained by Hal Gabow) to an applied computational scientist focused on biological data analyses and then to a computational biologist who is now mostly concerned about solving (systems) biology problems using computational (and experimental) techniques. Karianne Hoel (BS 1992) is living in Oslo, Norway and has worked as an IT consultant for numerous customers and projects in the Oslo area. She is currently working for the biggest hospital in Norway, helping to consolidate their clinical systems after the biggest merger of hospitals in Norwegian history.

Bruce Tesar (MS 1992, PhD 1995) is an Associate Professor in the Department of Linguistics and the Center for Cognitive Science at Rutgers in New Brunswick, NJ. He and his wife, Esther, have two daughters, Heidi and Amanda. Bruce is currently finishing up his second book, tentatively titled “Output-Driven Phonology”. Gerry Stahl (PhD 1993) is an associate professor in the College of Information Science and Technology at Drexel University in Philadelphia, PA. His book “Studying Virtual Math Teams,” which reports on development and study of a cyber-learning environment for math students to collaboratively discuss math online, is now available in paperback from Springer Press. Greg Hill (MS 1993) is on the research staff in Ecology and Evolutionary Biology at Brown University in Providence, RI. He is enjoying the change to the East Coast after being in Colorado for so long.

Glenn Standerfer (BS 1994) is now a senior software engineer at eCarList in Dallas,TX. He spent several years in Australia before moving to Texas. He is married with three boys — including a set of twins, plays Irish fiddle and helps run the annual O’Flaherty Irish Music retreat.

Chris Jensen (BS 1994) works at Troppus Software, a Boulder startup specializing in software that improves the quality of technical support. He is currently designing and developing Web services for the company’s service-oriented architecture.

Kevin Stephens (BS 1994, MS 1995) is in management at WB Games in Bothell, WA. He overseas several groups, including quality assurance, product research and development assessment.

Marc Anderson (BS 1995) is an assistant professor at the San Francisco State University in the Department of Chemistry and Biochemistry ... hoping to get tenure in another year or so!

Ruth Shrawm (PhD 1995) is president and chief scientific officer at the VeriFax Corporation in Boulder, which has developed products related to automatic signature verification for security of access in the physical and electronic environments, as well as a device for assessment of motor control impairment in patients.

Melodi (Mel) Mosley Gates (MS 1995) recently graduated with a JD from the University of Denver, Sturm College of Law and has accepted a position at the Denver office for Patton Boggs, LLP, a national law firm. Stan James (BS 1996) is living in Berlin and writing a book about New Media and Neuroscience.

Doug Cosman (BS 1996) has been working in the area of automated online advertising ever since his senior project in the same area. Several years ago he started a company, Yieldex (yieldex.com), around the concept of management of advertising inventory. He now has over 20 employees and offices in New York, San Francisco and Boulder. Two years ago Yieldex won the Amazon.com Web Services startup of the year award and a similar award from the Colorado Software and Internet Association.

Masaru Ryumae (BS 1997) recently moved to San Francisco and is now working on Bing Maps at Microsoft Boulder.

Let us know what you’ve been up to!

Send updates to: newsletter@cs.colorado.edu
Update your contact information at: engineering.colorado.edu/alumni

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Thorna was at the CU, has graduated from college and is now playing professional basketball in Poland. **Bart Enos** (BS 2000, MS 2000) is the entrepreneurial alliance program manager for the National Center for Women & Information Technology (ncwit.org). **Julien Chastang** (MS 2000) is now working on the Integrated Data Viewer (IDV) at UCAR Unidata. IDV is a Java-based software framework for analyzing and visualizing geoscience data. In addition to working at UCAR, Julien continues to improve his popular open source project, charts4j (charts4j.com), a free, lightweight charts and graphs Java API. **Ara Howard** (BS 2001) and **David Clements** (BS 2001) have formed dojo4 (dojo4.com), as well as creating and supporting numerous start-ups on the Boulder start-up scene. They are working on their own product, cryptic.ly, which lets users store and share notes privately and securely. **Stephan Gerali** (BS 2001) is a software engineer and architect for Lockheed Martin Enterprise Business Services in Littleton. **Art Messal** (BS 2001) is currently working for Los Angeles-based Ionic Media, while living in Estes Park, CO. When not working, Art also spends time creating ... well ... art! (www.gallerykunst.com) **Colette Wilkow** (BS 2001) recently completed eight years (the last as mission manager) on the Mars Exploration Rover at the NASA Jet Propulsion Laboratory in Pasadena, CA. She later became the ground software systems engineer for the GRAIL (a lunar mission to measure the Moon’s gravity field) and SMAP (an Earth orbiter to measure global soil moisture) Missions. She has recently joined the Mars Science Laboratory Project that will send the next rover “Curiosity” to Mars. On a personal note, Colette married Jacob Lohr in 2006. They welcomed their first child, Emily Grace Lohr, in July 2010. **Erica Singer** (BS 2001) is currently a web developer at ZAAZ, Inc. in Seattle, WA. **Shane Brinkman-Davis** (BS 2001, MS 2001) was a founder of Imikimi (imikimi.com) in 2007. Imikimi is an online creative community where millions of people throughout the world gather to create, re-mix and collaborate on their digital self-expressions in a fun and easy way. **Zach Johnson** (BS 2001) is a senior developer at Microsoft in Redmond, working on the architecture of the PC client for the Zune ecosystem in the next version of Windows, Xbox and Windows Phone. Zach and his wife, Jennifer (Jennifer Peterson (BS 2001))), have a five-year-old daughter and live in Woodinville, WA. **Shane Church** (BS 2001) is now a Microsoft .NET developer at EffectiveUI (effectiveui.com) in Denver. **Thomas Strohmann** (MS 2002, PhD 2006) is currently at Google in Mountain View. He and his wife, Jessica, are enjoying playing with their one-year-old son, Calvin. **Craig Swift** (BS 2002) completed his MBA and is working as a senior business analyst at the National Renewable Energy Laboratory in Golden. **Van-ya Avramova** (BS 2002) is a software engineer in Microsoft’s Online Services Division in Bellevue, WA. She recently joined the Live Site Engineering Group for Bing Mobile and MSN, where she is applying real-time analytics to correlate disparate events to predict and prevent live site incidents. **David Quebeau** (BS 2002) is currently a software baseline manager at Lockheed Martin in Littleton, CO. His adventures lately have been of the family kind with two young kids and a new baby last year. **Kent Polkinghorne** (BS 2002) is now at the CU Civil Engineering Structures and Materials Lab, where he helps civil engineering professors and graduate students break, smash, twist, and shatter various materials and structures by designing test configurations and programming systems that execute and record data from the tests. He is married and a proud parent of a three-year-old girl and a ten-month-old boy. **Gabriel DiGiacomo** (BS 2002) is currently working for Vibrant Solar in Denver, as well as with the Adventure Education Company’s Summer Sword Camps at Chautauqua. He is pursuing certification by the North American Board of Certified Energy Practitioners. **Jackson Fox** (BS 2002) is now living in Baton Rouge, LA and is the lead interaction designer for MoreBetterLabs. They are about to launch their first product, a new online learning management tool called Ruzuku (ruzu.kl.com). **Trevor Stone** (BS 2003, MS 2003) is now at Google in Boulder, working on Google Docs and cloud storage. He previously worked at Tyler Technologies for five years, developing automated entity extraction from scanned documents, data conversion, and many other projects for Tyler’s enterprise software for county governments. Before joining Google, Trevor took time off to travel to fantastic locales and do exciting things like climb volcanoes in Guatemala, learn to scuba dive in Honduras, photograph the Rocky Mountains, and create a temporary city at Burning Man. **Grant Macklem** (BS 2003, MS 2003) is a senior software engineer at National Instruments in Aachen, Germany, where he is on assignment to train NI employees. When not working, he has been able to travel in both Europe and Asia, as well as find time for skiing the French and Swiss Alps. **Gabriel Perry** (BS 2003) supports e-commerce systems at Convertis in Gunbarrel. When not working, he plays lead guitar in a rock-n-roll band called “Crow Radio”. **Luke Swanson** (BS 2003) is now vice president of engineering at Photobucket in Denver. **Mercedes Tehranian** (BS 2003) is taking some time to raise her two kids after working at Lockheed Martin in Sunnyvale, CA as a system integration analyst for almost five years. **Ken Gruchalla** (MS
PING!  News from CS Alumni (continued from p. 24)

2003, PhD 2009) is a senior scientist at the National Renewable Energy Laboratory in Golden, where he leads the scientific visualization efforts in the Computational Science Center. He currently lives in Denver with his wife and two children. ■ Scott Carpenter (BS 2003) is at Microsoft in Redmond, working on the Bing.com search engine and looking forward to seeing more of the Buffs as they join the Pac-12! ■ Blake Reid (BS 2004) is now a law clerk at the Colorado Supreme Court in Denver. ■ Kostas Pagratis (BS 2004) is working at Flatirons Solutions in Boulder, which specializes in digital asset management. ■ Reese Llloyd (BS 2004) is at IBM Boulder, where he is the Lab Manager for a contract IBM holds with the USDA Forest Service. He is in charge of the lab network, SAN, power, cooling, business controls, security, and also assists other teams with solution development, testing and troubleshooting. ■ Bryce Wilcox (BS 2004), who now goes by Zoo- ko Wilcox-O’Hearn, is currently an engineer at SimpleGeo. An important concept in distributed naming schemes, Zoooko’s Triangle, is named after him. ■ Geoffrey Griffith (BS 2004) has founded Imagine Thought Software (www.Imagine-Thought.com), a software consulting firm in Lafayette, CO. ■ Jeffrey Poznanovic (BS 2004) works at the Swiss National Supercomputing Center in the Italian-speaking region of Ticino, Switzerland. When he and his wife aren’t working, they enjoy exploring the Alps by foot and ski. ■ Zack Sanders (BS 2005) and Brian Sax (BS 2008) have formed Fiddler on the Root, a company providing web application security expertise to any business with an online presence. FOTR (fiddlerontheroot.com) specializes in ethical hacking and penetration testing as a service to expose potential vulnerabilities in web applications. ■ Nels Anderson (BS 2005) is working his dream job, creating compelling and novel video games at Klei Entertainment, a small, independent game developer in Vancouver, BC. He recently celebrated his first wedding anniversary to his incredible Canadian wife, Tila, and is eagerly looking forward to full Canadian citizenship. ■ Nicholas Lamb (BS 2005) started a software consulting company called Revel Software in Denver. He has also started a self-funded educational startup with a friend. Their first product is now available at www.mootup.com. ■ Byron Young (BS 2005) spent five years working at Riverbed Technology in San Francisco. He left last May and has been traveling and surfing in South America since September, currently in Ecuador. He plans on continuing his travels for a year and then ... who knows! ■ Adam Bender (BS 2005) is a Software Architect at Green Energy Corporation in Westminster, where he is leading application development on their “Total Grid Management” platform. ■ David Brown (BS 2005) is a software engineering manager at HomeAway.com, which connects homeowners and property managers with travelers who seek the space, value and amenities of vacation rental homes as an alternative to hotels. He is responsible for a large segment of the business that involves all of the Professional Management Property Software. ■ Lee Himman (BS 2006) is currently doing work for Sonian, Inc. out of Boston, but working from Boulder. He’s developing a lot of Clojure code on Amazon EC2 nodes to handle import and indexing data related to document archiving in the cloud. ■ Timsy (Bir) Apel (BS 2006) is now married to Evan Apel and works at Qualcomm in Boulder. When not working, they have traveled to Colomb- ia, Canada and to the Joshua Tree National Park in California. ■ Aaron Schram (BS 2006) is a research assistant in the Department of Computer Science at CU-Boulder. He is working towards a PhD, doing software engineering research with Professor Ken Anderson. ■ Tom Josephson (BS 2007) is currently at Ericsson in Boulder. Tom and his wife, Lindy, welcomed their first son, Luke, in December 2010. He (Tom ... not Luke) has been avidly playing Starcraft 2 when he can scrape some free time together, hoping to reach Diamond league in the near future. [Check back next year to see how that went!—BWS] ■ Mike Procopio (PhD 2007) has returned to Boulder and is a Software Engineer at Google. He continues to be active in applied machine learning research, and has even found time to get healthy and enjoy a new hobby ... running! ■ Brandon Booth (BS 2007) is a game developer at Heavy Iron Studios in Culver City, CA. He’s personally helped publish Wall-E, Up, and Sponge Bob: Truth or Square video games. He’s also attending the University of Southern California pursuing an MSCS with an emphasis on game development. ■ Aaron Bach (BS 2008) is now a signage architect at Four Winds Interactive in Denver. Four Winds Interactive is one of the largest developers of interactive digital signage networks in the world. Aaron’s work unfortunately requires lots of travel to places like Las Vegas. ■ Scott Porter (BS 2008) is an intelligence officer in the Marine Corps. He is temporarily working in the Republic of Georgia, training one of their infantry battalions for an Afghan-istan deployment. He recently returned from a six-month Afghan deployment where he worked at an Infantry Division Intelligence Shop. ■ Addison LeMessurier (BS 2008) is developing iPhone games at Team Phobic in Boulder. ■ David Motta (BS 2008) is at Northrop Grumman Corporation in Colorado Springs, working on a Missile Defense Agency contract. ■ Daniel McDonald (BS 2008) is a professional research Assistant in the Department of Chemistry and Biochemistry at the University of Colorado. A paper which he co-authored, “Forensic identification using skin bacterial communities”, was featured in CSI: Miami (season 8 episode 190, “Time Bomb”). ■ Eric Kearv (BS 2008) is at Green Energy Corporation in Westminster, where he works on the Green Bus Platform, part of the Global Energy Model to help develop the energy infrastructure in developing nations. ■ Bajashkhai Ray (MS 2009) is a PhD student in the Electrical and Computer Engineering Department at the University of Texas at Austin. ■ Joe Chan (BS 2009) is a technical support engineer at VMware in Broomfield, CO, currently working on the Network team. ■ Tae Kwon (BS 2009) is a software integrator at Alticat in Broomfield, CO. Alticat provides middle- ware for settop box vendors such as Samsung and Cisco. ■ Brandon Bauman (BS 2009) is a masters student in computer graphics and game technology in the Computer Science Department at the University of Pennsylvania.

10s

Kyle Madruga (BS 2010) is working in Austin, TX for Cisco in the Security Applications Division on the Intrusion Prevention System team. Since moving to Austin he has taken up water skiing, wake boarding, competition archery and clay shooting. ■ Kaiti Trumble (BS 2010) is at the Laboratory for Atmospheric and Space Physics, where she is working on flight software, including some embedded systems programming, Perl programming, and documentation ... which she describes as the perfect job for a “CS/space nerd”. ■ Zach Flower (BS 2010) is a software engineer at Name.com, where he is working on a wide variety of projects, including web-based applications, mobile sites, SMS integration, legacy code transitions and brand building. ■ David Knox (MS 2010) is a second-year grad student in the Computational Bioscience program on the CU Anschutz Medical Campus. During his 30-year computer industry career, he has taken breaks to build his own house, cook for two years at a classical french restaurant, and run the perimeter of Colorado (1814 miles). His latest adventure is trying to navigate the world of academia with hopes of completing his PhD by 2012. ■ Gary Ye (PhD 2010) is a senior software engineer for Penguin Computing in San Francisco, where he’s working to make Linux cluster computing easier to manage. This includes everything from higher layer apps to supporting lower level infrastructure, with the goal of providing a cost-effective alternative to investing in cluster computing infrastructure for high performance computing applications.
Giving Back

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The generosity of alumni, corporations, parents, and friends enables Computer Science to fund a variety of important initiatives. Donations of any kind, no matter what the amount, are integral to the success of programs such as undergraduate and graduate research, scholarship and community outreach, innovation, faculty and student awards, among many others. If you are already a regular contributor to the Department of Computer Science, we offer our sincere thanks. Your gifts are a critical part of our success and we appreciate your continued support. If you are not yet a donor, we invite you to become a part of the future of our department by making your contribution today.

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Nick Lobejko
Associate Director, Development
University of Colorado Foundation
4740 Walnut Street
Boulder, CO 80301
Nick.Lobejko@cufund.org
303-492-6702

How much does a driver impact energy efficiency?

Professor Qin Lv’s student Kun Li conducts road tests for user driving behavior analysis and impact on Plugin Hybrid Electric Vehicle (PHEV) energy efficiency and the environment.
Self-Assembly of Structures

Professor Nikolaus Correll’s student, Erik Komendera, developed a distributed algorithm for self-assembly of structures using intelligent scaffolding blocks. Intelligent scaffolding blocks (red) coordinate the construction process and continuously re-assemble along the emerging structure.