ACM TechNews

Welcome to the July 1, 2009 edition of ACM TechNews, providing timely information for IT professionals three times a week.

Please Note: In observance of the Independence Day holiday, TechNews will not publish on Friday, July 3. Publication will resume on Monday, July 6.

HEADLINES AT A GLANCE

Chinese Delay Plan for Censor Software

Wall Street Journal (07/01/09) P. A1; Chao, Loretta; Dean, Jason; Lin, Bai; et al.

The Chinese government has postponed its mandate that manufacturers embed Web-filtering software in all new PCs sold in the country, in the wake of fervent opposition inside and outside China. The Xinhua news agency quoted a Ministry of Industry and Information Technology representative as saying that some PC makers claimed they did not have sufficient time to meet the July 1 deadline, in which case a delay was permissible. The postponement alleviates global PC companies' worries that complying with the rules would make them susceptible to legal liability and allegations of aiding censorship, yet they also were reluctant to openly challenge China's government, given the heavy concentration of both PC production and PC sales in the country. The Chinese government has said the purpose of implementing the Web-filtering software is to prevent youngsters from viewing online pornography and other "harmful content," and it insists that the software "definitely has no capability for collecting users' information or monitoring their Internet behavior." Information Technology Industry Council (ITIC) president Dean Garfield says the computer industry is in favor of enabling parents to block access to objectionable online material, but is against any requirement that specifies a particular company's product. Isaac Mao with Harvard University's Berkman Center for Internet & Society says the Chinese initiative "has lost legitimacy" and that the government's enforcement of the rule would be impossible. There also are indications that the plan has broadened public interest in China regarding questions about government inquisitiveness and censorship. The postponement does not

signal the end of the issue, and a Hewlett-Packard representative said the company is collaborating with the ITIC "to seek additional information, clarify open questions, and monitor developments on this matter."

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Scientists Create First Electronic Quantum Processor
Yale University (06/28/09) Muzzin, Suzanne Taylor

Yale University researchers have led a research effort to develop the first rudimentary solid-state quantum processor, a major step toward the creation of a quantum computer. The researchers used a two-qubit superconducting chip to successfully run simple algorithms, including a search, marking the first demonstration of quantum information processing with a solid-state device. "Our processor can perform only a few very simple quantum tasks, which have been demonstrated before with single nuclei, atoms, and photons," says Yale professor Robert Schoelkopf. "But this is the first time they've been possible in an all-electronic device that looks and feels much more like a regular microprocessor." Yale postdoctoral associate Leonardo DiCarlo, the lead author of a paper on the discovery, says the key that made the two-qubit processor possible was getting the qubits to rapidly switch between the on and off states so they exchanged information quickly but only when the researchers wanted them to do so. This has not been possible using solid-state qubits because scientists could not get the qubits to maintain a specific quantum state long enough. The first qubits created about a decade ago were able to maintain specific quantum states for about a nanosecond, but the new qubits can maintain theirs for a microsecond, a thousand times longer. The researchers are now working to increase the amount of time the qubits maintain their quantum states so they can run more complicated algorithms. Schoelkopf says processing power increases exponentially with each qubit added, so the potential for advanced quantum computing is huge. However, he says it will still be a while before quantum computers can be used to solve complex problems.

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A Robot That Navigates Like a Person
Technology Review (06/30/09) Corley, Anne-Marie

European scientists have developed a new robot that navigates using human-like visual processing and object detection as a tool for investigating how the brain responds to its environment while the body is moving. "It seems to be a trend, from neuroscience to computer science, to look at the brain for designing new systems," says Tomaso Poggio of the Massachusetts Institute of Technology's Center for Biological and Computational Learning. The wheeled machine features a movable head that sees stereoscopically with a pair of cameras, and is controlled by algorithms designed to imitate different components of the human visual system. The device employs a simulated neural network to update its position relative to its surroundings, continually adjusting to each new input in a mimicry of human visual processing and movement planning. The robot mirrors object recognition, motion estimation, and decision making to navigate around a room, moving toward specific targets while evading walls and impediments. Heiko Neumann with the University of Ulm's Vision and Perception Lab says neuroscientists typically concentrate on a specific aspect of vision and motion, but the creation of a real, human-like computer navigation model requires the integration of these various aspects into a "coherent model architecture." Project coordinator Mark Greenlee of Germany's University of Regensburg says that potential applications of the robot's technology could include intelligent wheelchairs capable of easy indoor navigation. Poggio says that we

Association for Computing Machinery
2 Penn Plaza, Suite 701
New York, NY 10121-0701
Phone: 1-800-342-6626 (U.S./Canada)

are "on the cusp of a new stage where artificial intelligence is getting information from neuroscience."

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Organic Traffic Lights
Inderscience Publishers (06/26/09)

Researchers in Germany believe organic computing has the potential to solve the problems of urban traffic systems, which rely on sensors and controllers. Using an organic approach, Holger Prothmann of the Karlsruhe Institute of Technology and colleagues have developed a decentralized traffic control system. "The organic approach is based on industry-standard traffic light controllers," Prothmann says. The researchers developed an observer/controller architecture, which enables the traffic light to respond to traffic flow and to forward information to traffic lights on nearby roads. Current systems use fixed timers that are unable to respond directly to traffic, and centralized systems are unable to respond optimally to changes in traffic on the roads. Working with colleagues at Karlsruhe and at Leibniz Universitat Hannover, Prothmann tested the decentralized traffic control system on roads in Hamburg, and found that it can reduce vehicle stops, delays, and the time needed to reach destinations. "The environmental and economic importance of traffic control systems combined with the distributed nature of traffic nodes and their constantly changing traffic demands make traffic light control an ideal test case for organic computing approaches," Prothmann says.

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The Anita Borg Institute for Women and Technology and the Motorola Foundation Partner to Inspire Tomorrow's Innovators
Business Wire (06/25/09) Barrett, Jerri

The Anita Borg Institute (ABI) for Women and Technology recently announced that the Motorola Foundation has awarded the institute a $30,560 Innovation Generation grant, which will fund a K-12 Computer Science Teacher Workshop at the 2009 Grace Hopper Celebration for Women in Computing Conference. Conference attendees will discuss generating and implementing solutions based on teacher perspectives with community and national leaders. The Motorola Foundation's Innovation Generation grants support programs that engage students in science, technology, engineering, and math (STEM) to help students build the confidence and skills needed to succeed. ABI, working with the Computer Science Teachers Association (CSTA) and the University of Arizona, will use the 2009 Grace Hopper Celebration to implement a new program designed to increase K-12 teachers' access and visibility to organizations and individuals in industry and academia dedicated to improving STEM education. The CSTA will provide best practices, workshop content, and resources to increase the success of K-12 teachers' efforts to interest girls and minority students in computer science, and the University of Arizona will provide a meeting place and increase community outreach efforts. The conference takes place September 30-October 3, in Tucson, Arizona.

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Embedded Electronics--Cars Get Cooperative
ICT Results (07/01/09)

The European EMMA project has developed a new middleware platform for embedded sensors called EM2P that acts as an interface between designers

and the electronics. The project's researchers say that EM2P could lead to thousands of new applications in a variety of industries, starting with in-car electronics. Embedded sensor systems are often designed for a single task, but that functionality, such as detecting a sudden deceleration, could be used for a variety of other purposes and used with other sensors to create new applications. "We sought to hide the underlying complexity of in-car embedded sensors so that developers could quickly design new applications with existing electronics," says EMMA coordinator Antonio Marques Moreno. "EMMA will foster cost-efficient ambient intelligence systems with optimal performance, high reliability, reduced time-to-market, and faster deployment." Project participants hope that hiding the complexity of the infrastructure will open up interfaces to third parties. The EMMA project focused on transportation to test its system, since vehicles offer numerous opportunities to enhance road safety, such as creating communication channels between sensors within a car and other cars or street signs. Marques says one of EM2P's major strengths is scalability, since it has been designed to be able to work with an entire city's vehicle population.

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Nurturing a Love of Math, Sciences
Baltimore Sun (06/29/09) P. 1; Walker, Childs

Experts are concerned that not enough teachers who can arouse passion for science, technology, engineering, and mathematics (STEM) in public school students are being produced by the United States, which endangers the country's ability to keep up with economic competitors. "We know that the quality of math and science teachers is the most influential single factor in determining whether or not a student will succeed or fail in these subjects," said President Barack Obama in an April 27 address to the National Academy of Sciences. "Yet, in high school, more than 20 percent of students in math and more than 60 percent of students in chemistry and physics are taught by teachers without expertise in these fields." A strategy for addressing the STEM educator shortage involves a combination of sharper recruiting tactics buttressed by financial incentives, the establishment of streamlined programs for potential math and science teachers, and aggressive initiatives to make teaching careers more appealing to math and science professionals. Education officials and corporate leaders agree that the United States will suffer a dearth of future researchers, innovators, and engineers if fewer high school students are getting excited about STEM disciplines. Some universities have started programs designed to step up their production of math and science teachers. One such effort is UTeach, a program that mixes aggressive recruitment of math and science majors, challenging courses, heavy fieldwork, mentoring by practicing teachers, and postgraduate support. In July, a panel set up by Maryland Gov. Martin O'Malley will unveil a plan to improve STEM education in the state, and one of its goals is a 300 percent increase in the number of STEM teachers produced by Maryland colleges and universities by 2015.

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Mobile TV Coming to Canada?
CTV British Columbia (06/26/09) Khoshnevis, Kian

Simon Fraser University (SFU) doctorate student Cheng-Hsin Hsu, along with SFU graduate students Yi Liu and Cong Ly, and their supervisor Mohamed Hefeeda, has designed algorithms and prototypes of mobile TV base stations that enable devices such as cell phones to receive TV programming. Similar technologies are already available in Europe and Asia, but Hsu says those technologies are very sensitive and unreliable. "The technology has been

there for a couple of years, but not here," Hsu says. "There are clearly some problems with it that prevent its deployment in North America. We are trying to optimize the broadcast networks to a stage where Canadian TV companies will consider them." Hsu's research has resulted in improved mobile TV broadcast performance and cell phones that broadcast more channels at once while reducing their channel-switching delay. Hsu also has improved the overall broadcast quality and extended battery life, which are features that are missing in mobile broadcast TV systems overseas. Hsu is currently working to establish mobile TV broadcasts through Wi-Fi and other wireless networks.

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Techies the Latest Weapon in Catching Car Thieves
Computerworld Australia (06/25/09) Edwards, Kathryn

Researchers at the University of Technology, Sydney, (UTS) Australia, have developed software that uses new imaging technology to enable moving police cars to automatically detect stolen cars in traffic. The new imaging techniques, which are based on hexagonal pixels instead of the traditional square pixels, allow a computer connected to a camera to accurately identify and read license plate numbers in real time. Geoff Hughes at Australia's National Motor Vehicle Theft Reduction Council says the technology could be placed in fixed speeding cameras, which often cannot differentiate between plates from different states. The technology is based on the development of spiral architecture, a data structure in which images are represented as collections of hexagonal pixels. UTS professor Xiangjian He says hexagonal pixels create images with smoother edges than square pixels, and can provide pictures of equal quality using 13 percent fewer pixels. "It's not a new idea, but what our team has done is use hexagonal pixels to develop much better methods of curve detection than is possible with square pixels, and this has opened the way for much quicker and more accurate shape identification," He says. Outside of law enforcement, the technology could improve digital cameras and object recognition capabilities in robots.

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'Mixed Reality' Human Helps Medical Students Learn to do Intimate Exams
University of Florida News (06/23/09) Hoover, Aaron

The University of Florida is using a life-sized computer avatar on a flat screen and a mannequin with prosthetic body parts to teach medical students how to perform exams that they would otherwise rarely get to perform of real people. Working with the Medical College of Georgia and three other universities, University of Florida engineers developed a hybrid computer/mannequin that enables medical students to correctly perform breast exams and learn how to talk to patients to obtain important information. The training technique is important because correct examinations and good doctor-patient communication are critical to obtaining successful medical treatments, says Florida professor Benjamin Lok. "Studies have shown that communication skills are actually a better predictor of outcome than medical skills," Lok says. The hybrid computer/mannequin patient talks to students and can respond using a computer speech and voice recognition system created by the researchers. The interaction is unscripted, but follows a typical pattern for a woman's visit to her doctor, and features both verbal and tactile challenges for medical students. Students need to obtain the patient's medical history, listen and empathize with her concerns, and respond to her questions, all while performing the physical exam, which requires the correct palpitating technique and proper pressure. Sensors inside

the prosthetic breast provide pressure information through different colors on a virtual breast on screen. Engineers can program the system to have or not have an abnormality, which would alter the conversation.

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Virtual Rendering
The Engineer (United Kingdom) (06/17/09)

Researchers at the universities of Bangor and Bradford plan to combine digital imagery with a computer function known as bidirectional reflectance distribution function (BRDF) in an effort to create a virtual rendering technique that could be used to replace cadaveric-based training. "Medical students do a lot of work by cutting up cadavers, but when they look at other tissues of the cadaver, the colors have already changed," says Bangor University professor Nigel John. "So when the students go from the cadaver lab to operating on a real person, it doesn't look quite like what they are used to and this can cause some difficulties." The concern over the accuracy of cadaveric-based training has resulted in its decline in recent years. However, using digital imagery with BRDF could be helpful because it has the potential to show how light reflects on opaque surfaces. A trial of the technique on patients undergoing brain surgery is scheduled for September.

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Data You Can Admire: Kwan-Liu Ma Converts Huge Data Sets into Illuminating Visualizations
CITRIS Newsletter (06/09) Slack, Gordy

The University of California, Davis' Visualization and Interface Design Innovation lab, run by professor Kwan-Liu Ma, seeks to render massive data sets into insightful visualizations that are explorable and workable. "By employing our visualization techniques we are able to let researchers see the full extent of their data at the highest possible resolution and in both three-dimensional space and the temporal domain," Ma says. "So scientists can begin to visualize things they just couldn't see in the past." In some instances the data has such a high level of detail that visualizations such as Ma's must be used prior to the validation of hypotheses. In other cases, the visualizations permit researchers to see relationships they may be unaware of. Ma says his team devised a user interface that enables researchers to move between different spaces so they can analyze the interaction between different factors at different levels. Ma's visualization software lets scientists zoom in on feature surfaces and move closer and further away from the surfaces, studying these different features at different scales. Ma wants users of his tools to be able to "visualize the process of visualization itself," noting that "if we can convey what has been done to the data to generate the image they're working with--not just the information loss but also the important mapping done to the data to get the image--then the user can have much greater control."

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