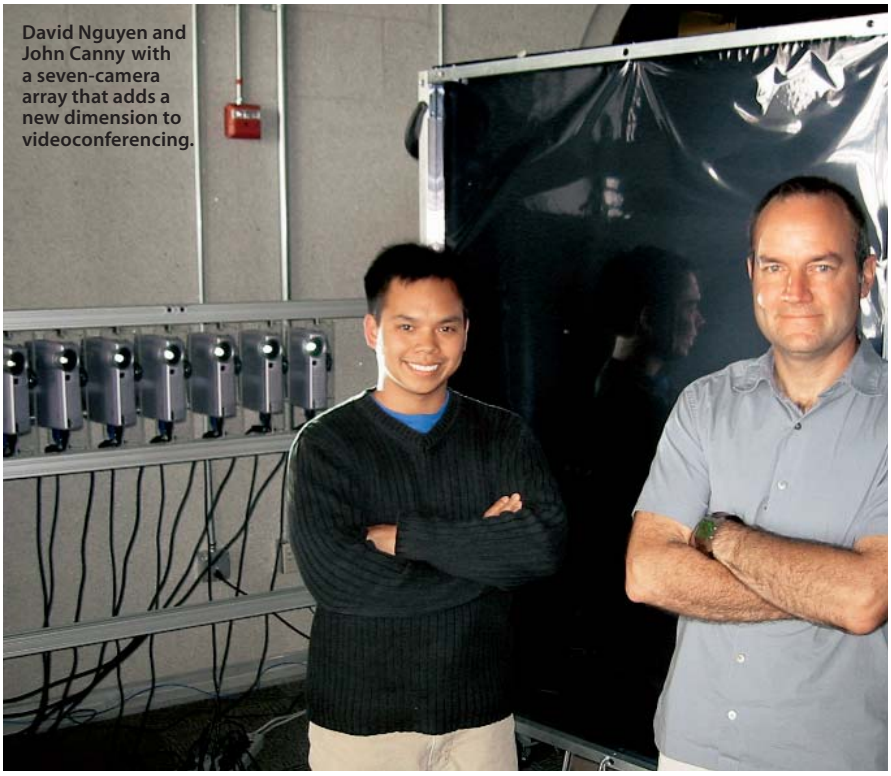


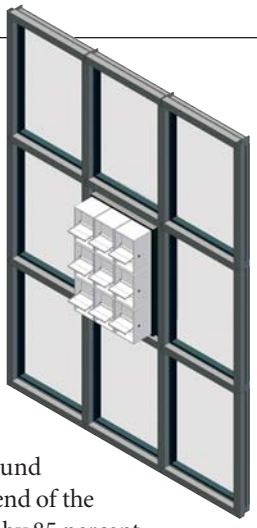
David Nguyen and John Canny with a seven-camera array that adds a new dimension to videoconferencing.

3-D CONFERENCING

WATCHING 3-D VIDEO USUALLY MEANS DONNING A GEEKY PAIR OF COLORED OR polarized glasses—not the kind of fashion statement you want to make at the office. But at the University of California, Berkeley, computer scientists David Nguyen and John Canny are building an office videoconferencing system that adds a third dimension to ordinary streaming-video images, no glasses required. "The dynamics people have when they're working in the same room"—who's looking at whom, for example—"are all taken away when you meet over a 2-D videoconference link," says Nguyen. So he and Canny built an array of seven cameras, each with a slightly different view, that link via a computer to seven video projectors. A special, multilayered screen focuses the light from each projector so that a viewer's right and left eyes receive images from adjacent cameras, creating a stereo effect. The pair plan to finish a prototype they can show to potential licensees by the end of 2005.

FRESH AIR

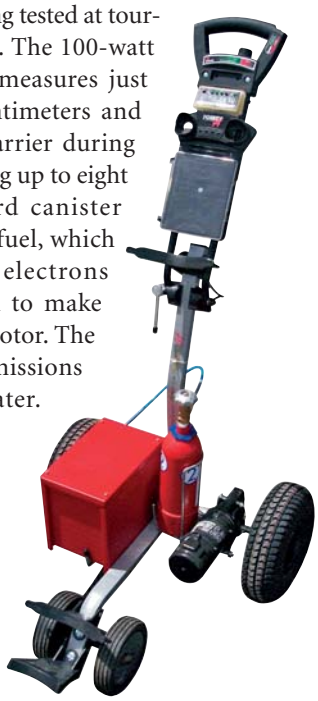
A NEW DEVICE MAY BRING FRESH AIR to people who live or work in city buildings—without letting in the noise from traffic. Developed by Chris Field, senior acoustic consultant at the Sydney, Australia, offices of engineering firm Arup, and Fergus Fricke, honorary associate professor at the University of Sydney, the polycarbonate brick has a channel cut through it that allows air to flow through. To stop street noise from doing the same, small tubular cavities lead off the channel. The air flowing over the mouths of the cavities causes them to resonate, creating small differences in pressure that scatter the sound waves, dissipating most of the traffic noise before it reaches the end of the channel. Field and Fricke claim the device cuts inbound noise by 85 percent, and they've licensed the technology to Silenceair in New South Wales, Australia.



Channels and chambers let air but not noise flow through this plastic brick.

FUEL CELLS TO THE FORE

GOLF CADDIES COULD SOON BE AT THE vanguard of the clean-energy movement. Engineering firm Soluções Racionais de Energia (SRE) of Torres Vedra, Portugal, has built a fuel-cell-powered golf bag carrier, which is being tested at tournaments in Europe. The 100-watt stack of fuel cells measures just 10 by 8 by 6.5 centimeters and has powered the carrier during rounds of golf lasting up to eight hours. An onboard canister supplies hydrogen fuel, which is stripped of its electrons inside the fuel cell to make electricity for the motor. The only significant emissions are droplets of water. When trials finish by the end of this year, SRE intends to ask an independent auditing firm to certify that the golf bag carrier meets international safety and quality standards so that it can go into production.



A green way to tote clubs on the green

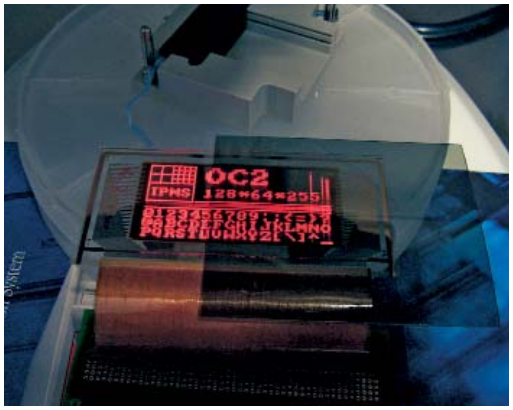
HERBICIDE HELPER

Researchers at the University of Texas at Austin have developed a chemical that could help farmers cut down on the hundreds of millions of kilograms of herbicide they spray on their fields each year. Plant cells defend themselves from herbicides using proteins that pump invading herbicide molecules out before they have a chance to do harm. The researchers' chemical, which would be combined with a conventional herbicide, inhibits an enzyme that powers these proteins, slowing the pumps so that the herbicide has more time inside the cells to do its job. In one field test, the herbicide helper reduced by 50 percent the amount of a common herbicide called atrazine needed to keep a corn crop free of weeds. The university has licensed the technology to Entercel, a startup that aims, via partnership with an agricultural chemical company, to have a combination herbicide and booster product on the market within five years.

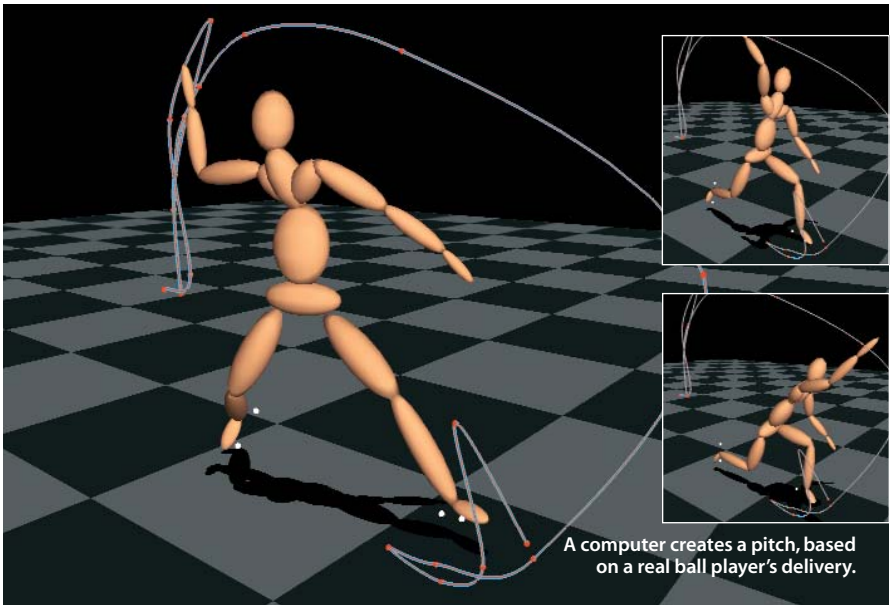
COURTESY OF CHRIS FIELD (FRESH AIR); GONÇALO DE MOURA ELIAS (FUEL CELLS); DAVID NGUYEN (3-D)

BRIGHT LIGHTS, LITTLE BATTERY

ORGANIC LIGHT-EMITTING DIODES HAVE BEEN TOUTED AS A BRIGHTER AND LESS power-hungry alternative to the standard liquid-crystal displays found in cell phones and other devices. Novaled, a startup in Dresden, Germany, aims to make OLEDs even more attractive by doubling their energy efficiency. The Novaled researchers infuse the outer, organic, layers of the multilayer diode with small amounts of another organic material, in much the way that chip makers "dope" semiconductors. The added molecules boost the layers' electrical conductivity and thus reduce the amount of power the diode loses as heat. The company has already made a more energy-efficient green OLED, says CEO Gildas Sorin. It is close to doubling the efficiency of the red and blue OLEDs that would also be required for a full-color display, he adds. Novaled expects the first display containing its materials to hit the market by early 2006.



Organic light-emitting diodes shine in a tiny display.



A computer creates a pitch, based on a real ball player's delivery.

AUTO ANIMATOR

ANIMATING A PERSON'S MOVEMENTS FOR A MOVIE OR VIDEO GAME CAN BE COSTLY and time consuming, requiring that actors be filmed with special cameras for every step and shrug. A new tool created by Zoran Popović at the University of Washington and Aaron Hertzmann at the University of Toronto, however, can extrapolate a person's movements from a single sequence of motions. First, the sequence is used to train the system. Then the animator picks a new movement for the digital character by, say, changing the position of its hands and feet. The system then calculates the most probable corresponding positions of the rest of the body. Popović says that a clip of only 20 or 30 frames is enough information to give the system a good sense of how a person tends to move. Popović imagines that the technology would be particularly useful for animators who make sports video games based on actual players. In fact, the technology is currently licensed to Redwood City, CA-based Electronic Arts, a maker of video games.

COURTESY OF KEITH GROCHOW (ANIMATOR); DIRK SCHWIPPER (LIGHTS)

A GREAT LISTENER

A new audio surveillance system could help fight crime in the city and protect kilometers of unmanned borders. Software developed by Ted Berger, director of the University of Southern California Center for Neural Engineering, can be trained to recognize and distinguish sounds that are indicators of a security breach or a safety hazard, such as a gunshot or the rattle of someone climbing a chain-link fence. The software is based on mathematical models that mimic the way the brain interprets sound, but it can distinguish between two similar sounds far more precisely than the human ear. This fall, Oak Brook, IL-based Safety Dynamics plans to implement the software in surveillance devices that monitor urban activity. Mounted on streetlight poles, the devices will listen for gunshots, then guide surveillance cameras toward the source of the sounds. Berger says the technology can also be used for large-scale security; an array of detectors placed along a deserted border, for example, could listen for footfalls or whispers, painting a scene solely on the basis of acoustic information. The detectors could then notify a central location of any suspicious activity.

MOVING CELLS WITH SOUND

BIOMEDICAL ENGINEERS AT THE UNIversity of Michigan are testing "acoustic tweezers" that use ultrasound waves to gently shuttle cells around. The cells are grown on a polymer that turns pulsed laser light into high-frequency vibrations; the vibrations heat the polymer slightly, and it responds by expanding. Projecting a pulsing ring of laser light around a cell deforms the underlying polymer into a tiny hill, and the cell slides down its slope. Moving the laser nudges the cell in any direction. One advantage of the technique over other cell manipulation schemes is that the process can be reversed and an isolated cell returned to its place in the cell culture. Project leaders Matt O'Donnell and Tak Buma hope to initially license the technology to drug companies. Drug researchers could quickly isolate liver cells, say, treat them with potential drugs, and return them safely to their cultures to see if they suffer any toxic effects.