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Innovation Awards

The 2008 Technology Innovation Awards

This year's winners include: an IV alternative, a better way to make solar panels, a cheap, fuel-efficient car and a better way to see in the dark.

In a medical emergency, quickly tapping a vein to deliver medication or other fluids can mean the difference between life and death. But in millions of cases a year, doctors and emergency personnel can't get an intravenous line started because of collapsed veins or other problems. The standard alternatives to an IV are time consuming and raise the risk of possibly deadly complications.

Larry Miller, a 30-year veteran of emergency care, came up with a solution.

Physicians long have known that lifesaving fluids could be effective if delivered to the blood-rich space inside bones, but there was a problem: finding a way to quickly penetrate the bone and insert a needle. Dr. Miller developed a high-speed drill that uses a specially designed needle to bore into bones and deliver fluids.

The EZ-IO device from Vidacare Corp., the company Dr. Miller co-founded in 2001, is the Gold winner in The Wall Street Journal's eighth annual Innovation Awards competition. A group of judges representing venture-capital firms, other companies and research institutions reviewed more than 160 entries to pick Gold, Silver and Bronze winners. They also selected the top technologies in 16 industry categories.

The Silver award went to Audience, a maker of voice processors, for a noise-suppression technology designed to block annoying background noise in mobile-phone calls. The technology uses a sophisticated microprocessor to identify and reduce even rapidly changing sounds -- emergency sirens, for instance -- that pose problems for other noise-blocking technologies.

A team of scientists at the Lawrence Berkeley National Laboratory won the Bronze for their work in developing a microchip that, by analyzing DNA, is able to identify thousands of different varieties of bacteria that might be present in air, water, soil, blood or tissue samples. The PhyloChip can detect potentially disease-causing bacteria without the lengthy process of growing cultures. And unlike other genetic-testing methods, it can distinguish thousands of different pathogens simultaneously.

The Wall Street Journal received more than 700 entries for the Innovation Awards,

and a Journal editor narrowed the field down to the 162 that were scored by the judges. As in the past, judges looked for innovations that broke new ground in their fields and that demonstrated some measurable impact.

Here's a look at the winners in each category:

COMPUTING SYSTEMS

[Salesforce.com](#) Inc. of San Francisco was the top pick in this category. The company made its name selling software as a service -- applications that are used online instead of being installed in a corporate data center. Its winning entry takes this concept and applies it to a suite of tools that a company can use to build its own customized business applications that are developed and delivered over the Internet.

The suite, called Force.com, provides the building blocks for payroll, accounts-receivables and expense-reporting systems and other common applications, and it requires minimal programming skills. Introduced in 2007, Force.com has about 47,000 users.

Other companies are developing similar "cloud computing" services, in which companies access computing power as needed, the way they buy electricity, without the need to run their own servers and software. Along with [Amazon.com](#) Inc. and [Google](#) Inc., "Salesforce is one of the leaders in this trend," says Asheem Chandna, a partner at venture-capital firm Greylock Partners and one of the Innovation Awards judges. "It's certainly a key direction where computing is heading."

CONSUMER ELECTRONICS

Hikers, cross-country skiers and others out in the wild often need to call for help, or just to send a reassuring note to friends and family. Spot Inc., a unit of [Globalstar](#) Inc., Milpitas, Calif., won in the consumer-electronics category for a hand-held device that can send preprogrammed messages along with the users' location, even if they're too remote for cellphone coverage.

The Spot Satellite Messenger taps into Globalstar's satellite network to provide one-way emergency or "I'm OK" messages from most places on the globe. Since its introduction in December, it has gained almost 50,000 subscribers and is credited with about 40 rescues, the company says.

ENERGY

[Applied Materials](#) Inc., of Santa Clara, Calif., was selected in the energy category for its SunFab production line, which can manufacture extremely large solar-power panels using thin-film photovoltaic material. By turning out solar panels more quickly

and cheaply than traditional production methods, the SunFab equipment promises to drive down the cost of solar power so that it's more competitive with electricity from traditional sources.

To date, Applied Materials has delivered four of the SunFab lines to solar-panel makers, including a 100-acre plant in China that, when it's up to full production, will be capable of turning out enough panels each year to generate one gigawatt of electricity.

Although the panels themselves are less efficient than traditional solar arrays, the SunFab technology "is really making a massive impact because suddenly people can buy turn-key photovoltaic production lines," says Peter Terwiesch, chief technology officer of ABB Ltd. and a member of the judging panel. "That's attracting a lot of new entrants."

ENVIRONMENT

The PhyloChip, developed by staff scientist Gary Andersen and a team of researchers at the Lawrence Berkeley National Laboratory in Berkeley, Calif., won in this category.

Identifying the presence of specific bacteria used to require growing the microbes in different cultures, a lengthy process that might distinguish less than 1% of the species present. More recently, genetic-testing techniques were developed that can more quickly spot specific organisms in a sample, but only those that researchers think might be present. With the PhyloChip, scientists can recognize up to 8,700 different organisms in a single sample in a matter of hours.

The PhyloChip isn't currently available commercially. It is manufactured by [Affymetrix Inc.](#) of Santa Clara, Calif., which has sold more than 2,500 chips to universities and other researchers. They have used the chip to investigate bacteria levels in municipal and recreational water supplies and to identify the types of germs that show up in some lung infections.

HEALTH-CARE IT

U.K.-based [GlaxoSmithKline](#) PLC won for new software that helps researchers screen potential drugs for possibly adverse medical reactions while the drugs are still in the earliest stage of development. This helps pharmaceutical researchers avoid spending time and resources on promising drugs only to find after several years that the drugs can't be marketed because they're potentially harmful.

The software, called Molecular Clinical Safety Intelligence, matches the chemical profiles of drugs in development and of potentially useful compounds against information about adverse reactions to drugs that are already on the market. It was

developed at GSK's research and development center in North Carolina for use by the company's own researchers.

MATERIALS AND OTHER BASE TECHNOLOGIES

Nanocomp Technologies Inc. of Concord, N.H., the winner in this category, has developed a process to create large sheets of fabric and lengths of yarn using carbon nanotubes -- synthetic carbon molecules prized for their exceptional strength and conductivity.

Previously, manufacturers haven't been able to take full advantage of the special qualities of carbon nanotubes because they could only produce particles a few microns long -- less than the diameter of a human hair -- limiting their usefulness.

David Lashmore, co-founder and chief technology officer at Nanocomp, came up with a technique for creating nanotubes that are more than a millimeter long. The length made it possible for the company to make carbon-nanotube materials in sheets up to 3 feet by 6 feet. The technology can also be used to manufacture lightweight, highly conductive yarns that can be used to make wiring and cables that have a fraction of the weight of traditional copper wires.

The company is still producing only limited quantities of its material, but it has received financing from the U.S. Army to help develop a lighter-weight alternative to body armor and is working with the Air Force to develop carbon-nanotube wiring for aircraft and satellites.

MEDICAL DEVICES

Vidacare, the overall Gold winner, took top honors in this category.

It usually is pretty simple to introduce an IV into healthy patients with normal blood pressure. But with emergency patients in shock or cardiac arrest, collapsing veins make a successful IV difficult or impossible. Fluids can also be injected into the space inside bones, known as the intraosseous area, and will travel around the body from there. But while the soft bones of young children can be pierced easily, that's not the case with the fully developed bones of adults.

Beginning in the early 1990s, Dr. Miller and a group of researchers at the University of Texas Health Science Center in San Antonio began working on a way to get a needle through a bone's hard surface. They eventually devised a drill with a hollow needle that could penetrate the bone and be hooked up to the necessary medication or other fluid. The device received Federal Drug Administration approval in 2004 and entered the market in late 2005. It is now deployed in about 40% of U.S. emergency rooms

and is used by more than half of the emergency medical services in the country, Vidacare says. The device has been so successful that the American Heart Association recently changed its guidelines to encourage the use of intraosseous access for patients suffering cardiac arrest.

The device "really does seem to be a new technology that already has had a significant clinical impact," says Anthony Komaroff, professor of medicine at Harvard Medical School, editor in chief of Harvard Health Publications and one of the Innovation Awards judges.

MEDICAL/BIOTECH

Rosetta Genomics Ltd., based in Rehovot, Israel, was selected in the biotech category for developing a group of diagnostic tests that use microribonucleic acid -- short strands of genetic material -- to help physicians identify the type of cancer a patient has so that targeted therapies can be prescribed more accurately.

The potential of microRNA in diagnosis is generating lots of interest among researchers, and a handful of companies are developing cancer-testing products using the technology. Columbia University Medical Center in New York recently received state approval for the first test using Rosetta's technology to distinguish between two common types of lung cancer. That and two other tests are expected to be on the market by the end of the year.

NETWORK/INTERNET TECHNOLOGIES

Xsigo Systems Inc., San Jose, Calif., won in this category with a technology that can be used to replace the physical cables in a data center with "virtual" connectors.

More and more corporate data centers are turning to "virtualization" -- software that makes a single computer server or storage device act like multiple devices -- to reduce costs and cut power consumption. But virtualized servers still have to be connected with physical cables and connectors that are costly and can't be easily changed to accommodate changes in server needs.

Xsigo, co-founded by Ashok Krishnamurthi, a former executive at Juniper Networks Inc., has developed hardware and software that enable a single connector to mimic the performance of as many as 14 separate cables. With the product, a technician who needs to add storage or server capacity can create a virtual connection from a control center instead of having to make a trip to the data center and physically plug in the new box.

NETWORK SECURITY

Veracode Inc., based in Burlington, Mass., won in this category for software that tests for security holes in new applications. Unlike other vulnerability-testing tools, which look for bugs by examining the source code -- the lines of readable instructions, in a mixture of words, numbers and symbols, telling the software what tasks to perform -- Veracode's technology looks for flaws in the software's binary code -- the zeros and ones that are actually read by the computer.

This method is just as accurate as examining source code, says Chris Wysopal, Veracode's co-founder and chief technology officer, but it can be used without requiring developers to turn over the proprietary source code. More important, it opens new uses for security testing by enabling customers to check for vulnerabilities in software they've purchased from a vendor or an outsourcer.

PHYSICAL SECURITY

Vumii Inc. was selected in this category for developing a night-vision camera technology that uses a near-infrared laser to illuminate an area.

Most long-distance night-vision cameras "see" in the dark by capturing thermal infrared rays. But these cameras can't read writing or recognize faces, and they can't see through glass. Atlanta-based Vumii's Discoverii technology gets its illumination from an invisible laser beam that produces a high-resolution image that can be captured by standard video equipment.

Introduced in 2006, the equipment is being used to monitor a nuclear power plant in Japan and a water system in Pennsylvania, among other uses.

SEMICONDUCTORS

The overall Silver winner, Audience of Mountain View, Calif., was the top innovator in this category.

Building on research that Lloyd Watts, the company's founder and chief technology officer, began as a graduate student, Audience uses "scene analysis" -- the method people use to distinguish important sounds from background noises -- to separate a caller's voice from surrounding sounds. The technology Mr. Watts and his research team developed relies on two microphones and a voice-processing chip that highlights the speaker's voice and partly mutes background sounds.

The technology is currently available in a handful of phone models sold in South Korea and Japan. It "addresses what many people recognize is a big problem on cellphones," says Robert Drost, a distinguished engineer at Sun Microsystems Inc. and one of the judges.

SOFTWARE

Cleversafe Inc., based in Chicago, won for a technology that offers a more secure and reliable way to store sensitive computer files.

The company's Dispersed Storage software breaks files up into slices and then sends the slices over the Internet to multiple storage locations on a network. By themselves, the slices are unreadable to hackers or anyone else not authorized to read them, but the original file can be easily reassembled, even if not all the slices are available due to equipment failure or natural disaster. The software also promises to be less expensive than traditional storage methods, which rely on creating full, multiple copies to protect against loss.

Jane Royston, professor of entrepreneurship and innovation at the Swiss Federal Institute of Technology in Lausanne and an Innovation Awards judge, says the software "could be an important part of Internet data storage systems."

TECHNOLOGY DESIGN

Stockholm-based Telefon AB L.M. Ericsson won in the tech design category for a new way to construct cellphone towers that are faster to build, cheaper to operate and more aesthetically pleasing than typical cellular towers.

The Tower Tube is a concrete structure that contains all the site's radio transmission and reception equipment -- usually housed in a separate building -- antennas and wiring. The tower protects the equipment from the weather and maintains a stable internal temperature, reducing cooling costs and energy consumption by as much as 40%. By raising the radio equipment to the top of the tower, closer to the antennas, the Tower Tube reduces the amount of cabling needed and increases both the range of coverage and the tower's call capacity.

The first Tower Tube was constructed at Ericsson headquarters in Sweden, and the company expects to begin shipping them commercially by the end of the year. Though the towers are hardly invisible, the design is a "good attempt at making cell towers less obtrusive," says Darlene J.S. Solomon, chief technology officer of Agilent Technologies Inc. and an Innovation Awards judge.

TRANSPORTATION

A tiny, fuel-efficient, four-seat automobile priced at \$2,500 was selected as the winner in the transportation category. The Nano, from Tata Motors Ltd., a unit of Mumbai-based Tata Group, is designed to appeal to millions of poor families in India who otherwise rely on motorbikes or other two-wheeled transportation. It promises to

deliver 50 miles a gallon and emit less pollution than two-wheelers. "It is a very impressive design accomplishment," says Barry H. Jaruzelski, partner at consulting firm Booz & Co. and an Innovation Awards judge.

The Nano was unveiled in January. Tata Motors says it plans to begin selling the car before the end of the year, despite protests by farmers that have interrupted construction of the company's plant in West Bengal.

WIRELESS

Another Tata Group company, Tata Consultancy Services Ltd., won in the wireless category for a service that delivers crop advice to farmers in rural India by cellphone. Using remote sensors, a voice-enabled text-messaging service and a camera phone, TCS's mKrishi service can provide weather information and advice about dealing with plant pests, fertilizer and watering problems and other issues directly to a farmer in the field. The service is still being tested and hasn't been launched commercially, but TCS plans to eventually make it available in 22 of India's official languages.

Though the technology itself isn't new, "it does bring together a number of things that are quite useful," says William Webb, head of research and development at the U.K. Office of Communications and a member of the judging panel. "And it certainly does fit into that category of being a very worthy application."

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