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The Winners, Category by Category

From Computing Systems to Wireless, the Most Innovative Technologies

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(*See Correction & Amplification below .*)

This year the Innovation Awards judges chose winners in 17 categories. Here's a look at the winning entries.

Computing Systems

Journal Reports

Read the complete **Technology: Innovation Awards report** .

Plus, get an **update on past winners** and read opinions from innovators on **what will win in coming years** .

Lightfleet Corp., based in Camas, Wash., won in this category for a novel way of connecting computer processors, using beamed light instead of copper or fiber-optic wires.

In big data centers, even the fastest servers get slowed by bottlenecks in the connections between microprocessors, or nodes. Lightfleet's technology aims to eliminate the bottlenecks by replacing the wired switches typically used to manage these connections with a device that sends a data-carrying beam of light to all the nodes at once. The faster transmission of data promises to make it possible, for example, to run Wall Street's high-speed trading operations more efficiently.

The company, founded in 2003, delivered a prototype of its first product earlier this year to Microsoft Research, the R&D arm of the computer giant, which will test how it handles different applications. A Lightfleet spokesman says the company expects the first commercial sales by the middle of next year.

RUNNER-UP

Marvell Semiconductor Inc., U.S.: A small, low-power networked home server, called the Plug Computer, that can deliver data and applications to a variety of devices.

Consumer Electronics

Industrial Technology Research Institute , winner of the overall Gold award, won in this category. (See " **Paper-Thin Screens With a Twist** ")

RUNNERS-UP

NanoLumens Inc., U.S.: Lightweight digital displays that are flexible, thin and energy efficient. The first product, a 112-inch display, weighs less than 90 pounds, is less than an inch thick and consumes less energy than five light bulbs.

Ford Motor Co., U.S.: MyFord Touch, an instrument panel for cars that replaces traditional

buttons, knobs and gauges with voice commands, customizable LCD screens and five-way controls on the steering wheel similar to those on cellphones and MP3 players.

Nokia Corp., Finland: An "augmented reality" browser for mobile devices, called Point & Find, that lets users get information about real-life objects by pointing a camera phone at the object.

E-Commerce

New Orleans-based Receivables Exchange LLC won in the e-commerce category—the first winner in this group since 2004—for its online marketplace where small and midsize businesses can auction their receivables.

Smaller companies don't have the same access to financial markets that their larger counterparts do, so it's especially difficult for them to raise short-term working capital. Taking out a loan backed by receivables—known as factoring—is common in some industries. But for most small and midsize businesses, a factoring deal can be costly and often takes a long time to arrange.

Receivables Exchange aims to make it much easier for a company to tap the cash locked in its receivables. A company posts its unpaid invoices on the exchange, which screens the seller to make sure it has a certain minimum revenue and has been in business for at least two years. The screening can be completed within 24 hours and the invoices can be posted the next day. Bidders offer to buy some or all of the posted receivables, and the exchange takes commissions from the buyer and seller.

The company was launched in 2007 by Justin Brownhill, a former investment banker who is now Receivables Exchange's chief executive, and Nicolas Perkin, its president. The exchange hosts between $1 million and $5 million in trades each day, a spokeswoman says; it doesn't reveal its revenue.

Energy

InEnTec LLC, based in Bend, Ore., won in the energy category for a process that uses high-temperature plasma gasification to produce synthetic fuel from municipal and industrial waste.

The technology offers a cleaner alternative to using incinerators to burn garbage.

The company's Plasma Enhanced Melter heats the waste in a super-hot plasma. This produces a synthetic gas that can be converted to ethanol, methanol, clean diesel and other transportation fuels. Ash from the process is captured in molten glass, producing an obsidian-like material that can be buried in landfills or used in construction materials. Metals are captured separately and can be recycled.

Plasma gasification isn't a new technology; companies have used it for more than a decade to break down industrial and medical waste. Other companies are planning plasma-gasification plants to convert municipal waste, and a pilot plant from U.K.-based Advanced Plasma Power has been in operation since 2007. But InEnTec says its technology is more energy efficient than other plasma-gasification systems.

InEnTec was formed in 1995 by researchers who had studied and improved the technology in a collaborative effort between the Massachusetts Institute of Technology and the U.S. Department of Energy's Pacific Northwest National Laboratory. Last year, the company created a joint venture with Houston-based Waste Management Inc. to build and operate plasma-gasification facilities using InEnTec's technology. The first, planned for Arlington, Ore., is scheduled to open by the end of the year, with the capacity to handle 25 tons of waste a day.

RUNNERS-UP

Enphase Energy, U.S.: The Enphase Microinverter System, which converts the direct-current output of solar panels to the alternating current used in homes and businesses. The system includes a meter that collects information about panels' performance and sends it to a website where customers can view the data.

Idaho National Laboratory, U.S.: An efficient, environmentally friendly process for making high-quality biodiesel from waste fats, oils and greases.

Solexant Corp., U.S.: Ultrathin-film inorganic solar photovoltaic cells.

Environment

Desalination promises to deliver virtually unlimited quantities of water to a water-constrained world. But for it to succeed, researchers are going to have to reduce the huge amounts of energy needed to make salt water drinkable.

NanoH2O Inc., based in El Segundo, Calif., was voted best in the environment category for a nanotechnology-based reverse-osmosis membrane that promises to reduce the cost of running a typical desalination plant by as much as 25%.

Reverse osmosis, which separates salt and other impurities from salt water by forcing it through a membrane at high pressure, is increasingly favored as a desalination technology. But the pumps that push water through the membranes consume large amounts of energy, and traditional membranes easily are clogged by impurities, reducing their efficiency.

NanoH2O, using technology based on research at the University of California, Los Angeles, weaves nanoparticles into its membranes. The nanoparticles are more permeable to water molecules than the material in traditional membranes, and they resist fouling by bacteria, salt and other contaminants. As a result, the company says, its membranes enable desalination plants to maintain the same levels of production while reducing energy consumption, or to produce 70% more fresh water at current energy levels.

The company says it has begun producing membranes and complete reverse-osmosis modules, which incorporate the membranes and can replace the filters already used in existing desalination plants. It delivered the first products in August.

RUNNERS-UP

Active Water Sciences LLC, U.S.: A portable, self-contained wastewater-treatment system, the Water Phoenix, that can convert municipal wastewater into effluent that meets U.S. Environmental Protection Agency standards in less than 24 hours, producing little to no sludge.

Ceracasa SA and FMC Foret SA, Spain: A porcelain tile, BionicTile, with a photocatalytic glaze that reduces levels of nitrogen oxides and nitric acid in city air.

ClimateWell AB, Sweden: SolarChiller, a solar-powered air-conditioning unit that delivers heating, cooling and hot water to buildings without using electricity.

Health-Care IT

Software called Connect, developed by more than 20 federal agencies led by a program of the U.S. Department of Health and Human Services, won in this category for technology that enables health-care providers to exchange health information electronically.

The health-care industry is moving, albeit slowly, to replace patients' paper records with electronic files that can be easily shared among physicians, hospitals, health-care agencies and others. Two roadblocks stand in the way, though: The cost of electronic records systems and the need to ensure security and patient privacy.

Connect addresses both problems. The software was devised to meet all requirements for maintaining the security and privacy of medical records, including rules for federal agencies that are stricter than those for private health-care companies. And the Federal Health Architecture program, which coordinates health IT activities for several federal agencies, distributes the open-source Connect software free to both government and private health organizations.

In one of the first deployments, the Social Security Administration worked with the state of Virginia's regional health-information network to streamline the process of determining eligibility for disability benefits. Instant access to patients' records cut the time it takes to process disability applications to 46 days from 84.

Though there is other software for exchanging medical records, the Innovation Awards judges praised Connect for its ability to put the technology in the hands of lots of medical providers. The developers "were one of the few people who could move the needle on adoption of these things," says Barry H. Jaruzelski, one of the judges and a partner at Booz & Co.

RUNNERS-UP

Life Image Inc., U.S.: A cloud-based platform for sharing and storing diagnostic images, such as X-rays.

Ingenix, U.S.: Disease Precursor Identification software, which can identify people at risk of developing costly, difficult-to-manage diseases, such as diabetes.

Materials and Other Base Technologies

Cement production pumps a lot of carbon dioxide into the atmosphere. **U.K.-based Novacem Ltd.** was recognized in this category for a new cement-making process that takes in more CO2 than it emits.`

The secret is using magnesium oxides instead of calcium carbonates, the main ingredient in Portland cement, the most common type. Magnesium-oxide cements have been around for a long time, but their quality wasn't as good as that of Portland cement, and their manufacture still emitted a lot of CO2.

Novacem, spun out of Imperial College London in 2007, says its cement is as durable as traditional materials and the production process can absorb 100 kilograms of CO2 for each metric ton of cement produced—compared with the roughly 800 kilograms of CO2 emitted in the production of each metric ton of traditional cement.

Novacem plans to begin construction next year of a plant to produce up to 25,000 metric tons of cement a year using the new technology, and to open the first commercial-scale plant by 2015.

RUNNERS-UP

Cambrios Technologies Corp., U.S.: A coating material made of highly conductive silver nanowires that can be used to create a transparent, less costly, bendable thin film for touch screens and other electronic components.

Bolt-A-Blok, U.S.: A building system that uses steel-reinforced concrete blocks that can be easily assembled into houses and other structures by unskilled labor.

MicroGreen Polymers Inc., U.S.: A method for reducing the cost of recycled plastics by adding a gas that expands the length and width of solid polymer sheets.

Medical Devices

Zoom Focus Eyewear LLC, winner of the overall Silver award, won in this category. (See " **A Different Kind of Eyeglasses** ")

RUNNERS-UP

MIT Mobility Lab, U.S.: The Leveraged Freedom Chair, a wheelchair designed for use in developing countries that can travel on virtually any terrain.

Abbott Laboratories

Abbott Labs' MitraClip for heart-valve repairs

Abbott Laboratories, U.S.: The MitraClip System, a catheter-based device designed to repair damaged heart valves without open-heart surgery.

Aribex Inc., U.S.: The Nomad, a hand-held dental X-ray device. It's rechargeable, can be taken anywhere and allows the operator to stay with the patient during the procedure.

Medicine-Biotech

Counsyl Inc., winner of the overall Bronze award, won in this category. (See " **A Genetic Test for Prospective Parents** ")

RUNNERS-UP

CardioDx Inc., U.S.: Corus CAD, a genomic test designed to help clinicians determine, from a simple blood sample, whether a patient with chest pain has a significant blockage in the coronary arteries.

Pacific Biosciences, U.S.: A DNA sequencer, which reads individual molecules of DNA as they replicate in order to determine an organism's precise genetic code in real time—producing results 20,000 times faster with less overall cost than other systems.

DuPont Qualicon, U.S.: Tests using DuPont's BAX System to detect pathogens in fish and shellfish and E. coli O157:H7 in beef and fresh produce.

Network/Internet Technologies/Broadband

Vidyo Inc., based in Hackensack, N.J., won in this category with its technology for delivering high-quality videoconferencing over the Internet or cellular networks at a fraction of the cost of dedicated "telepresence" systems.

Internet videoconferencing has been around for a few years, but the calls typically are characterized by jerky, low-resolution video. More-realistic, high-resolution videoconferencing

systems generally require dedicated communications lines and expensive equipment, limiting their use.

Vidyo uses a new video-compression standard to produce a high-definition videoconferencing product that can work on desktop or laptop computers, tablets and smart phones and travel over the Internet or 3G and 4G cellular networks.

The company introduced its systems, which can include routers and other hardware in addition to software, in 2007. This summer, it licensed software to Hewlett-Packard Co., which will use the technology to extend its Halo telepresence service to desktop computers and to conference rooms not already set up with dedicated systems.

RUNNER-UP

Microsoft Corp., U.S.: An experimental Internet application, called Pivot, designed to help users to explore, organize and visualize collections of data quickly by showing relationships between the information.

Network Security

The Internet is thick with malware—viruses, worms, spyware, Trojan horses. The judges awarded Symantec Corp., based in Mountain View, Calif., the top prize in the network-security category for a new way to head off these threats: "reputation-based" technology that examines the usage patterns of millions of computers to spot dangers that traditional security products typically miss.

In general, security software identifies malicious software by looking for distinguishing patterns of code or watching for bad behavior—a computer's inexplicably connecting to an unknown server, for example. The problem is that there are so many new malware variants constantly appearing, some of them targeting only a small number of computers, that those techniques can't always spot them before they do mischief.

Symantec's new technology examines the software running on the computers of millions of volunteers, who remain anonymous, to spot possible threats. Based on what these patterns show about a program's source, age, prevalence and other characteristics, the technology assigns a "reputation rating" to every piece of software that it comes across. The technology had been known initially as Quorum but will soon be renamed.

Symantec says that the technology, first incorporated in the company's Norton 2010 security suite that was released in late 2009, is detecting about 10 million new threats a month that are invisible to traditional security methods.

RUNNERS-UP

Panda Security, Spain.: Panda Cloud Antivirus, a free, cloud-based antivirus solution.

Symplified Inc., U.S.: Symplified SinglePoint, a cloud-based service that enables organizations to apply and enforce security policies and controls on cloud applications.

Physical Security

Surveillance cameras generate a prodigious amount of video; unfortunately there's not enough time and manpower to watch it all.

The winner in this category, Israel-based BriefCam Ltd., has developed a fresh solution to the problem: Video Synopsis, which enables a viewer to browse a day's worth of recording in just a

few minutes by creating a summary of all the activities captured by a camera.

Other video-surveillance technologies address the too-much-information problem by fast forwarding through recordings or capturing images only when something happens—using motion detectors, for instance.

BriefCam takes a different approach. Its patented technology pulls out activities recorded over the course of a day—vehicles driving through a security gate, people walking in and out of a building—and compiles the images into a highlight reel in which each vehicle, for instance, follows immediately the one that preceded it through the gate, regardless of how much time actually elapsed between their arrivals. Each vehicle's image carries a time stamp to show when it was recorded, and the user can click on the time stamp to call up that section of the video.

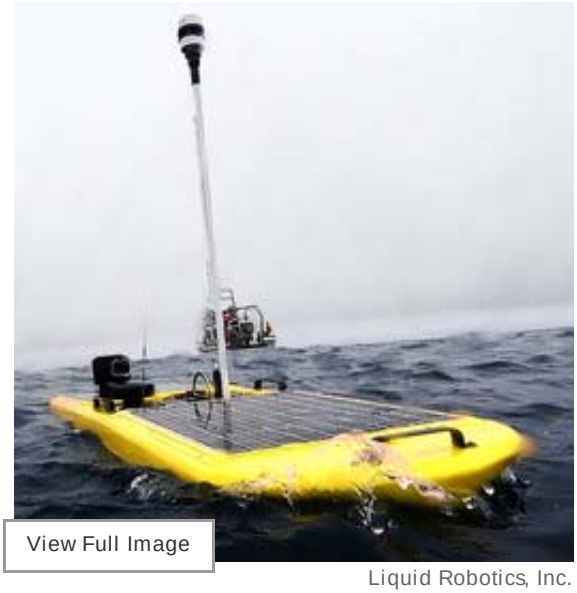
"Five hours of video is not five hours any more," says Shmuel Peleg, developer of the technology and the company's chief scientist. "It's five minutes."

Video Synopsis, licensed from Hebrew University of Jerusalem, where Mr. Peleg is a faculty member, was launched in 2009.

Robotics

Liquid Robotics Inc., based in Sunnyvale, Calif., is the winner in this category for developing an unmanned seagoing craft propelled by the power of ocean waves.

Most unmanned ocean craft can remain at sea for only a short time, relying on batteries to power propellers or pumps. The heavier their payload, the less time they have.



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Liquid Robotics, Inc.

Liquid Robotics' Wave Glider

Thanks to its propulsion system, Liquid Robotics' Wave Glider avoids those limits.

The craft, which consists of a surface buoy and a submerged glider with wing-shaped panels, converts the up-and-down motion of waves into forward thrust, making it possible to propel the buoy indefinitely without relying on batteries or other power sources.

The craft can be controlled remotely via satellite over an Internet connection. Instruments are powered by a solar panel on the surface of the floating buoy. Innovation Awards judge William Webb says the technology is "simple, novel and very workable."

The vehicle originally was designed by co-inventor Roger Hine, a Silicon Valley engineer and now the company's chief executive, to monitor the activities of humpback whales. It can also be used for tsunami warnings, observing weather and ocean conditions, and national-defense applications. The first craft was sold in 2009.

This summer, BP PLC deployed two Wave Gliders to the Gulf of Mexico to monitor water quality near the site of the well that exploded in April and spewed millions of gallons of oil into the Gulf.

Semiconductors

InVisage Technologies Inc., based in Menlo Park, Calif., took the prize in the

semiconductors category with QuantumFilm, an image sensor for digital cameras that uses semiconducting nanocrystals to capture far more light than traditional sensors.

Inexpensive digital cameras rely on sensors made from silicon that are limited in the amount of light they can capture. This is especially an issue in the smaller sensors used in cellphone cameras.

InVisage replaced silicon in the sensor with quantum dots, semiconducting crystals that are nanometers in size. The product, InVisage says, captures more than 90% of the available light, compared with 25% for a silicon-based sensor.

The technology taps research from the University of Toronto by Ted Sargent, a nanotechnology researcher and InVisage's founder and chief technology officer. The first QuantumFilm prototypes were unveiled in March, and the company says it will deliver sample chips to smart-phone makers by the end of the year; these chips will be used to build prototype devices. The chips could be available in consumer products as early as the end of next year.

RUNNERS-UP

Industrial Technology Research Institute, Taiwan: Slim, flexible sensors. ITRI envisions use of the sensors in such things as electronic musical instruments and weight scales embedded in luggage.

STMicroelectronics, Switzerland: The iNemo family of smart multisensor devices, which can be used in new ways to measure movement, pressure, temperature and altitude.

Nanosys Inc., U.S.: QuantumRail, a component that delivers more vibrant color and brightness in notebooks and mobile devices as well as increased energy efficiency.

Software

San Francisco-based Unity Technologies won in this category for a set of game-development tools that make it cheap and easy to create three-dimensional interactive content, including games, training simulations and medical visualizations, for a range of devices from cellphones to game systems.

The software for creating 3D online universes typically requires teams of engineers who spend years creating and refining these tools. As a result, they're often too complex and expensive for small-scale or amateur game developers.

Unity's software simplifies the process of building 3D games and other programs. It includes an easy-to-use editor that can take prefabricated components—rain or falling crates, for example—and combine them with other features to create full game environments.

The software also makes it possible to deploy games on a range of computer systems: Macs or PCs, game consoles from Sony Corp., Nintendo Co. or Microsoft Corp., and Apple Inc.'s iPhone and iPad.

The tools are simple enough for hobbyists or start-up developers; two developers used it to make the popular Zombieville USA app for the iPhone. They also are powerful enough for the largest game developers. Electronic Arts Inc., for example, used Unity to create its Tiger Woods PGA Tour Online game. "What you can create in a short time frame with a low learning curve is pretty revolutionary," says Robert Drost, a computer architect and one of the Innovation Awards judges.

The first version of the software was introduced in 2005, and it currently is being used by more than 200,000 developers. In October 2009, the company began offering at no cost its entry-level version, normally priced at $200 and intended mainly for hobbyists and small, independent game developers.

Technology Design

The efficient and compact storage of cookware may not be one of the world's great problems, but for anyone who has tried to put away a stack of awkwardly shaped pans with their lids and protruding handles, it's definitely an unmet need.

View Full Image

Gavin Thomson Design Ltd.

Gavin Thomson Design's nesting pans

Gavin Thomson Design Ltd., based in the U.K., won this category with an elegant solution to this daily annoyance. Mr. Thomson designed a set of three saucepans that nest one inside the other. The largest pan snugly holds the next smaller pan, which holds the smallest one; each permanently attached handle rests inside the hollowed-out grip of the next larger pan, and the lids all fit on top.

The patented design was licensed to Stellar brands, a unit of Portugal-based Silampos SA, and the first products, called Eazistore, were introduced in March in the U.K. Mr. Thomson's firm is negotiating with housewares brands in North America and Asia to distribute the pans in those regions.

RUNNERS-UP

Smart Lid Systems, Australia: A disposable coffee-cup lid that changes color from brown to red when hot.

Panasonic Avionics Corp., U.S.: An in-flight entertainment system that integrates a touch-screen monitor with a thin, lightweight economy-class seat.

Wireless

Ubiquisys Ltd., based in the U.K., won in the wireless category for a low-priced femtocell—a small cellular base station for use indoors.

Femtocells are designed to address two big, related problems: the poor cellphone coverage typically found inside a house, apartment or office building, and the growing congestion on cellular networks, aggravated by the explosion of data use on the latest smart phones. While femtocells have been around for a few years, their adoption has been limited by their high cost.

The company's G3-mini, introduced in December, is the first femtocell to be sold at a wholesale price under $100—a price that makes it possible for carriers to provide them to customers free of charge.

Ubiquisys keeps the cost down by providing software that's already proven to work on the leading carrier networks and delivering hardware blueprints to consumer-electronics makers, which can take advantage of their high-volume manufacturing lines to turn out lower-priced gear.

Tokyo-based Softbank Mobile Corp. began offering free G3-mini devices to consumers, retailers

and small-office customers in the spring, and the first units were shipped in August.

RUNNERS-UP

Motorola Inc., U.S.: The iSIM, a thin, flexible wafer that attaches to the SIM card in a mobile device. The iSIM enables a host of new mobile applications built by third-party developers.

Shared Spectrum Co., U.S.: Technology that permits two or more networks or applications to share the same radio-frequency band by using channels when they are idle.

Pyxis Mobile Inc., U.S.: Application Studio, which allows companies to create applications for BlackBerry, iPhone, Android and Windows mobile devices from a single configuration with no coding.

Correction & Amplification

In one of the first deployments of the Department of Health and Human Services' Connect software, the Social Security Administration worked with a private regional health-information network in Virginia to streamline the process of determining eligibility for disability benefits. A previous version of this article incorrectly said the health-information network was run by the state of Virginia.

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