



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

[Advanced manufacturing \(1\)](#)[Advanced materials \(2\)](#)[Autonomous systems & robotics \(4\)](#)[Big data \(2\)](#)[Biotechnology \(1\)](#)[Breakthrough technology \(5\)](#)[Communications technology \(1\)](#)[Imaging technology \(1\)](#)[Information technology \(1\)](#)[Materials science \(5\)](#)[Medical Sciences \(1\)](#)[Microelectronics \(2\)](#)[Quantum science \(2\)](#)[S&T policy \(3\)](#)[Science without borders \(4\)](#)[Sensors \(2\)](#)

FEATURE ARTICLES

[Battelle, R&D Magazine release annual research funding forecast](#)

[R&D Magazine, 18DEC2012](#)

Global research and development (R&D) spending is forecast to grow by 3.7%, or \$53.7 billion in 2013 to \$1.5 trillion, according to the closely watched forecast by Battelle and R&D Magazine. While much remains uncertain about the future of the U.S. R&D enterprise, China's march to prominence in the global R&D arena remains constant and strong, accounting for \$23 billion on the coming year's projected growth. [FULL REPORT](#)

Tags: [S&T policy](#), [R&D Funding](#), [Featured Article](#)

[Quantum Imaging Technique Heralds Unjammable Aircraft Detection](#)

[MIT Technology Review, 16DEC2012](#)

Researchers at Rochester University use polarised photons to detect and image objects. Reflected photons can, of course, be used to build up an image of the object. But an adversary could intercept these photons and resend them in a way that disguises the object's shape or makes it look as if it is elsewhere.

[TECHNICAL ARTICLE](#)

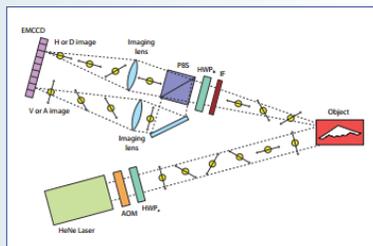
Tags: [Imaging technology](#), [Featured Article](#)

[Extending Einstein's ideas: New kind of quantum entanglement demonstrated](#)

[Science Daily, 15DEC2012](#)

Researchers in Canada have demonstrated a new form of three-particle entanglement in this experiment, which is based on the position and momentum properties of photons. This may prove to be a valuable part of future communications networks that operate on the rules of quantum mechanics, and could lead to new fundamental tests of quantum theory that deepen our understanding of the world around us. [TECHNICAL ARTICLE](#)

Tags: [Quantum science](#), [S&T Canada](#), [Featured Article](#)



S&T NEWS ARTICLES

ADVANCED MANUFACTURING

[DNA Nanotechnology Takes Two Big Steps Forward in Manufacturing](#)

[IEEE Spectrum, 18DEC2012](#)

A fundamental, unproven assumption in the field of DNA nanotechnology was that the nanoscale objects produced through DNA self-assembly achieved atomically precise positional accuracy. Researchers in Germany have challenged that assumption head on and built a 3-D object using DNA self assembly techniques and found that indeed the object met its design specifications down to the sub-nanometer scale. [VIDEO](#), [TECHNICAL ARTICLE](#)

Tags: [Advanced manufacturing](#)

ADVANCED MATERIALS

[Metamaterials experts show a way to reduce electrons' effective mass to nearly zero](#)

[Science Daily, 18DEC2012](#)

The field of metamaterials involves augmenting materials with specially designed patterns, enabling those materials to manipulate electromagnetic waves and fields. Researchers at Penn State have a theory for moving this phenomenon onto the quantum scale, laying out blueprints for materials where electrons have nearly zero effective mass. Such materials could make for faster circuits with novel properties. [TECHNICAL ARTICLE](#)

Tags: [Advanced materials](#), [Materials science](#)

[Novel ways of substituting critical raw materials](#)

[EU R&D News, 18DEC2012](#)

How to be more resourceful is a dilemma facing us all as we strive to reduce, reuse, recycle and substitute. Now an EU project is focusing on the latter with the substitution of critical raw materials. The Critical Raw Materials Innovation Network (CRM_InnoNet) will create an integrated community that will drive innovation in the field of critical raw materials substitution, which aims to benefit the EU industry.

Tags: [Advanced materials](#), [S&T EU](#)

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AUTONOMOUS SYSTEMS & ROBOTICS

Head-mounted cameras could help robots understand social interactions

Science Daily, 15DEC2012

Gaze helps delineate social groupings. Researchers at Carnegie Mellon University have developed a method for detecting where people's gazes intersect. In the future these insights will be essential for robots designed to interact with humans. [PROJECT WEBSITE](#)

Tags: *Autonomous systems & robotics***'Liquid that thinks:' Swarm of ping-pong-ball-sized robots created**

Science Daily, 15DEC2012

A research team at the University of Colorado has developed a basic robotic building block, which they hope to reproduce in large quantities to develop increasingly complex systems. Recently the team created a swarm of 20 robots, each the size of a ping-pong ball, which they call "droplets." When the droplets swarm together, they form a "liquid that thinks."

Tags: *Autonomous systems & robotics***Micro sensors help underwater robots swim like fish**

Science Daily, 15DEC2012

Scientists in Singapore have invented a 'sense-ational' device, similar to a string of 'feelers' found on the bodies of the Blind Cave Fish, which enables the fish to sense their surrounding and navigate easily.

Tags: *Autonomous systems & robotics, Microrobots***Video Friday: Hubo and Valves, UAVs and Lasers, and One Very Lucky Parrot**

IEEE Spectrum, 14DEC2012

Here's a short clip from a youBot hackathon, where a dual-armed 'bot was taught to write its own name.

Tags: *Autonomous systems & robotics*

BIG DATA

Big Data and Crowdsourcing in Humanitarian Crisis Mapping

Smart Data Collective, 17DEC2012

The Digital Humanitarian Network is a network of networks that hosts volunteer and technical communities that are available to help with real-time social data monitoring, big data and GIS analysis, geo-referencing of event data, and crisis map production.

Tags: *Big data***Big-data research spurs industrial development**

Science Daily, 15DEC2012

One of the world's largest specialist groups within the field of big-data analytics is being assembled in Norway. The centre for Information Access Disruptions (iAD), with its head office in Tromsø, is at the core of this activity.

Tags: *Big data*

BIOTECHNOLOGY

Nanoparticle research and the future of medicine

PhysOrg.com, 18DEC2012

According to a study at the University of Dublin, nanoparticles cloak themselves in quite different ways than previous larger particles or drug molecules, meaning they can acquire almost the full range of biological activities that proteins can. Whatever is adsorbed onto the nanoparticle becomes its address label, and that influences how the nanoparticle will function in the body.

Tags: *Biotechnology, Medical Sciences*

BREAKTHROUGH TECHNOLOGY

Schrödinger's cat has a light touch: Quantum physics used to observe delicate systems

Science Daily, 18DEC2012

Researchers in Spain have shown that groups of photons organized in certain quantum states can gently explore the properties of objects in a non-invasive way. For the first time, the results overcome a limit imposed by quantum mechanics, and may permit the observation of unknown properties of ultra-sensitive objects such as individual atoms or living cells.

Tags: *Breakthrough technology***Achilles' heel of pathogenic bacteria discovered**

Science Daily, 17DEC2012

Researchers in Germany have identified a potential new target to fight bacteria: the factor EF-P. EF-P plays a crucial role in the production of proteins that are essential for the virulence of EHEC or salmonellae. The researchers' findings suggest that drugs blocking EF-P would impair the fitness of pathogenic bacteria and might lead to a new generation of specific antibiotics that allow to combat infections caused by drug-resistant pathogens.

TECHNICAL ARTICLE

Tags: *Breakthrough technology, Medical Sciences***IBM Reveals Five Innovations That Will Change Our Lives within Five Years**

IBM, 17DEC2012

IBM unveiled the seventh annual IBM 5 in 5—a list of innovations that have the potential to change the way people work, live and interact during the next five years. Touch: You will be able to touch through your phone, Sight: A pixel will be worth a thousands words, Hearing: Computers will hear what matters, Taste: Digital taste buds will help you to eat smarter, Smell: Computers will have a sense of smell.

Tags: *Breakthrough technology**continued...*

“If we all did the things we are capable of, we would astound ourselves.”

THOMAS A. EDISON

Major breakthrough in high-precision indoor positioning

Science Daily, 17DEC2012

Researchers in Singapore developed a new method to build a WiFi radio map that does not require GPS signals. WiFi fingerprints are a set of WiFi signals captured by a mobile device and the measurements of received WiFi signal strengths (RSSs) from surrounding access points at the device. A WiFi radio map shows RSSs of WiFi access points (APs) at different locations in a given environment. Therefore, each WiFi fingerprint on the radio map is connected to location information.

Tags: Breakthrough technology, Information technology

Math formula gives new glimpse into the magical mind of Ramanujan

Science Daily, 17DEC2012

A mathematician has now solved one of the greatest puzzles left behind by the enigmatic Indian genius with the development of a formula for mock modular forms that may prove useful to physicists who study black holes.

Tags: Breakthrough technology, Mathematics

COMMUNICATIONS TECHNOLOGY

Deployable Radio Frequency Data Backbone To Match Fiber Optic Capacity

DARPA News, 14DEC2012

DARPA's 100 Gb/s RF Backbone (100G) intends to develop a fiber-optic-equivalent communications backbone that can be deployed worldwide. The goal is to create a 100 Gb/s data link that achieves a range greater than 200 kilometers between airborne assets and a range greater than 100 kilometers between an airborne asset (at 60,000 feet) and the ground. The 100G program goal is to meet the weight and power metrics of the Common Data Link (CDL) deployed by Forces today for high-capacity data streaming from platforms.

Tags: Communications Technology

INFORMATION TECHNOLOGY

Stretchable electronics

EurekAlert, 15DEC2012

Currently electronics such as cell phones, tablets, laptops, etc., are rigid. According to researchers at the University of Delaware stretchable electronics are the future of mobile electronics, leading giants such as IBM, Sony and Nokia to incorporate the technology into their products.

Tags: Information Technology

MATERIALS SCIENCE

Building better structural materials

Science Daily, 15DEC2012

When the stress put on a material exceeds its strength the changes that take place in the material become permanent. This could result in the material breaking or shattering, but it could also re-shape the material, such as a hammer denting a piece of metal. Carnegie Mellon University researchers findings could help physicists and engineers create stronger, longer-lasting materials. It can also help earth scientists understand tectonic events and seismicity.

TECHNICAL ARTICLE

Tags: Materials science

Engineers develop new energy-efficient computer memory using magnetic materials

Science Daily, 15DEC2012

By using electric voltage instead of a flowing electric current, researchers at UCLA have made major improvements to an ultra-fast, high-capacity class of computer memory known as magnetoresistive random access memory, or MRAM.

Tags: Materials science, Information technology

Nanocrystals not small enough to avoid defects

EurekAlert, 15DEC2012

Nanocrystals as protective coatings for advanced gas turbine and jet engines are receiving a lot of attention for their many advantageous mechanical properties, including their resistance to stress. However, contrary to computer simulations, the tiny size of nanocrystals apparently does not safeguard them from defects as shown by studies at Berkeley Laboratory.

Tags: Materials science, Advanced materials

New method to understand superconductors

Science Daily, 15DEC2012

Researchers in the UK have devised a new method to understand the processes that happen when atoms cool which could lead to new materials for superconducting power grids and widespread use of magnetic resonance imaging (MRI). TECHNICAL ARTICLE

Tags: Materials science

A thin-skinned catalyst for chemical reactions

e! Science News, 13DEC2012

A chemical nanostructure developed by Boston College researchers behaves much like the pores of the skin, serving as a precise control for a typically stubborn method of catalysis that is the workhorse of industrial chemistry. Scientists have been looking for ways to exert greater

selectivity in heterogeneous catalysis in an effort to expand its application and extend “green chemistry” benefits of reduced byproducts and waste.

Tags: Materials science

FEATURED RESOURCE

[Asia Research News](#)

ResearchSEA is Asia’s first research news portal, a one-stop centre where journalists and members of the public can gain access to news and local experts from the research world in Asia. [RSS](#) [Science](#), [Technology](#)

MEDICAL SCIENCES

[New form of cell division found: Natural back-up mechanism during faulty cell division](#)

[Science Daily](#), 17DEC2012

Researchers have discovered a new form of cell division in human cells. They believe it serves as a natural back-up mechanism during faulty cell division, preventing some cells from going down a path that can lead to cancer.

Tags: Medical Sciences, Biology

MICROELECTRONICS

[Cream of the crop: Sandwich chips combining the best of two technologies](#)

[Science Daily](#), 18DEC2012

Researchers in Germany broke new technological ground and successfully combined their—up to now separate—technology worlds. Due to their high performance, the novel chips developed within the HiTeK project promise to open up new applications.

Tags: Microelectronics, S&T Germany

[A New Tool for Secret Agents—And the Rest of Us](#)

[THz Science and Technology Network](#), 13DEC2012

Tiny inexpensive silicon microchips developed by the California Institute of Technology generate and radiate terahertz waves that fall into a largely untapped region of the electromagnetic spectrum—between microwaves and far-infrared radiation—and that can penetrate a host of materials without the ionizing damage of X-rays. When incorporated into handheld devices, the new microchips could enable a broad range of applications in fields ranging from homeland security to wireless communications to health care, and even touchless gaming.

Tags: Microelectronics, Terahertz technology

QUANTUM SCIENCE

[Physicists make strides in understanding quantum entanglement](#)

[Science Daily](#), 15DEC2012

Using computers to calculate the extreme version of quantum entanglement—how the spin of every electron in certain electronic materials could be entangled with another electron’s spin—a research team at UC Santa Barbara found a way to predict this characteristic. Future applications of the research are expected to benefit fields such as information technology. [TECHNICAL ARTICLE](#)

Tags: Quantum science

S&T POLICY

[The Uncertain State of U.S. R&D](#)

[R&D Magazine](#), 18DEC2012

The watchword heading into 2013 is uncertainty, and the effect on the U.S. research and development enterprise is more unclear than ever. The current economic condition and uneasy prospects for the future combined with a federal government funding projection that could range anywhere from flat to significant declines have limited the prospects for 2013.

Tags: S&T policy, R&D Funding

[Australia launches national nanotechnology research strategy](#)

[Nanowerk](#), 13DEC2012

Outlining a bold vision for a nanotechnology enabled Australian Economy, the research strategy highlights a range of existing and emerging nanotechnology applications. [REPORT](#)

Tags: S&T policy, S&T Australia

SCIENCE WITHOUT BORDERS

[Physics World’s 2012 Book of the Year](#)

[Physics World](#), 18DEC2012

Well into the 1970s and 1980s interest in fundamental aspects of quantum mechanics was largely confined to a handful of physics oddballs, many of whom combined their enthusiasm for Bell’s theorem and quantum entanglement with a penchant for psychedelic drugs and New Age philosophy. Their story is told in David Kaiser’s book *How the Hippies Saved Physics*—our pick for Physics World’s 2012 Book of the Year.

Tags: Science without borders

[The Year in Science Pictures 2012](#)

[Science Magazine](#), 18DEC2012

A collection of some of the most spectacular science images of the last twelve months.

Tags: Science without borders

In decision-making, it might be worth trusting your gut

Science Daily, 14DEC2012

According to a team of researchers from Rice University, George Mason University and Boston College even if you're an expert, intuitive decision-making is better for some types of tasks than others. Tasks that can be solved through predetermined steps, like math problems, are not as conducive to intuitive decision-making as less-structured tasks, which may include certain strategic or human resource management problems. [TECHNICAL ARTICLE](#)

Tags: Science without borders

Van Allen Probes reveal new dynamics of radiation belts

PhysOrg.com, 13DEC2012

Just 96 days since their launch, NASA's twin Van Allen Probes have already provided new insights into the structure and behavior of the radiation belts that surround Earth, giving scientists a clearer understanding about the fundamental physical properties of these regions more than half a century after their discovery.

Tags: Science without borders, NASA, Space technology

SENSORS

Rice uses light to remotely trigger biochemical reactions

e! Science News, 15DEC2012

Researchers at Rice University are turning light into heat at the point of need, on the nanoscale, to trigger biochemical reactions remotely on demand. The method makes use of materials derived from unique microbes—thermophiles—that thrive at high temperatures but shut down at room temperature.

Tags: Sensors

Sierra Nevada will provide counter IED jammers to be worn by individual soldiers

Defense Systems, 15DEC2012

The U.S. Army Contracting Command has awarded a \$56.5 million contract for the production of Individual Counter Radio Controlled Improvised Explosive Device Electronics Warfare (ICREW) systems, referred to as "Baldr" systems.

Tags: Sensors, Military technology ■

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