



# S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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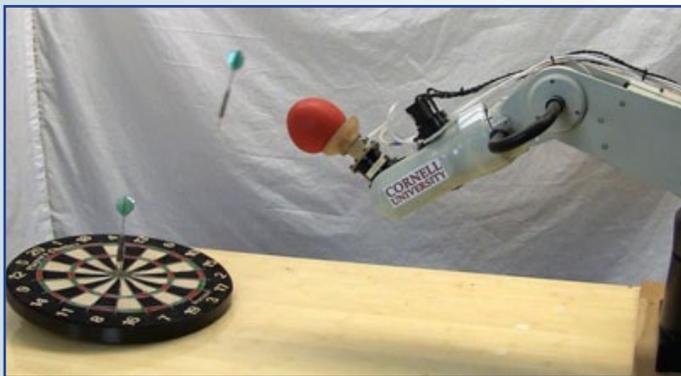
## FEATURE ARTICLES

### [Jamming Robot Gripper Learns to Throw Stuff, Humans Surrender](#)

[IEEE Spectrum, 14FEB2012](#)

That squishy dollop of brilliance that is the jamming robot gripper has learned a new trick: Roboticists at Cornell and the University of Chicago have taught it to throw stuff. The gripper is simply a latex balloon filled with coffee grounds. The grounds move around each other like grains of sand and can conform to objects and complex surfaces, but when air is pumped out of the balloon, the grounds all “jam” together into a solid mass, yielding a strong hold on whatever the gripper is in contact with. [VIDEO](#) [TECHNICAL PAPER](#): John R. Amend, et. al., [A Positive Pressure Universal Gripper Based on the Jamming of Granular Material](#)

[Tags: Autonomous systems & robotics, Robotics, Featured Article](#)



### [Meet the pioneers of future and emerging technology](#)

[Nanowerk, 10FEB2012](#)

The European Commission’s Future and Emerging Technologies (FET) programme encourages unconventional match-ups like chemistry and IT, physics and optics, biology and data engineering. Researchers funded by FET are driven by ideas and a sense of purpose which push the boundaries of science and

technology. Long-term research investment like this may seem harder to justify in these tough economic times. But policy planners should resist the temptation to cut funding for such trailblazing programmes. [FET Web site](#)

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

## S&T NEWS ARTICLES

### ADVANCED MATERIALS

#### [Inspired by Steel, Nanomanufacturing Gets Wear-Resistant Carbide Tip](#)

[IBM, 08FEB2012](#)

Scientists at the University of Pennsylvania, the University of Wisconsin-Madison and IBM Research-Zurich have fabricated an ultrasharp silicon carbide tip possessing such high strength that it is thousands of times more wear-resistant at the nanoscale than previous designs. The new tip, which is 100,000 times smaller than the tip of a pencil, represents an important step towards nanomanufacturing for applications, including bio sensors for healthcare and the environment.

[Tags: Advanced materials, Nanomaterials](#)

### AUTONOMOUS SYSTEMS & ROBOTICS

#### [Hovering Not Hard If You’re Top-heavy, NYU Researchers Find](#)

[Science Newsline, 10FEB2012](#)

Top-heavy structures are more likely to maintain their balance while hovering in the air than are those that bear a lower center of gravity, researchers at New York University have found. Their findings are counter to common perceptions that flight stability can be achieved only through a relatively even distribution of weight—and may offer new design principles for hovering aircraft. The lessons learned from these studies could be put to use in designing stable and maneuverable flapping-wing robots.

[Tags: Autonomous systems & robotics, Robotics](#)

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**Japan scientist makes 'Avatar' robot****PhysOrg.com, 10FEB2012**

A Japanese-developed robot that mimics the movements of its human controller is bringing the Hollywood blockbuster "Avatar" one step closer to reality. TELESAR V robot that mimics the movements of its human controller, and relays back data on what it sees, hears and feels. The thin polyester gloves the operator wears are lined with semi-conductors and tiny motors to allow the user to "feel" what the mechanical hands are touching—a smooth or a bumpy surface as well as heat and cold.

*Tags: Autonomous systems & robotics, Robotics***Origami Robots Make Complex Movements With Just Paper and Air****IEEE Spectrum, 10FEB2012**

George M. Whitesides' lab at Harvard has started to manufacture these beautiful air-powered origami robotic actuators out of paper and elastic. These "soft pneumatic actuators" are constructed by combining paper with a silicone elastomer called Exoflex in a mold and casting the composite so that they contain internal pneumatic networks. The key to the funky shapes that these actuators can make is to use paper to constrain the ways in which the elastomer can bend. The advantages of robots constructed with methods like these are numerous: They're simple to make, flexible, expandable, lightweight, and cheap. [Prof. Whiteside's lab](#)

*Tags: Autonomous systems & robotics, Robotics***DARPA's AlphaDog Wanders the Wilderness****Wired , 07FEB2012**

The 'bot proved capable of lugging 400 pounds of gear, logging 20 miles without refueling, and successfully using sensors to follow a human leader's direction. They want to imbue AlphaDog with "hearing technology," so that squad members can "speak commands ... such as 'stop,' 'sit,' or 'come here.' DARPA Legged Squad Support System (LS3)

**VIDEO***Tags: Autonomous systems & robotics***BIG DATA****Gearing up for data deluge from world's biggest radio telescope****EurekAlert, 13FEB2012**

ICRAR (International Centre for Radio Astronomy Research) is a joint venture between Curtin University and the University of Western Australia. Scientists say the \$2 billion SKA (Square Kilometre Array) will generate one exabyte of data—a billion terabytes (or one quintillion bytes)—every day while it searches the sky with the power to detect airport radars in other galaxies 50 light years away. ICRAR is bringing together some of the world's leading minds to figure out how to solve the data deluge.

It has signed an agreement with DataDirect Networks to develop the extraordinary new data storage capability.

*Tags: Big data, Foreign S&T***The age of big data****New York Times, 11FEB2012**

Data is doubling every two years, estimates IDC (International data Corporation). A report last year by the McKinsey Global Institute, the research arm of the consulting firm, projected that the United States needs 140,000 to 190,000 more workers with "deep analytical" expertise and 1.5 million more data-literate managers, whether retrained or hired. McKinsey REPORT (interactive feature): "[Big data: The next frontier for competition](#)"

*Tags: Big data***BIOTECHNOLOGY****Lens produces hours of scientific work in seconds****PhysOrg.com, 13FEB2012**

Scientists in Scotland are creating a lens which will be capable of showing three-dimensional images within cells and tissues at the same time as showing the whole organism, something which is currently not possible with any single imaging device. The innovative Mesolens—the only device of its kind in the world—will be able to capture detail in organisms which are too big to be examined satisfactorily by existing microscopes and will offer a deeper insight into areas such as cancerous tissues and the cortex of the brain.

*Tags: Biotechnology, Medical Sciences***COMMUNICATIONS TECHNOLOGY****Spray-on antenna gets great reception at Google event****PhysOrg.com, 14FEB2012**

A Utah start-up has introduced a spray-on signal booster in a can that promises an improved signal. The company suggests this is a lightweight, easy answer for smartphone users who are frustrated over dropped calls and poor cell-phone reception with traditional antennas. The approach can create signal-boosting antennas on nearby walls, trees or clothes. The spray product was unveiled at Google's Solve for X "conference."

*Tags: Communications Technology, Nanomaterials, Science without borders***New error-correcting codes guarantee the fastest possible rate of data transmission****PhysOrg.com, 10FEB2012**

The scheme works by creating one long codeword for each message, but successively longer chunks of the codeword are themselves good codewords. "The transmission strategy is that we send the first part of the codeword," Wornell

“If at first, the idea is not absurd, then there is no hope for it .”

ALBERT EINSTEIN

(MIT) explains. “If it doesn’t succeed, we send the second part, and so on. We don’t repeat transmissions: We always send the next part rather than resending the same part again.

*Tags: Communications Technology, Information technology*

### **DARPA Tackles Poor Cell Signals In War Zones** **Information Week, 08FEB2012**

Through new Fixed Wireless at a Distance program, military hopes to make connections over both commercial and traditional military mobile devices more reliable.

*Tags: Communications Technology, DARPA, Government S&T*

## CYBER SECURITY

### **Genetics Inspired Research Prevents Cyber Attacks**

**Newswise, 14FEB2012**

Leveraging the concept of “survival of the fittest,” Wake Forest University researchers are fighting the continual evolution of computer viruses, worms and malware with evolution by developing the first-ever automated computer configurations that adjust as quickly as the threats.

*Tags: Cyber security*

## ENERGY

### **‘We could put oil back in ground’**

**BBC, 07FEB2012**

That’s why Glasgow University’s Solar Fuels Group wants us to make the leap from solar power to solar fuel. It’s a multidisciplinary, multi-million pound effort which aims to convert renewable energy into fuel that’s simple to store. [VIDEO](#)

*Tags: Energy, Renewable energy, Solar energy*

## ENVIRONMENTAL SCIENCE

### **Effects of sea spray geoengineering on global climate**

**PhysOrg.com, 14FEB2012**

Anthropogenic climate warming is leading to consideration of options for geoengineering to offset rising carbon dioxide levels. One potential technique involves injecting artificial sea spray into the atmosphere. The sea salt particles would affect Earth’s radiation budget directly, by scattering incoming solar radiation, and indirectly, by acting as cloud condensation nuclei, which could lead to whiter clouds that reflect more radiation. This research is being done in Finland.

*Tags: Environmental science, Climatology*

## FOREIGN S&T

### **China defence budget to double over 5 years: IHS**

**Space War, 14FEB2012**

China’s defence budget stood at \$119.8 billion last year and will rise to \$238.2 billion in 2015, marking a combined annual growth rate of 18.75 percent during the period, the US-based IHS said in a forecast. China will use the additional cash to modernise its equipment while reducing its manpower.

*Tags: Foreign S&T, S&T China*

## GOVERNMENT S&T

### **NASA showcases ‘spinoff’ technologies**

**PhysOrg.com, 08FEB2012**

Contrary to popular belief, Tang, Velcro and Teflon (along with the zero-gravity space pen) aren’t derived from NASA technology. NASA has, however, developed numerous technologies over the years, which are featured in annual Spinoff reports. Yes, memory foam mattresses are in fact one such product developed from NASA technologies. [More inventions](#)

*Tags: Government S&T, NASA*

### **NIST Provides Octagonal Window of Opportunity for Carbon Capture**

**Science Newline, 08FEB2012**

Filtering carbon dioxide, a greenhouse gas, from factory smokestacks is a necessary, but expensive part of many manufacturing processes. However, a collaborative research team from NIST and the University of Delaware has gathered new insight into the performance of zeolite that may stop carbon dioxide in its tracks far more efficiently than current scrubbers do.

*Tags: Government S&T*

## INFORMATION TECHNOLOGY

### **Electronics - the future is flexible**

**Nanowerk, 07FEB2012**

Flexible electronics, now being printed, is the future of new applications in sensors, displays, power and lighting according to experts gathered at the FlexTech Alliance 2012 Flexible Electronics and Displays Conference and Exhibition.

*Tags: Information Technology, Flexible electronics*

**EU-funded prizewinning researchers decongest the internet**

Cordis (UK), 01FEB2012

Spanish researchers have successfully defined translators that permit understanding between contents in IPv4 and IPv6 protocols by means of a technology called NAT64 and DNS64. This is a standard used by the major manufacturers of routers, such as Cisco or Juniper, and the major sellers of the Domain Name System (DNS), such as Berkeley Internet Name Domain (BIND) or Microsoft.

*Tags: Information Technology*

**Molecules from scratch without the fiendish physics**

New Scientist, 10FEB2012

A SUITE of artificial intelligence algorithms may become the ultimate chemistry set. The algorithm is still mainly a proof of principle. If it can learn to predict something else, such as how well a molecule binds to an enzyme, it could help with designing drugs, fuel cells, batteries or biosensors. The applications can be as broad as chemistry.

*Tags: Materials science*

**MICROELECTRONICS****Experimental carbon nanotube transistor breaks the 10-nanometer level**

Nanowerk, 09FEB2012

Carbon nanotube (CNT) transistors have been touted as a possible replacement for silicon devices but the crucial question so far has been if CNT transistors can offer performance advantages over silicon at sub-10 nm lengths? New experimental results from IBM Research are indicating that the answer is 'yes'.

*Tags: Microelectronics, CNT, Nanomaterials*

**New technology platform for molecule-based electronics**

Nanowerk, 09FEB2012

Researchers at the Nano-Science Center at the University of Copenhagen have developed a new nano-technology platform for the development of molecule-based electronic components using the wonder material graphene. Using chemical and physical processes they are now able to produce large flakes of graphene that can be used as components in an entirely new technology platform within molecule-based electronics.

*Tags: Microelectronics, Foreign S&T, Nanomaterials*

**NEUROSCIENCE****Right hand or left? How the brain solves a perceptual puzzle**

Science Daily, 08FEB2012

This "hand laterality" problem may seem obscure, but it reveals a lot about how the brain sorts out confusing perceptions. Now, a new study challenges the long-held consensus about how we solve this problem. The study helps us understand the experience of amputees, who sometimes sense an uncontrollable itch or clenching in the "phantom" body part. Showing the opposite hand or leg in a mirror allows the patient to "feel" the absent limb and mentally relieve the discomfort—a "binding" of vision and feeling.

*Tags: Neuroscience*

**FEATURED RESOURCE****TED**

TED is a nonprofit devoted to Ideas Worth Spreading. It started out (in 1984) as a conference bringing together people from three worlds: Technology, Entertainment, Design. Since then its scope has become ever broader. TED includes the TEDTalks video site, the Open Translation Project and more.

**MATERIALS SCIENCE****ORNL microscopy explores nanowires' weakest link**

EurekAlert, 13FEB2012

Deliberately introduced defects, which are only the size of a single atom, could turn a conducting nanowire into an insulator by shutting down the path of electrons. This is the first correlated study that links electron movement to structural elements such as single point defects or impurities that are intentionally grown in the nanowires.

*Tags: Materials science, Advanced materials, Nanomaterials*

**Startling results in synthetic chemistry.. presented in Nature Chemistry**

EurekAlert, 13FEB2012

A team of scientists from ETH Zurich and Empa (Switzerland) have succeeded for the first time in producing regularly ordered planar polymers that form a kind of 'molecular carpet' on a nanometer scale. The tiny hexagons in the polymers, formed by benzene rings with three ester groups, can be removed by a simple hydrolytic process. This would form a "sieve" with an ordered structure suitable for the selective filtration of molecules.

*Tags: Materials science, Foreign S&T*

## PHOTONICS

**[Fast photon control brings quantum photonic technologies closer](#)**[PhysOrg.com](#), 13FEB2012

A team of physicists in the UK has taken another step toward realizing quantum photonic technologies by demonstrating how to quickly manipulate single photons at the same wavelengths used in existing optical telecommunications networks. The ability to control a photon's path and polarization in the time of a few nanoseconds could allow photonic circuits to be integrated with existing optical telecom networks, leading to significant improvements.

*Tags: Photonics, Communications Technology, S&T UK*

## QUANTUM SCIENCE

**[Scientists make iron transparent](#)**[Nanowerk](#), 07FEB2012

For the first time, an experiment shows that atomic nuclei can become transparent. The effect of electromagnetically induced transparency (EIT) is well known from laser physics. The Helmholtz research team managed to prove for the first time that this transparency effect also exists for X-ray light, when the X-rays are directed towards atomic nuclei of the Mössbauer isotope iron-57. This experiment definitely means considerable technical progress for quantum computing: apart from the basic possibility to make materials transparent with light, the intensity of light is decisive for a future technical realisation as well.

*Tags: Quantum science*

## S&amp;T POLICY

**[\\$8.5 Million Initiative Will Study Quantum Memories](#)**[Newswise](#), 15FEB2012

The U.S. Air Force Office of Scientific Research has awarded \$8.5 million to a consortium of seven U.S. universities that will work together to determine the best approach for generating quantum memories based on interaction between light and matter. The five-year Multidisciplinary University Research Initiative (MURI) will be led by the Georgia Institute of Technology and include scientists from Columbia University, Harvard University, the Massachusetts Institute of Technology, the University of Michigan, Stanford University and the University of Wisconsin.

*Tags: S&T policy, Government S&T, Quantum science*

## SCIENCE WITHOUT BORDERS

**[Improving forecasts of volcanic ash concentrations](#)**[PhysOrg.com](#), 14FEB2012

Volcanic ash can severely damage airplanes, and eruptions such as the 2010 Eyjafjallajökull eruption may result in major disruption to air travel. Improved forecasting

of ash cloud locations and concentrations could benefit the aviation industry and reduce delays, but forecasting is challenging because eruptions and atmospheric transport of volcanic ash are complex processes. TECHNICAL ARTICLE: [Operational prediction of ash concentrations in the distal volcanic cloud from the 2010 Eyjafjallajökull eruption](#), *Journal of Geophysical Research-Atmospheres*, doi:10.1029/2011JD016790, 2012.

*Tags: Science without borders*

**['Invisibility' cloak could protect buildings from earthquakes](#)**[PhysOrg.com](#), 14FEB2012

The University of Manchester research has shown that by cloaking components of structures with pressurised rubber, powerful waves such as those produced by an earthquake would not 'see' the building – they would simply pass around the structure and thus prevent serious damage or destruction. This 'invisibility' could prove to be of great significance in safeguarding key structures such as nuclear power plants, electric pylons and government offices from destruction from natural or terrorist attacks.

*Tags: Science without borders*

**[Computer programs that think like humans](#)**[PhysOrg.com](#), 13FEB2012

The most common math computer programs score below 100 on IQ tests with number sequences. Researchers at the University of Gothenburg, Sweden, have created a computer program that can score 150.

*Tags: Science without borders, Foreign S&T*

**[Seven equations that rule your world](#)**[New Scientist](#), 13FEB2012

There are thousands of important equations. The seven I focus on here - the wave equation, Maxwell's four equations, the Fourier transform and Schrödinger's equation - illustrate how empirical observations have led to equations that we use both in science and in everyday life. VIDEO

*Tags: Science without borders*

**[Elsevier boycott gathers pace](#)**[Nature News](#), 08FEB2012

Rebel academics ponder how to break free of commercial publishers. Gowers, a mathematician at the University of Cambridge, UK, and a winner of the Fields medal, declared his boycott in a blog post on 21 January. He cited Elsevier's high prices; the practice of bundling journals, and the company's support for US legislation such as the Research Works Act (RWA), which would forbid government agencies from requiring that the results of research they fund be placed in public repositories. Gowers says the main question is how to replicate or replace the role that journals play in reviewing work and conferring prestige. Since the protest began, more than 4,800 researchers from all fields have joined in.

*Tags: Science without borders*

## SENSORS

### New Butterfly-inspired Design From GE To Enable More Advanced, Low Cost Thermal Imaging Devices

GE Global Research, 13FEB2012

Everything from medical imaging to defense applications could be impacted by this inexpensive bio-inspired discovery. The experiment involved the doping of Morpho butterfly scales with single-walled carbon nanotubes (SWNTs). When the researchers blew on butterfly wings coated with the SWNTs, the wings detected temperature changes down to a mere 0.02 degrees Celsius within 1/40 of a second. Commercial applications of this technology could reach the market within the next five years.

*Tags: Sensors, Biomimetics* ■

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