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S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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FEATURE ARTICLES

The tiny, lethal weapon that viruses use to kill bacteria (w/video)

PhysOrg.com, 10APR2012

Grouped together under the unassuming name φ92, a family of bacteriophage viruses has perfected its specialty: they attack salmonella and coliform bacteria. The centerpiece of their arsenal is a needle-like tip that pierces its victim's membrane. EPFL [France] scientists have measured this miniscule weapon; at a single nanometer, it's roughly 20 times the diameter of a helium atom. By determining the exact structure of the tip, the EPFL scientists have filled in all the missing details in our understanding of φ92's lethal weapon.

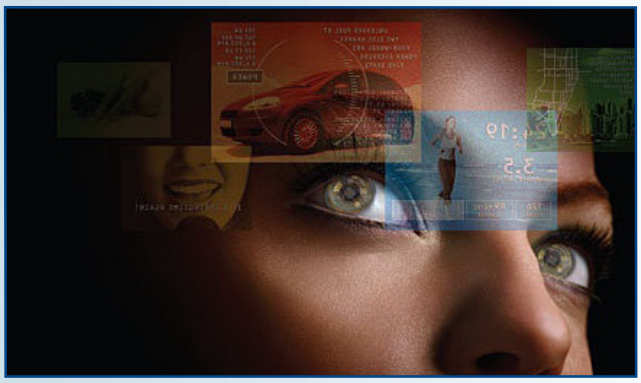
Tags: Breakthrough technology, Biology, Featured Article

Google's Augmented Reality Concept Video

IEEE Spectrum, 04APR2012

Google[x], the company's Mountain View, Calif., skunkworks, has released a concept video for an augmented reality project it's been working on. Called Project Glass, it seems to hope to bring the web, location services, and social media straight to your eyeballs, with nothing in between. VIDEO

Tags: Information Technology, Featured Article



S&T NEWS ARTICLES

ADVANCED MANUFACTURING

Printable houses are coming

KurzweilAI, 11APR2012

Italian inventor Enrico Dini has developed a huge 3D printer called D-Shape that can print entire buildings out of sand. The printer sprays a thin layer of sand followed by a layer of magnesium-based binder from hundreds of nozzles on its underside. The glue turns the sand to solid stone, which is built up layer-by-layer from the bottom up to form anything from a sculpture to a sandstone building.

Tags: Advanced manufacturing, Science without borders

ADVANCED MATERIALS

Toray ready to mass produce self-repair coating for touch screens

PhysOrg.com, 09APR2012

Underneath the self-healing layer is a 125µm polyethylene terephthalate base. They will only say that the material has both high elasticity and viscosity. The end result is a film that, according to the company, heals itself in as little as ten seconds at room temperature.

Tags: Advanced materials, S&T Japan

AUTONOMOUS SYSTEMS & ROBOTICS

DARPA seeks robot enthusiasts (and you) to face off for $2M prize

DARPA, 10APR2012

The DARPA Robotics Challenge consists of both robotics hardware and software development tasks. The challenge is structured to increase the diversity of innovative solutions by encouraging participation from around the world including universities, small, medium and large businesses and even individuals and groups with ideas on how to advance the field of robotics. BAA Solicitation

Tags: Autonomous systems & robotics, Government S&T, Robotics

Pirates, Beware: Navy's Smart Robocopters Will Spy You in the Crowd

ONR, 05APR2012

Called the Multi-Mode Sensor Seeker (MMSS), the sensor is

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a mix of high-definition cameras, mid-wave infrared sensors and laser-radar (LADAR) technology. It will be placed on a robotic helicopter called Fire Scout. Carrying advanced automatic target recognition software, the sensor prototype will allow Fire Scout to autonomously identify small boats on the water, reducing the workload of Sailors operating it from control stations aboard Navy ships.
Tags: Autonomous systems & robotics, Government S&T, ONR

BIOTECHNOLOGY

Nano-sized 'factories' churn out proteins

MIT News, 09APR2012

Drugs made of protein have shown promise in treating cancer, but they are difficult to deliver because the body usually breaks down proteins before they reach their destination. To get around that obstacle, a team of MIT researchers has developed a new type of nanoparticle that can synthesize proteins on demand. Once these "protein-factory" particles reach their targets, the researchers can turn on protein synthesis by shining ultraviolet light on them.
Tags: Biotechnology, Nanomaterials

Handheld plasma flashlight rids skin of pathogens

KurzweilAI, 06APR2012

Imagine a handheld, battery-powered plasma-producing device that can rid skin of bacteria in an instant—no soap and water required. It could be used in ambulance emergency calls, natural disaster sites, military combat operations, and wherever treatment is required in remote locations. In an experiment, the plasma flashlight effectively inactivated a thick biofilm with 17 different layers of one of the most antibiotic- and heat-resistant bacteria, Enterococcus faecalis. Although the exact mechanism behind the anti-bacterial effect of plasma is largely unknown, it is thought that reactions between the plasma and the air surrounding it create a cocktail of compounds that are similar to the ones found in our own immune system.
Tags: Biotechnology

BREAKTHROUGH TECHNOLOGY

Opening the gate to robust quantum computing

EurekAlert, 09APR2012

Scientists have overcome a major hurdle facing quantum computing: How to protect quantum information from degradation by the environment while simultaneously performing computation in a solid-state quantum system. The key to quantum information processing is in the relationship between qubits. Usually, when you decouple qubits from their environment to protect their quantum data, you decouple them from everything, even from each other. But, researchers at Ames Laboratory found a narrow window of opportunity where both the electron and nucleus can be decoupled from their environment, while retaining their relationship to each other.
Tags: Breakthrough technology, Quantum science

CYBER SECURITY

Innovation leadership makes US a cyber target

Federal Computer, 04APR2012

To start to fix the problem, private companies and the government both need to migrate critical networks and data to better-protected infrastructure, with network segmentation and hardened end-systems being key. A failure to do so could result in the U.S. falling behind as the innovation front-runner. Already, the U.S. has lost at least hundreds of billions of dollars to malicious cyber infiltration.
Tags: Cyber security

FORECASTING

1981 climate change predictions were eerily accurate

PhysOrg.com, 09APR2012

Within the paper, several graphs note the growth of atmospheric carbon dioxide, both naturally occurring and man-made, and projected a future rise based on the continued use of fossil fuels by humans. Van Oldenborgh and Haarsma overlaid data gathered by NASA and KNMI in recent years and found that the projections made by Hansen et al. were pretty much spot-on.
Tags: Forecasting, Climatology

GOVERNMENT S&T

Proposed satellite would beam solar power to earth

KurzweilAI, 09APR2012

A NASA-funded new approach to power-beaming solar-power satellites has been developed. SPS-ALPHA (Solar Power Satellite via Arbitrarily Large PHased Array) uses a large array of individually controlled thin-film mirrors, outfitted on the curved surface of the satellite. These movable mirrors intercept and redirect incoming sunlight toward photovoltaic cells affixed to the backside of the solar power satellite's large array. The Earth-pointing side of this large modular circular array is tiled with a collection of microwave-power transmission panels that generate the coherent, low-intensity beam of radio frequency energy and transmits that energy to Earth.
Tags: Government S&T, Energy, Government S&T, Solar energy

No-photon laser: Physicists demonstrate 'superradiant' laser design

PhysOrg.com, 05APR2012

Physicists at JILA (Colorado) have demonstrated a novel "superradiant" laser design in which electromagnetic waves from a large group of identical antennas are care-

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"You've got to think about the big things while you're doing small things, so that the small things go in the right direction." ALVIN TOFFLER

fully synchronized to build a combined wave with special useful features that are not possible otherwise. It has the potential to be 100 to 1,000 times more stable than the best conventional visible lasers. This type of laser could boost the performance of the most advanced atomic clocks and related technologies, such as communications and navigation systems as well as space-based astronomical instruments.

Tags: Government S&T

INFORMATION TECHNOLOGY

Wavii: New Kind Of News Gatherer

Information Week, 11APR2012

Wavii gathers its information from all over the Web—news, videos, tweets, and beyond—and then attempts to make sense of what it has found using machine learning techniques. Wavii is not just a pattern-matching system. It recognizes linguistic concepts and that understanding makes its assistance more valuable. Not only is Wavii good at finding information that matches a user's expressed interests but it also concisely summarizes that information.

Tags: Information Technology

12 companies join Stanford and Berkeley to launch new Open Networking Research Center

EurekAlert, 10APR2012

The new networking research center includes two research groups at Berkeley and Stanford as well as a new nonprofit networking lab. The center focuses on creating a solid scientific foundation for software-defined networking (SDN) and a practical open source SDN infrastructure that will reinvent networking.

Tags: Information Technology, Communications Technology

Researcher finds faster, cheaper way to cool electronic devices

EurekAlert, 09APR2012

The technique uses a "heat spreader" made of a copper-graphene composite, which is attached to the electronic device using an indium-graphene interface film. Both copper-graphene and indium-graphene have higher thermal conductivity, allowing the device to cool efficiently.

Tags: Information Technology

Transactional memory: An idea ahead of its time

R&D Magazine, 09APR2012

Nearly 20 years ago, two Brown University computer scientists were working on a largely theoretical problem: How could multiple parallel processors make changes to shared resources safely and efficiently? Their proposal—transactional memory—is sparking fresh interest as a new generation of processors seeks improved power and speed.

Tags: Information Technology

MATERIALS SCIENCE

Micromechanical mirror performs under pressure...of light

PhysOrg.com, 09APR2012

With careful design, gratings can work as mirrors as long as the spacing between the ridges is below the wavelength of light, which is about 1560 nm. Researchers produced a grating with a spacing of about 700 nanometers beginning with a membrane of silicon nitride—a material known to have exceedingly low mechanical losses—and then etching it with reactive ions..

Tags: Materials science

The weird nanoscale phenomenon of remote heating

Nanowerk, 09APR2012

Scientists have discovered that when electric current is run through carbon nanotubes, objects nearby heat up while the nanotubes themselves stay cool. The nanotube's electrons are creating electrical fields due to the current, and the substrate's atoms are directly responding to those fields. The transfer of energy is taking place through these intermediaries. While there is some analogy to a microwave oven, the physics behind the two phenomena is actually very different. Understanding this phenomenon could lead to new ways of building computer processors that can run at higher speeds without overheating, dissipating their heat elsewhere.

Tags: Materials science, Nanomaterials

MICROELECTRONICS

Chips as mini Internets

MIT News, 18APR2012

In order to keep increasing chips' computational power chipmakers are giving them additional "cores," or processing units. Researchers at MIT want cores to communicate the same way computers hooked to the Internet do: by bundling the information they transmit into "packets." Each core would have its own router, which could send a packet down any of several paths.

Tags: Microelectronics, Information technology

A New Microchip Knows Just Where You Are, Indoors and Out

MIT Technology Review, 09APR2012

The unprecedented accuracy of the Broadcom 4752 chip

continued...

results from the sheer breadth of sensors from which it can process information. It can receive signals from global navigation satellites, cell-phone towers, and Wi-Fi hot spots, and also input from gyroscopes, accelerometers, step counters, and altimeters. The integration of new kinds of location data opens up the possibility of navigating indoors, where GPS signals are weak or nonexistent.

Tags: Microelectronics

ISPD: Semiconductors aim for 8-nm node

EE Times, 06APR2012

The three alternative pathways were 193-nanometer immersion lithography supplemented with multi-patterning, extreme ultraviolet (EUV) lithography and e-beam lithography. Although the pathways are fraught with engineering peril one of three alternatives was sure to surmount the downward scaling hurdles to 8-nm design rules.

Tags: Microelectronics, Semiconductors

Researchers develop first silicon wafer-scale 110 GHz phased array transmitter

PhysOrg.com, 06APR2012

The phased array chip was developed using TowerJazz's SBC18H3 BiCMOS which offers both high-performance 0.18-micron SiGe bipolar and high quality passive elements combined with high density 0.18-micron CMOS. The device targets applications for automotive radar, aerospace and defense, passive imaging, security, and mmWave imaging.

Tags: Microelectronics, Terahertz technology

Featured Resource

Nanowerk Spotlight

Behind the buzz and beyond the hype: Our daily Nanowerk-exclusive nanotechnology feature article. Some stories are more like an introduction to nanotechnology, some are about understanding current developments, and some are advanced reviews of leading edge research. RSS

QUANTUM SCIENCE

New Optical Route to Magnetic State Control: Viewpoint

American Physical Society, 09APR2012

Optically switched magnetic domains are easier to control if the light source is circularly polarized. Devices that harness the spin of the electron (rather than solely its charge) to process and store information are the basis of spintronics. Currently, static forces are used to switch the magnetization in a spintronics device, but the vision for future devices is to be able to switch them at high speeds with short-pulsed laser light.

Tags: Quantum science

Controlling quantum tunneling with light

EurekAlert, 05APR2012

Scientists at the Cavendish Laboratory in Cambridge have used light to help push electrons through a classically impenetrable barrier. While quantum tunneling is at the heart of the peculiar wave nature of particles, this is the first time that it has been controlled by light.

Tags: Quantum science

Quantum computer built inside a diamond

EurekAlert, 04APR2012

The team of researchers from USC utilized the impurities in diamond to build a quantum computer. A rogue nitrogen nucleus became the first qubit. In a second flaw sat an electron, which became the second qubit. (Though put more accurately, the "spin" of each of these subatomic particles was used as the qubit.) The team was able to demonstrate that their diamond-encased system does indeed operate in a quantum fashion by seeing how closely it matched "Grover's algorithm."

Tags: Quantum science, Qbits

S&T POLICY

The dragon's new teeth - A rare look inside the world's biggest military expansion

The Economist, 07APR2012

China's defence budget has almost certainly experienced double digit growth for two decades. According to SIPRI, a research institute, annual defence spending rose from over $30 billion in 2000 to almost $120 billion in 2010. SIPRI usually adds about 50% to the official figure that China gives for its defence spending, because even basic military items such as research and development are kept off budget.

Tags: S&T policy, Military technology, R&D Funding

SCIENCE WITHOUT BORDERS

Wellcome Trust joins 'academic spring' to open up science

KurzweilAI, 11APR2012

One of the world's largest funders of science the Wellcome Trust, the largest non-governmental funder of medical research after the Bill & Melinda Gates Foundation, is now behind a growing campaign to break the stranglehold of academic journals and allow all research papers to be shared online.

Tags: Science without borders, Bibliometrics

Exciting new field of bioorthogonal chemistry owes a debt to curiosity-driven research from previous eras

PhysOrg.com, 10APR2012

Bioorthogonal chemistry is the term Carolyn Bertozzi [UC, Berkley] herself coined nearly a decade ago to describe chemical reactions that can take place inside living systems

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without interfering with native biochemical processes. Bertozzi has said she developed bioorthogonal chemistry to solve the scientific equivalent of finding a needle in a haystack – singling out one type of biomolecule for analysis from the all the diverse species that populate cells and organisms. Her ground-breaking research made use of experiments nearly a century ago by two German chemists whose work was driven primarily by scientific curiosity as opposed to the more problem-driven research of today.

Tags: Science without borders

New test gauges risk intelligence

R&D Magazine, 10APR2012

Innovation often requires risky decisions, but tests for personality, intelligence, and memory don't measure the ability of a person to make effective decisions in risky situations. If we want to have educated citizens who make decisions based on information, we need people who understand information about risks. Seen in this way, risk intelligence is just as important a skill as reading and writing. Fortunately it can also be learned. Risk Literacy

Tags: Science without borders

SENSORS

UV light illuminates the tremendous sensing potential of single-walled carbon nanotubes

Nanowerk, 10APR2012

Ironically the ultrahigh sensitivity of SWCNTs (Single-walled carbon nanotubes) is easily compromised by various unintentional contaminants from the device fabrication process as well as the ambient environment. Researchers have now shown that applying continuous in situ ultraviolet light illumination during gas detection can enhance a SWCNT-sensor's performance by orders of magnitude.

Tags: Sensors, Advanced materials, Carbon nanotube, Nanomaterials

STEM

An Analysis of STEM Education Funding at the NSF: Trends and Policy Discussion - Congressional Research Service report

Secrecy News, 09APR2012

In its contemporary construct federal policy makers interest in STEM largely focuses on the connection between STEM education and the U.S. science and engineering workforce, which, in turn, is often perceived as instrumental to national security and the U.S. economy. This report analyzes NSF funding trends and selected closely related STEM education policy issues in order to place conversations about FY2013 funding in broader fiscal and policy context. It concludes with an analysis of potential policy options. REPORT

Tags: STEM

Helping U.S. Students "Make the Grade" in Science and Math

NSF News, 05APR2012

On Tuesday, April 10, science, technology, engineering and mathematics (STEM) education experts from around the nation and the National Science Foundation (NSF) will convene a workshop at the University of Illinois at Chicago to discuss practices that can be immediately adopted by K-12 schools to help reform STEM education nationally.

Tags: STEM

US students need new way of learning science

e! Science News, 05APR2012

Michigan State University professor is proposing 8+1 Science, a new way of thinking about and teaching science, not a new set of science standards. The 8+1 concepts were derived from two basic questions: What are things made of and how do systems interact and change? The eight concepts are: atoms, cells, radiation, systems change, forces, energy, conservation of mass and energy, and variation.

Tags: STEM ■

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