



# TryEngineering Today!

The monthly newsletter of TryEngineering - find out more at [www.tryengineering.org](http://www.tryengineering.org)

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## Nanotechnology Sharpens X-Rays

Researchers at the Paul Scherrer Institute (PSI) and the Ecole Polytechnique Fédérale de Lausanne (EPFL) in Switzerland have developed a novel method for producing dark-field x-ray images at wavelengths used in typical medical and industrial imaging equipment. Dark-field images provide more detail than ordinary x-ray radiographs and could be used to diagnose the onset of osteoporosis, breast cancer or Alzheimer's disease, to identify explosives in hand luggage, or to

pinpoint hairline cracks or corrosion in functional structures. Up until this point, dark-field x-ray imaging required sophisticated optics and could only be produced at facilities like the PSI's 300m-diameter, \$200 million synchrotron. With the new nanostructured gratings described in the new research, dark-field images could soon be produced using ordinary x-ray equipment already in place in hospitals and airports around the world. Unlike traditional x-ray images, which show a simple absorption



Traditional x-ray image of chicken wing on left; more detailed darkfield image on right. (Image Source: EPFL)

contrast, dark-field images capture the scattering of the radiation within the material itself, exposing subtle inner changes in bone, soft tissue, or alloys. The overall clarity of the images is striking. More details are at [www.epfl.ch](http://www.epfl.ch).

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## New Chip Can Geotag Photos

Air Semiconductor of Swindon, United Kingdom, recently revealed the Airwave-I chip, which can continuously track a user's location all with negligible power drain on battery operated devices. Airwave-I requires as little as 1% of the power required by current GPS solutions and consumes only 1mA when

continuously tracking. The new technology will, for example, enable cameras to automatically geotag images and mobile handsets to run a new generation of autonomous location sensitive applications. It will enable mobile handset designers to specify instant location functionality without significant impact on

power budgets. Co-founders David Tester and Stephen Graham and their team have spent the last 18 months developing the new proprietary technology that utilizes signals from GPS satellites in an innovative manner. The initial planned application is geotagging on digital cameras. Find out more at [www.air-semi.com](http://www.air-semi.com).

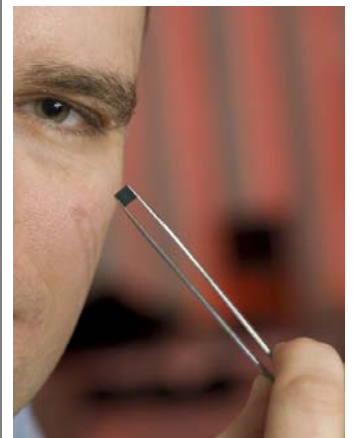


Image Credit: Air Semiconductor



## Electric Messages: Then and Now

Each month, TryEngineering Today! profiles one of the many lesson plans available on TryEngineering.org.

The "Electric Messages: Then and Now" lesson focuses on exploring electric message systems, from light signals using International Morse Code to text messaging.

Through the lesson, students construct a simple telegraph using a battery, wires, a switch, and bulb. Students also evaluate and discuss the broad impact of

communications on society.

Today, with instant messaging, we can hardly imagine that 150 years ago it might take months for even critical news to spread. As a result of this activity, students should develop an understanding of electrical communications, audio and visual applications of International Morse Code, electrical wiring, simple switches, and of course -- teamwork.

All lessons on TryEngineering.org provide detailed teacher

and student handouts and worksheets, many which can serve as pre-activity homework assignments.

The lesson is appropriate for students aged 8-18, and provides step-by-step instructions for both educators and teachers. It explores the impact of electrical communications on society and therefore the value that engineers add to our world.

Explore this, and other lessons online at [www.tryengineering.org/lesson.php](http://www.tryengineering.org/lesson.php).



## Honors for Sydney Opera House

The Sydney Opera House is one of the architectural wonders of the world, perhaps the best known building of the 20th century with its design and construction involving countless innovative design and engineering ideas and construction techniques. The cultural, heritage and architectural importance of Sydney Opera House was recently recognized by its inclusion in 2007 on the World Heritage List and in 2003, on the State Heritage Register,

exactly 30 years after its official opening. It was the youngest cultural site ever included on the World Heritage List.

The Sydney Opera House was engineered with a series of large precast concrete 'shells' which form the roofs of the structure. It covers 4.5 acres of land and is supported by 580 concrete piers that have been sunk up to 70 feet below sea level. The power supply for the building is sufficient to

supply power to a town of 25,000 people. The roofs are covered with 1.056 million tiles. Planning for the Sydney Opera House began in the late 1940s; it was built in three stages. During stage one (1959-1963) the upper podium was built. In stage two (1963-1967) the outer shells were complete, and in stage three (1967-73) the interior design and construction were finalized. More details are available at [www.sydneyoperahouse.com](http://www.sydneyoperahouse.com).





## South Pole Engineering Marvel

In January, the United States dedicated a new scientific station at the geographic South Pole--the third since 1957--officially ushering in a new support system for sophisticated large-scale experiments in disciplines ranging from astrophysics to environmental chemistry and seismology.

The replacement of the South Pole station was given support by the external panel that suggested that the existing facilities were both outmoded and potentially unsafe.

The elevated station is the most imposing

structure ever built at the Pole and the 12-year reconstruction required extraordinary effort to complete.

It required 925 flights by ski-equipped LC-130 aircraft flown by the New York Air National Guard. At 26,000 pounds of cargo per flight, a total of 24 million pounds of cargo were transported.

The new station not only is dramatically more technologically and architecturally sophisticated than the 1975 station or its predecessor, but is also almost immeasurably different from the first habitation ever erected

at the Pole: a pyramidal tent left as proof of his accomplishment by the first man to reach the site, Norwegian Roald Amundsen, and for Briton Scott, whose party reached the Pole a month later. The station is named for the two explorers.

In November of 2007, Popular Science magazine named the new station as one of its "Best of What's New" innovations of the year.

More details about the station and a live webcam are at [www.nsf.gov/od/opp/support/southp.jsp](http://www.nsf.gov/od/opp/support/southp.jsp).



Amundsen-Scott South Pole Station  
Image Credit: Dwight Bohnet,  
National Science Foundation

## Invention Connection

TryEngineering.org provides a link to an interactive internet game that allows visitors to trace the paths of innovation from the microwave to the mouse.

No inventor works alone. All inventors stand on the shoulders of previous inventors, working from their insights, innovations, and systems of thought.

Every invention we use today has roots that go back years, decades, and even centuries.

The "Invention Connection" challenges visitors to reach back in history, connecting prior innovations with today's breakthroughs. Find out how the abacus lead to the invention of the microwave oven. See how the Kodak camera

led to the development of synthetic tissue. Explore the path that connects the invention of vulcanized rubber to the creation of the world wide web. Learn how the cotton gin lead to the bicycle!

For the link to "Invention Connection" and other games, click on "Play Games!" at [www.tryengineering.org](http://www.tryengineering.org).





## Singapore Engineering Plastics Plant

BASF recently opened a new engineering plastics compounding plant at its Pudong site in Shanghai, China. The new facility is a world-scale plant with an annual capacity of 45,000 metric tons.

It is one of the most modern compounding plants in the world today, with the highest environmental standards and the most efficient production capabilities available. Alongside this new plant in Shanghai, BASF has similar compounding facilities in Malaysia and Korea,

which are part of BASF's global network of engineering plastics and compounding plants.

BASF has also set up a Technical Center for engineering plastics in Shanghai, where its engineers design and optimize new engineering plastic parts in close cooperation with customers. The development support ranges from computer aided engineering in the initial design phase to component tests in the trial and launch phase.

Engineering plastics are used, for example, in automotive construction as well as the electrical and electronics industries. Some innovative applications include, component mounts, seat structures, oil sump modules, electronic control units, sensors, air intake manifolds, cylinder head covers, air spring and cooling elements as well as roof frames and highly integrated laser-structured electronic devices. Find out more at [www.asiapacific.basf.com](http://www.asiapacific.basf.com).



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## TryEngineering.org

is a resource for students (ages 8-18), their parents, their teachers and their school counselors. It is a portal about engineering and engineering careers, developed to help young people understand better what engineering means, and how an engineering career can be made part of their future.

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