



TryEngineering Today!

The monthly newsletter of TryEngineering - find out more at www.tryengineering.org

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Rosetta Mission to Observe Asteroids

The International Rosetta Mission is the European Space Agency's first mission designed to orbit and land on a comet. The mission consists of an orbiter and a lander, called Philae. Rosetta was launched in March 2004 from Europe's Spaceport in Kourou, French Guiana, and will meet its new target, 67P/Churyumov-Gerasimenko, in 2014.

The spacecraft gets its name from the famous Rosetta stone that led to the deciphering of Egyptian hieroglyphics almost 200 years ago.

During its trek to Comet 67P/Churyumov-Gerasimenko, Rosetta will make two excursions to the main asteroid belt that lies between the orbits of Jupiter and Mars. Scientists have identified two target asteroids along Rosetta's path, 2867-Steins and 21-Lutetia. An extensive observation campaign of the two asteroids from close by will take place in September 2008 and July 2010, respectively.

The prime contractor was Astrium, Germany, the leader of an industrial team involving more than 50 contractors from 14



Artist's impression of the Rosetta orbiter and lander.
Image Credit: European Space Agency

European countries and the United States.

More details are at <http://rosetta.esa.int>.

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Meet Virtual Eve

Researchers at Australia's Massey University have created "Eve," an intelligent tutoring system that can adapt its response to the emotional state of people by interaction through a computer system. The ability of virtual Eve to alter her presentation according to the reaction of the child facing her at the keyboard has been

hailed as an exciting development in the e-learning market. Although Eve was developed for one-to-one math teaching with eight-year-olds, she is a significant character in the future of human computer interaction. Linked to a child via computer, the animated character or virtual tutor can tell if the child is

frustrated, angry or confused by the on-screen teaching session and can adapt the tutoring session appropriately. The animated Eve (with a human-sounding voice) can ask questions, give feedback, discuss questions and solutions and show emotion. Find out more at www.massey.ac.nz.



Image Credit: Massey University



Build a Better Bag

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

The "Build a Better Candy Bag" lesson demonstrates how product design differences can affect the success of a final product -- in this case a bag for holding candy. Students work in pairs to evaluate, design, and build a better candy bag.

Through the lesson, students to work in pairs to design, build, and test a candy bag. It could be a

bag to hold anything -- from pencils to potatoes. Students must predict the volume and strength of their original design, sketch the design, create a model bag, and then test their bag using weight. After testing, students redesign their bag to improve it, and then retest. Student pairs make predictions, compare results, and discuss their findings.

The lesson is appropriate for students aged 8-18, and provides step-by-step instructions for both educators and teachers.

Students involved in the activity see first-hand how product design directly impacts product performance. The lesson uses science, math, and engineering concepts and applications.

All lessons on TryEngineering.org provide detailed teacher and student handouts and worksheets, many which can serve as pre-activity homework assignments.

Explore this, and other lessons online at www.tryengineering.org/lesson.php.



Remote Ocean Sensing from Space

Surrey Satellite Technology Ltd (SSTL) and the University of Surrey, U.K., have succeeded in detecting a weakly reflected Galileo signal off the ocean surface using the GPS Reflectometry Experiment on one of SSTL's small satellites, UK-DMC. The reflection was received off the North coast of Australia and the shape of the reflection gives an indication of the ocean roughness, and hence the weather at that place and

time. The experiment was carried into space on the British remote sensing satellite UK-DMC launched in 2003. The experiment was a demonstration that GPS reflections could be used to determine the roughness of the ocean, using a method called 'bistatic radar' or 'forward scatterometry.' Unlike other radar remote sensing systems, no transmitter is needed as GPS satellites are already broadcasting predictable signals to the

Earth 24 hours a day. A satellite dedicated to GPS reflectometry would only therefore need to carry a modified GPS receiver and an antenna, which could potentially be accommodated on a tiny 10 kg satellite platform at a low cost. The UK-DMC Reflectometry Experiment has also been used to detect GPS signals reflected off ice and dry land. These measurements may be used as inputs for climate modelling. More details are at www.surrey.ac.uk.





Engineers Develop Nanoradio

Harnessing the electrical and mechanical properties of the carbon nanotube, a team of researchers and engineers has crafted a working radio from a single fiber of that material. Fixed between two electrodes, the vibrating tube successfully performed the four critical roles of a radio -- antenna, tunable filter, amplifier and demodulator -- to tune in a radio signal generated in the room and play it back through an attached speaker. The nanoradio was developed at the U.S. National Science Foundation's Center of Integrated Nanomechanical Systems.

Functional across a bandwidth widely used for commercial radio, the tiny device could have applications far beyond novelty, from radio-controlled devices that could flow in the human bloodstream to highly efficient, miniscule, cell phone devices. The new device works in a manner more similar to the vacuum tubes from the 1930s than transistors found in modern radios. In the new radio, a single carbon fiber a few hundred nanometers (billionths of a meter) long, and only a few molecules thick, stands glued to a negatively charged base of tungsten that acts as a cathode.

Roughly one millionth of a meter directly across from the base lies a positively charged piece of copper that acts as an anode. Power in the form of streaming electrons travels from an attached battery through the cathode, into the nanotube, and across a vacuum to the anode via a field-emission tunneling process. The researchers believe it would be easy to produce such nanotube radios for receiving signals in the 40-400 megahertz range, a range within which most FM radio broadcasts fall. More details are at <http://socrates.berkeley.edu/~argon/nanoradio/radio.html>.



This image, taken by a transmission electron microscope, shows a single carbon nanotube protruding from an electrode. The waves shown were added for visual effect.

Credit: Zettl Research Group, Lawrence Berkeley National Laboratory and University of California at Berkeley

West Point Bridge Designer

TryEngineering.org provides a link to an interactive internet game that allows visitors to explore bridge building concepts online. The "West Point Bridge Designer" will introduce you to engineering through an authentic, hands-on design experience. The software provides tools to model, test, and optimize a steel highway bridge, based on

realistic specifications, constraints, and performance criteria. In the optimization phase, users return to the drawing board. If the test bridge didn't collapse, it is considered a successful design. But it is not be an optimal design unless building costs are appropriate. Of course, designing an inexpensive bridge is not as important as designing

a safe bridge -- but in the game, and the real world, the cost of a bridge will help determine if the design is actually built. For the link to "West Point Bridge Designer" and other games, click on "Play Games!" at www.tryengineering.org. The "West Point Bridge Designer" software is free, in the public domain, and for use on PCs only.



Image Credit:
West Point Bridge Design Contest



EEG-controlled Robot Arm

A new EEG-controlled robot arm might one day bring help to people with paralysis. In the Brain2Robot project, an international team of researchers and engineers has developed a robot control system that works on the basis of electroencephalograph (EEG) signals. This could enable patients with severe motor disabilities to regain some of their lost autonomy. The patient controls the robot arm with their thoughts: If they think about wanting to move their right hand, the

robot arm is activated. If they imagine themselves moving their left hand, the robot arm will, for instance, lift up a cup of coffee. But how can thoughts be translated into instructions for the robot? The solution is based on a concept known as a brain-computer interface (BCI). Researchers at the Fraunhofer Institute for Computer Architecture and Software Technology FIRST and the Charité hospital in Berlin have been working on this type of interface for almost seven years.

For the input, they use a perfectly normal electroencephalogram (EEG), just like the ones used in everyday clinical practice. Highly efficient algorithms analyze these signals using a self-learning technique. The software is capable of recognizing and distinguishing between the patterns of signals that correspond to an intention to raise the left or right hand, and extract them from the pulses being fired by millions of other neurons in the brain. Find out more at www.first.fraunhofer.de.



A robot arm controlled by the user's thoughts could one day make life easier for people with paralysis.
Image: © Fraunhofer FIRST



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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.

It is brought to you by:



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