



# TryEngineering Today!

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

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## Engineering Students Make MRIs Quieter

Having an MRI exam could soon become a bit more pleasant, thanks to the work of a team of University of Florida engineering students. The students designed a headset that shows promise of reducing the extremely loud, repetitive, industrial-like noises that accompany magnetic resonance image examinations. The noises, which range from beeping to whirring to grinding and can often be as loud as a jet engine, stem from the workings of the powerful magnets at the heart of the machines' ability to

produce sharply defined internal images of the body or body parts. With battery-operated headphones that cancel internal airplane noise or other loud noises now available, muffling the noise a patient hears when inserted into the cylinder-like MRI machines might seem a small challenge. But the problem is that no electronics are permitted within the MRI chamber because the electronics can distort or disrupt the images scanned by the machines'



magnets. So the difficulty for the UF students was figuring out how to reduce noise without the use of any wires, switches or other electronics with the patient in the chamber.

Find out more at [www.eng.ufl.edu](http://www.eng.ufl.edu).

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## Bionic Eye by 2020?

A working bionic eye could be an Australian world first by 2020, leading researchers at the University of New South Wales say. The bionic eye was identified as a key health goal for Australia at a recent "2020 Summit" and Professor Nigel Lovell, from the UNSW Australian Vision Prosthesis Group

(AVPG), said a functional device can be a reality within 12 years with a concerted national effort. Over the past 10 years, AVPG researchers have developed a "vision prosthesis", or bionic eye, capable of detecting not only light and dark but also patterns. Associate Professor Gregg Suaning, also with the AVPG, said the

current device consists of an external micro-camera and microprocessor which is mounted on glasses and transmits a signal to an implanted electronic circuit and electrode, connected to the retina at the back of the eye. More details can be found at <http://bionic.gsbme.unsw.edu.au>.



Image Source:  
The University of New South Wales



## Insulators and Conductors

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

The “Insulators and Conductors” lesson encourages students to test different classroom materials to determine if they are conductors or insulators of electricity. Students work in teams to test their predictions about each material, then groups compare results and discuss findings.

Through the lesson, students will learn about the electrical properties

of different materials. They will also find out how conductors and insulators react to electric current. Students also will solve simple algebraic manipulations involving squares and square roots. They’ll learn to make predictions and draw conclusions, and of course see first-hand how valuable teamwork can be.

Tested materials can include many easy to find, low cost materials such as metal paper clips, paper, erasers, aluminum

foil, metal pens, rubber bands, pencils, coins, hairclips, or keys.

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 8-11, and provides step-by-step instructions for both educators and teachers.

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



## BlueCrystal Research Computer

A new £7 million supercomputer facility known as ‘BlueCrystal’ that will revolutionize research in areas such as climate change, drug design and aerospace engineering is now open at the University of Bristol in the United Kingdom. BlueCrystal is one of the fastest and largest computers of its kind in the UK, able to carry out more than 37 trillion calculations a second. The state-of-the-art system enables researchers from a wide range of disciplines to

undertake research requiring either very large amounts of data to be processed or lengthy computations to be carried out.

Major users include climatologists who are developing models to predict climate change. These models require huge amounts of computing power and disk space, with a typical simulation taking three months to run and generating 10,000 gigabytes of model output. Computational modeling

also plays a critical part in drug design. Researchers are searching for anti-cancer drugs that will prevent secondary tumors developing from breast cancer. By using computer simulation to screen for suitable compounds, rather than undertaking exhaustive screening processes in the laboratory, the most promising compounds can be identified more quickly and become the focus of further research.

Find out more at [www.acrc.bris.ac.uk](http://www.acrc.bris.ac.uk).



Supercomputer, BlueCrystal  
Photo by Ian Stewart  
Image Source: University of Bristol



## Melting Defects Lead to Better Microchips

As microchips shrink, even tiny defects in the lines, dots and other shapes etched on them become major barriers to performance. Princeton University engineers have now found a way to literally melt away such defects, using a process that could dramatically improve chip quality without increasing fabrication cost.

Microchips work best when the structures fabricated on them are straight, thin and tall. Rough edges and other defects can degrade or even ruin chip performance in most applications. In integrated

circuits, for instance, such flaws could cause current to leak and voltage to fluctuate. In optic devices, they could interfere with the transmission of light. In biological devices, they could impede the flow of DNA and other biomaterials. To deal with this problem, researchers try to improve the process used to make the microchips. A technique recently invented in the lab of Princeton engineer Stephen Chou allows for the easy correction of defects and refinement of shapes in nanostructures. The "Open" method involves using a laser to briefly melt defects,

which self correct before cooling. The "Capped" method prevents the technique from rounding off the structures. The "Guided" version causes the structures to grow toward a nearby plate, causing them to become not only smoother, but taller and thinner, which are all desirable traits for creating smaller, more powerful computer chips. However, Chou said such an approach works only to a point; eventually chip makers will run up against fundamental physical limits of current manufacturing techniques. Find out more at [www.princeton.edu](http://www.princeton.edu).



## Design a Mars Parachute

Most people are familiar with what a parachute is -- a soft fabric device used to slow the motion of an object through an atmosphere by creating drag. But, why not try designing your own!

You'll have to consider many factors in your newly engineered parachute. For example, how heavy is the object that must be lowered safely? Is it fragile? What

temperature is the air in which it will travel? What materials do you have available?

To help you give it a try, TryEngineering.org provides a link to a NOVA interactive internet game that lets you design the ideal parachute for the Mars Exploration Rover Mission. You'll test volume, drag, strength, and the stability of the

design using a simulated wind tunnel. And, your parachute must be able to fit in a small canister. But don't worry, you'll be able to redesign your parachute and fine-tune all your decisions until it operates as needed!

For the links to the Parachute Design game and other interactive engineering activities, click on "Play Games!" at [www.tryengineering.org](http://www.tryengineering.org).





## Advanced Radio Frequency ID Tags

PolyIC, BASF, Evonik Industries, Elantas Beck, and Siemens have announced the launch of a new German Federal Ministry of Education and Research-sponsored alliance project called MaDriX to advance the development of high-performance printable Radio Frequency Identification (RFID) tags.

The current generation of RFID tags contain silicon chips and are mainly used for high-priced products because of the complex manufacturing processes involved. Printed electronic technology will reduce the cost of RFID tag production thanks to the development

of new materials such as electrically conductive and semiconducting plastics that can be employed in high throughput printing processes. This will make printed radio frequency identification tags suitable for use in cheaper consumer goods so that they may even come to replace printed barcodes. Goods labeled with RFID tags can be identified by radiowaves and are used in applications from logistics through to supermarket checkouts. They also make products harder to fake. The gradual launch of printed RFID tags within the next 10 years is a realistic prospect.

PolyIC engages with issues of component characterization, process development and setting up demonstrators. BASF, Evonik Industries, and Elantas Beck will supply new materials to produce semiconductors and insulators for use in electronic circuits. Siemens is developing new real-time visual print inspection processes for quality control in the printing process. A number of universities and research institutes are also involved in the MaDriX project.

More details are at [www.polyic.com](http://www.polyic.com).



Model of a polymer flexible RFID tag.  
(Image Credit: PolyIC press picture)



## TryEngineering Today!

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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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