TryEngineering Today!

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

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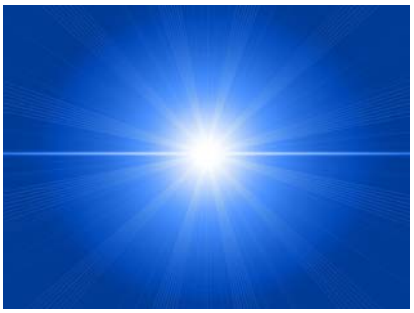
New Solar Plants in Spain & Korea

SunPower Corporation, a manufacturer of high-efficiency solar cells, solar panels and solar systems, has announced the completion of two solar-electric power plants in Spain, totaling 8.7 megawatts. The two plants, located in Llerena and Lebrija, were developed by Solarpack, a Spanish company specializing in renewable energy development, investment, consulting and services.

For these projects, SunPower used its proprietary "SunPower Tracker" technology, which follows the sun during the day, and delivers significantly more energy than traditional fixed-tilt systems.



Sunpower also recently produced a full-scale, five inch prototype solar cell with an efficiency of 23.4 percent. This is a world-record for a large area solar cell.

The company also recently completed design and construction of a new 1.4-megawatt solar electric power plant project in Hampyeong, South Korea. SunPower worked with Korean energy company EnE System to complete the plant, which is owned by Hampyeong Solar Plus, and will generate 1.8 million kilowatt-hours per year.
Find out more at www.sunpowercorp.com.

The Exoskeleton

Raytheon Company's research facility in Salt Lake City, Utah, USA, is developing a robotic suit for the soldier of tomorrow. Known as the Exoskeleton, it's essentially a wearable robot that amplifies its wearer's strength, endurance, and agility. Built from a combination of sensors, actuators and controllers, the futuristic suit enables a user to easily carry a man on his back or lift 200 pounds several hundred times without tiring. Yet the suit is also agile enough to let its wearer kick a soccer ball, punch a speed bag, and climb stairs with ease. "As far as software engineering goes, this job is about as good as it gets. We get to write programs and we see them working on actual robots; that's very exciting," says test engineer Rex Jameson. Development of the Exoskeleton has been underway since 2000, when Raytheon realized that if humans could work alongside robots, they should also be able to work inside robots. More details are at www.raytheon.com.

Software engineer Rex Jameson suits up to test the Exoskeletan.
Image Source: Raytheon Company

Inside this issue:

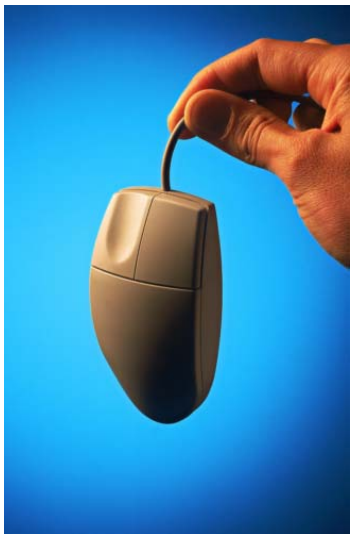
Mouse Mysteries

Each month, TryEngineering Today profiles one of the many lesson plans available on TryEngineering.org. Each lesson plan is aligned with education standards to allow teachers and students to apply engineering principles in the classroom.

EEEEK A Mouse! is a lesson that focuses on computer and mechanical engineering and explores how computer mice operate and how engineering provided an interface between man and machine. Students learn about how the engineering behind the original mouse, and see how ongoing design enhancements have impacted everyday life. Topics examined include problem solving, teamwork, and the engineering design process. Students work in teams to disassemble a mouse, evaluate the design and operation of its component parts. Students recommend changes to improve functionality through redesign and/or material selection, build a model showing the enhanced mechanics or design, and present to their class.

The lesson can be adapted for ages 8 - 18, and includes both teacher and student handouts and worksheets.

As a result of this activity, students should develop an understanding of the computer - human interface, the impact of engineering and technology on society, how engineering problem solving works, and the importance of teamwork in the engineering workplace. Explore this and other lessons at www.tryengineering.org/lesson.php.



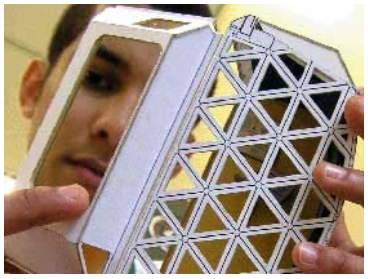
NASA's Habitability Design Center

The Habitability Design Center (HDC) is NASA's conceptual, human-centered design studio.

The HDC creates opportunities for design to solve the unique challenges of living and working in extreme environments, by providing advanced concepts to the NASA community using Human Factors as a design tool to develop products, systems, and architecture. By focusing on the needs of humans, the HDC creates and aids in product development that enhances crew productivity and well-being. This resource of imaginative design aims to inspire the next generation of human exploration of the Moon, Mars and beyond.

The HDC assures successful human habitation and performance in space through the development of early and iterative conceptual designs, models and mockups of habitation systems, hardware and architectural concepts. Evaluations then investigate crew interface designs and operating concepts to predict human and machine performance in space, and generate design requirements and concepts, which are refined by Engineering to produce flight hardware.

Find out more at http://hefd.jsc.nasa.gov/hdc.htm.



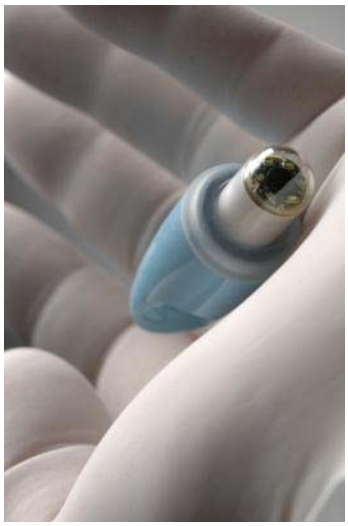
Scale model of the International Space Station crew quarters.
Image Credit: NASA

Magnet-controlled Camera in the Body

Images of the inside of the intestine can be obtained today as patients swallow a camera that is no larger than a candy. It makes its way through the intestine and transmits images of the intestinal villi to an external receiver which the patient carries on a belt. However, today's camera system is not very suitable for examinations of the esophagus and the stomach. The reason is that camera only takes about three or four seconds to make its way through the esophagus – producing two to four images per second – and once it reaches the stomach, its roughly five-gram weight causes it to drop very quickly to the lower wall of the stomach. In other words, it is too fast to deliver usable images.
In collaboration with engineers from the manufacturer Given Imaging, the Israelite Hospital in Hamburg and the Royal Imperial College in London, researchers from the Fraunhofer Institute for Biomedical Engineering in Sankt Ingbert have developed the first-ever control system for the camera pill.

The engineers developed a magnetic device roughly the size of a bar of chocolate which allows doctors to control the position of the camera within the body during an examination. Doctors will be able to stop the camera in the esophagus, move it up and down and turn it, and thus adjust the angle of the camera as required. The steerable camera pill is constructed in much the same way as its predecessor: It consists of a camera, a transmitter that sends the images to the receiver, a battery and several cold-light diodes which briefly flare up like a flashlight every time a picture is taken.

Find out more at www.fraunhofer.de.



The camera pill is not larger than a candy. It can be swallowed by the patient. The doctor steers it through esophagus and stomach by a magnetic device.
Credit: Fraunhofer

Play the MRI Game

Magnetic resonance imaging, MRI, represents a breakthrough in medical diagnostics and research. Worldwide, more than 60 million investigations with MRI are performed each year. In 2003, this imaging technique was awarded the Nobel Prize in Physiology or Medicine. But, do you know how a MRI machine operates? It uses electromagnetic radiation to obtain images of soft tissues in a body, such as the brain or the spinal cord. It works well in some situations, but not in others. For example, if a person has some metal implants or a cardiac pacemaker, they cannot use an MRI because of the powerful magnetic field and radio waves.

To help provide a first hand experience with MRI applications, TryEngineering.org provides a link to an interactive internet game that lets visitors use a virtual MRI to diagnose a variety of illnesses and physical problems. Through the game you can help determine which patient should have an MRI and what the results show. For the links to the MRI: The Magnetic Miracle game, click on "Play Games!" at www.tryengineering.org.

NeuroArm Performs Brain Surgery

Canada's MacDonald, Dettwiler and Associates Ltd. (MDA) has announced that "neuroArm," a medical robotic system has successfully performed ground-breaking robotic neurosurgery at the Calgary Foothills Hospital.

Dr. Garnette Sutherland, professor of neurosurgery at the University of Calgary's Faculty of Medicine and a Calgary Health Region neurosurgeon, skillfully operated neuroArm during an intricate 8-hour procedure to remove a brain tumour from a 21 year old patient.

"The manipulators and controls performed flawlessly, providing extraordinary control and extreme accuracy," said Dr. Sutherland. "The success of this procedure is expected to revolutionize neurosurgery," he added.

The neuroArm is the first of its kind image-guided robot providing unprecedented levels of dexterity and high positional accuracy. The system combines a highly accurate MRI compatible manipulator system, image guidance, end effectors that incorporate modified neurosurgical tools, touch sensors and hand controllers that provide remote presence and control to the surgeon. Initially designed for brain surgery applications, technology can be applied to other surgical applications.

Find out more at www.mdacorporation.com.

Dr. Garnette Sutherland performing the groundbreaking neurosurgery at the Foothills Medical Centre.
Photo by Calvin Sun;
Image Provided by University of Calgary - Faculty of Medicine

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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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