

# **ENERGY Education** newsletter

January/February 2008



## **Guiding Students Toward a Career in Engineering**

**National Engineers Week, February 17-23, 2008**

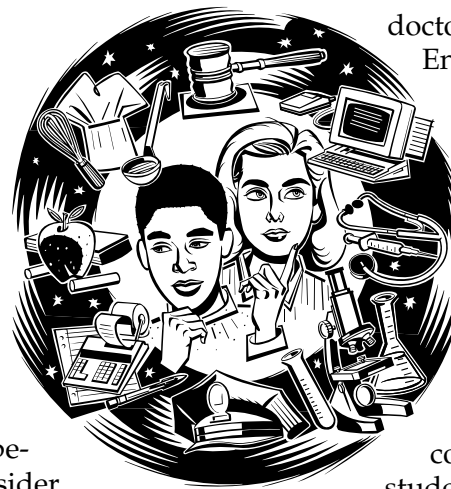
One million people in the United States work as engineers. What are they doing? Some engineers say that their work consists of recognizing problems and devising new ways to solve them. Others say, "Engineers work to make the world a better, safer, cleaner place." They point out that engineering may not be an end in itself, as is pure science. Instead, engineering is a means to an end. Engineering puts science to work. The goal of National Engineers Week, February 17-23, is to encourage students to consider preparing themselves for one of the many rewarding career paths that fall under the umbrella term "engineering."

Engineering is also a field with excellent employment prospects at high rates of pay. The University of Akron's website, [www.uakron.edu](http://www.uakron.edu), points out that the U.S. Department of Labor estimates that there is "a shortage of about 500,000 engineers in the U.S. job market. Consequently, starting salaries for engineers are excellent." In recent years, engineers graduating from The University of Akron have earned starting salaries of approximately \$50,000, plus paid moving expenses.

### **Developing Student Interest in Engineering**

Several websites promoting engineering careers are geared toward the interests and attitudes of high school students. The goal is to get away from the traditional image of engineering as "very difficult," "very stressful," and "requiring really, really hard math courses." No wonder that in the past, so many students – and especially girls – have refused to consider even trying to become an engineer!

Sites such as [www.engineergirl.org](http://www.engineergirl.org) present the stories of real engineers who are solving fascinating problems. One works with physicians caring for premature infants. The infrared camera they are developing together will identify places where human tissue is hotter than normal. These are the sites that are painful – vital information when caring for a baby too small to tell the



doctor where it hurts. EngineerGirl is sponsored by the National Academy of Engineering. JETS, the Junior Engineering Technical Society, offers a wide range of programs and contests for all students thinking about

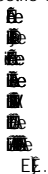
a career in engineering or technology. This organization is sponsored by corporations and the U.S. Army Research Office, and is affiliated with many universities and engineering societies. Students can sign up online at [www.jets.org](http://www.jets.org) for the e-newsletter, Pre-Engineering Times. The Explore online area allows students to read "extreme engineer profiles" and feature

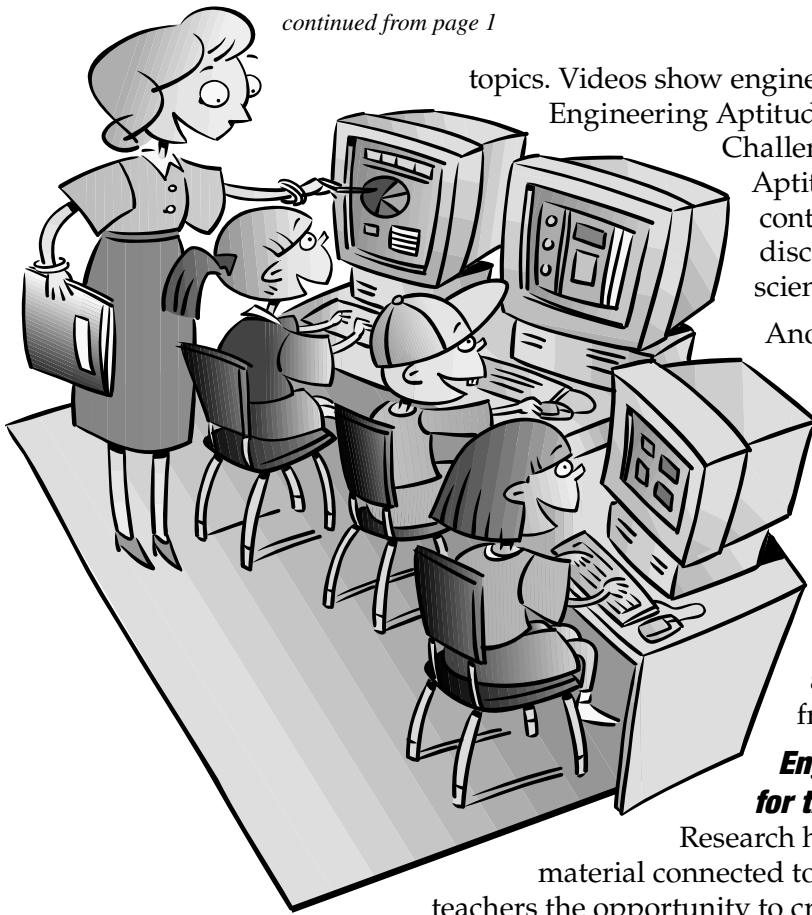
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topics. Videos show engineers in action. JETS sponsors the National Engineering Aptitude Search, the National Engineering Design Challenge, and TEAMS (Tests of Engineering Aptitude, Mathematics and Science). These contests present students with opportunities to discover engineering and its applications of science, technology and mathematics.

Another site aimed at high school girls is [www.engineeryourlife.org](http://www.engineeryourlife.org). The focus of this site is, "Find your dream job." Featured are engineers in a wide range of areas, with examples of the problems these women are engaged in solving. Another area of the site helps students understand what it's like to be an engineering student. Parents receive guidance here in finding scholarships and financial aid. Both parents and students may benefit from the section on preparing for college.

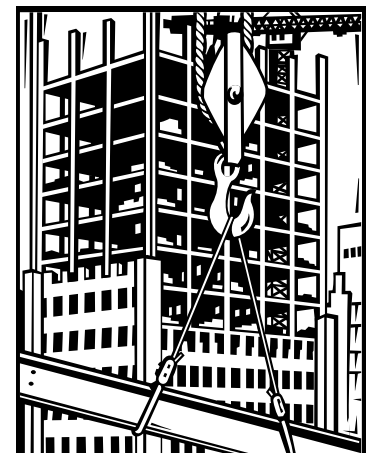
### **Engineering Activities for the K-12 Classroom**

Research has shown that students prefer to learn material connected to the real world. Engineering activities give teachers the opportunity to create group projects that enable students to have hands-on experience putting their abstract learning to work.

At [www.teachengineering.org](http://www.teachengineering.org) teachers will find curriculum ideas designed to help each student become a technological thinker and leader. The activities help connect science and math concepts to the everyday engineering that surrounds us. This collection uses engineering as a vehicle to integrate math and science fundamentals through open-ended, hands-on discovery. All lesson plans are based upon age-appropriate national and state science, technology, mathematics and engineering educational standards.

The American Society for Engineering Education, [www.asee.org](http://www.asee.org), has created a site, [www.engineeringk12.org](http://www.engineeringk12.org), that offers abundant resources for educators, as well as curricula requiring no knowledge of engineering on the part of the teacher. A project designed for grades 2-6 teaches children how to build an air-powered car. For older students, Amazing Skyscrapers addresses the basic engineering used to build the world's tallest buildings. A link to the American Society of Civil Engineers site, [www.asce.org/public/handson.cfm](http://www.asce.org/public/handson.cfm), leads to an activity in which students see which team can build the strongest bridge out of one sheet of copier paper and five paper clips.

No, engineering is not just "stress and really hard math." Engineering is a great way to learn, and a great career path. As a nation, we have 500,000 engineering positions to fill. How many of your students will be accepting these opportunities?



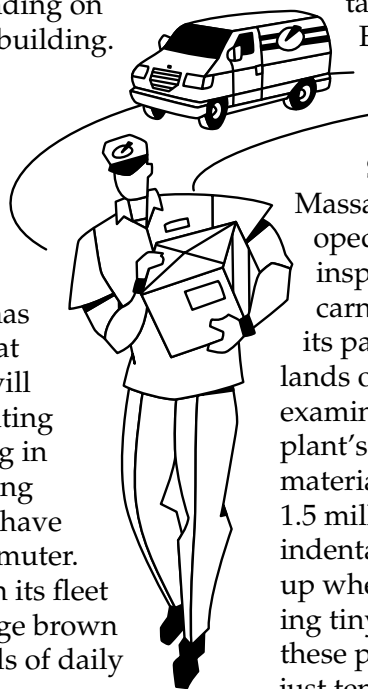
## Termite Architecture

In Harare, Zimbabwe, a new office and shopping complex remains comfortable year round without regular air-conditioning or heating and consumes far less energy than comparable structures. The building uses a ventilation system modeled on the region's termite mounds. Zimbabwe's termites build huge mounds, inside which they grow a fungus for food. The fungus must be kept at exactly 87 degrees Fahrenheit, while the outside temperature ranges between 35 and 104 degrees. To achieve the constant temperature, the termites open and close a series of heating and cooling vents. Harare's Eastgate Centre has a ventilation system that works in a similar way, drawing in warm or cool air depending on the temperature of the building. [www.inhabitat.com](http://www.inhabitat.com), December 10, 2007

## The Right Way to Save Gas

Computer analysis of the routes their trucks take every day has led UPS to conclude that eliminating left turns will save time and fuel. Waiting with the engine running in the left lane for oncoming traffic to clear may not have much impact on a commuter. For UPS, however, with its fleet of more than 95,000 large brown trucks and its thousands of daily deliveries, this small improvement in efficiency can have a significant impact on the bottom line and on the environment. Last year the company's computer analysis helped reduce delivery routes by 28.5 million miles, saving roughly three million gallons of gas and reducing emissions of CO<sub>2</sub> by 31,000 metric tons.

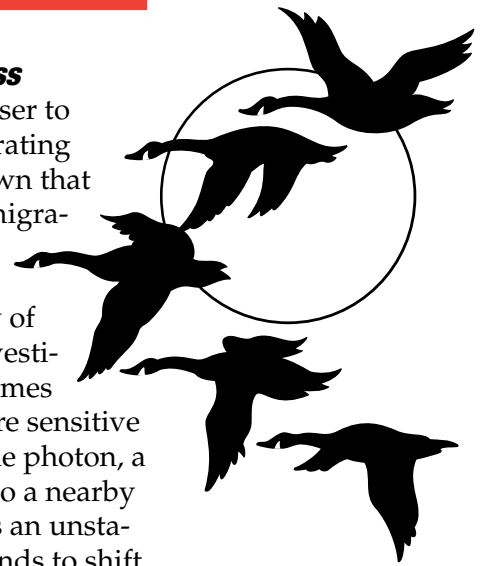
*The New York Times*, December 9, 2007



## Migrating Birds' Inner Compass

Biologists have come a step closer to solving the puzzle of how migrating birds navigate. It has been shown that birds can align themselves to migration routes in blue light, but not in yellow or red. A team of researchers at the University of Oldenburg in Germany has investigated proteins called cryptochromes that are found in the eye and are sensitive to blue light. When hit by a blue photon, a cryptochrome loses an electron to a nearby flavin molecule, where it forms an unstable radical pair. The electron tends to shift back, but the rate of the shift is affected by any surrounding magnetic field. By panning its head – something birds do before taking flight – the bird can detect Earth's magnetic field.

*The Economist*, November 3, 2007




## Learning from Plants


Scientists from the University of Massachusetts, Amherst, have developed a new material that draws its inspiration from the Venus flytrap. A carnivorous plant, the flytrap snaps its paired leaves shut to trap a fly that lands on the leaf's surface. Researchers examined the mechanism behind the plant's rapid reaction and created a new material formed from two layers each 1.5 millimeters thick. Each layer contains indentations, like minute craters, that line up when the layers are attached, forming tiny pockets. In response to pressure, these pockets flip inside out and back in just tens of milliseconds. "There are very, very large changes in geometry with a very, very small amount of pressure," says Alfred Crosby, one of the researchers. "So it's extremely sensitive." Crosby's team hopes to use this material in food packaging that can sense when food is spoiling and in devices that could transport medicines throughout the body.

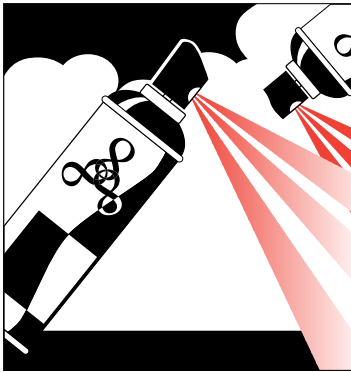
*Science News for Kids*, December 5, 2007


Visit our website at [www.firstenergycorp.com/education](http://www.firstenergycorp.com/education)


## Educational Resources Available


 For resources on **polymer science**, visit [www.agpa.uakron.edu](http://www.agpa.uakron.edu), the website of the University of Akron's College of Polymer Science and Polymer Engineering. Online resources include lesson plans, video lessons, demonstrations and a multimedia introduction to polymers.


 Adopt-An-Author, a nationwide non-profit program, aims to **get middle and high school students excited about reading**. Register at [www.adoptanauthor.com](http://www.adoptanauthor.com) and receive free support materials, a free poster and the opportunity for students to interact with authors.




 The Consumer Aerosol Products Council offers a **free classroom kit** that includes a teacher's guide, classroom activities, student materials and experiments and a video about the atmosphere. Visit [www.nocfcs.org/teachers/classroomaerosoladventure.htm](http://www.nocfcs.org/teachers/classroomaerosoladventure.htm).


 To download a **coloring book about famous physicists** from the American Physical Society, go to [www.physicscentral.com/coloringbook/coloringbook.pdf](http://www.physicscentral.com/coloringbook/coloringbook.pdf).


 For **free posters on optics and photonics**, visit [spie.org/x2579.xml](http://spie.org/x2579.xml), a page on the website of SPIE, an international society advancing an interdisciplinary approach to the science and application of light.

 The Autodesk company provides **free resources for students and teachers** on architecture, mechanical and civil engineering, industrial design, and animation and games. Visit [www.autodesk.com/school](http://www.autodesk.com/school).

 To order a **free copy of NASA's Earth/Mars Comparison poster**, go to <http://mars.jpl.nasa.gov/classroom/earthMarsForm.html>.

 To watch a four-minute movie by the Futures Channel about **how maglev trains work**, go to [www.thefutureschannel.com/dockets/science\\_technology/maglev\\_trains/](http://www.thefutureschannel.com/dockets/science_technology/maglev_trains/).

 The Wyland Clean Ocean Challenge from the Birch Aquarium brings together art and science to **teach students about the ocean**. For information and to download curriculum, visit [www.wylandoceanchallenge.org](http://www.wylandoceanchallenge.org).

 The Astronomical Society of the Pacific offers a **free online newsletter for teachers** about astronomy and the universe at [www.astrosociety.org/education/publications/tnl/tnl.html](http://www.astrosociety.org/education/publications/tnl/tnl.html).



*The greatest mistake you can make in life is to be continually fearing you will make one.*

- Elbert Hubbard