

Special Report: *Electronics disappearing? Find out why.*

HEADLINE DISCOVERIES

Jan/Feb 2013; Issue 1

Prefrontal Cortex
is also
greatly expanded.

Left side that
facilitates sensory
inputs are much
larger than normal.

NAO ROBOT

STAR TREK-STYLE FUSION ENGINES

OBESITY VIRUS

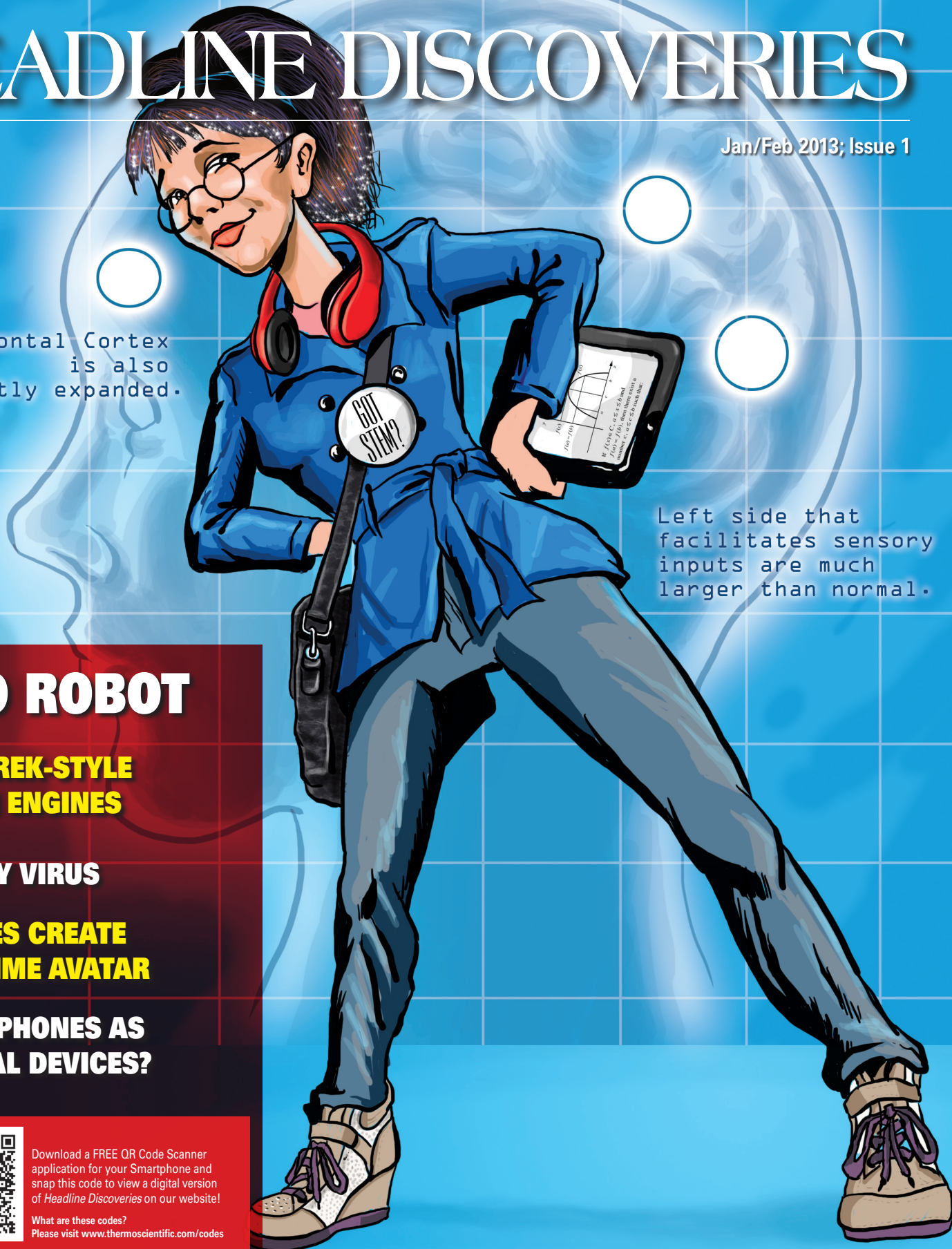
GLASSES CREATE REAL-TIME AVATAR

SMARTPHONES AS MEDICAL DEVICES?



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CAREER SPOTLIGHT: COMPUTER ENGINEER

By Gwen Myslinski

Do you ever wonder how your computer, Smartphone and other digital “toys” got to be so “smart?” They aren’t really smart; they were built with advanced technology by computer engineers.

EDUCATION AND TRAINING

Computer engineers combine principles and techniques of engineering and computer science. However, it is more than a blend of the two fields; computer engineers understand cyber security, networking, design automation, machine intelligence, computer software, embedded systems, etc.

HARDWARE VS. SOFTWARE

There are two major specialties in computer engineering: hardware and software. Computer hardware engineers generally research, design, develop and test computer equipment, while computer software engineers generally design, construct and maintain computer programs.

Computer engineers require a basic understanding of both disciplines, but often times specialize in one or the other. Generally hardware is applied to items like computer chips, circuit boards, computers, telephones, modems, printers – anything that can be physically held. Software is designed to operate

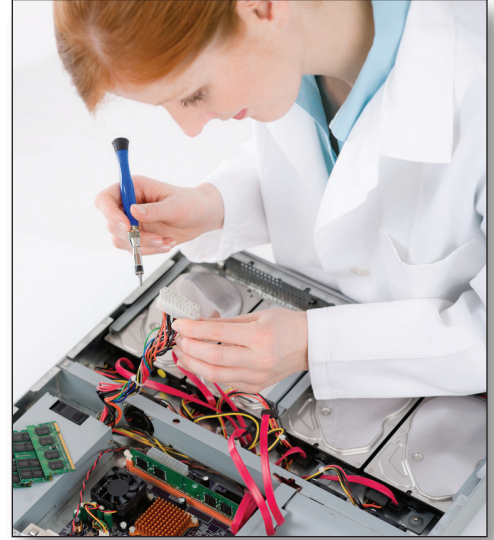
the hardware. Once it’s designed, it needs to be constructed, tested and maintained then applied to the hardware it was designed for.

JOB OUTLOOK

Computer engineers can expect to earn some of the highest starting salaries in engineering. For example, an entry level computer engineer’s starting salary is estimated at \$65,000 according to www.naceweb.org. Graduates can work in fields that include: wireless communication, computer manufacturers, chemical companies, defense contractors, automobile control systems, telecommunications, consulting, transportation, games and toys, manufacturing, consumer goods, robotics, etc.

The number of computer software engineers is expected to rise rapidly, while hardware engineers will increase, but not nearly as fast because, according to the Bureau of Labor and Statistics, “more innovation in computers now takes place with software than with hardware.”

Learn more about our career spotlight at www.fisheredu.com/STEM.



CLASSROOM DISCUSSION

- Besides the hardware components mentioned above, what other critical items might you find in a standard household machine?
- A bit holds one piece of information. What about a byte? Kilobyte? Megabyte?

STEVE JOBS: TECHNOLOGICAL VISIONARY (1955-2011)

By Patricia Rogler



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Can you imagine living in a world without iPhones, iPods, iTunes or iPads? That would be the world we live in if Steve Jobs, the person responsible for creating all of these devices, had never existed. He changed the computer, music, film and wireless communications industries forever and, in doing so, changed the world we live in today.

EARLY LIFE

Steve Jobs was born on February 24, 1955, and was given up for adoption at birth. He was an extremely intelligent child who had trouble with formal teaching but, nonetheless, excelled when tested, so much so that his school administrators wanted him to skip two grades. His father, a mechanic and carpenter, taught his son rudimentary electronics by taking apart and rebuilding radios and televisions with him in the family garage. After high school, Jobs enrolled in Reed College but dropped out after six months, choosing instead to take creative courses for the next 18 months. He eventually took a job with Atari, but in 1976, he started

his own company with Steve Wozniak, a computer whiz whom he met through a mutual friend while in high school.

APPLE AND BEYOND

At age 21, Jobs, along with Wozniak, formed Apple Computer Company selling computers out of his parents’ garage. They marketed the world’s first successful personal computer. By the age of 25, Jobs was a multimillionaire, and by the age of 30, he was ousted from Apple. He went on to create his own computer company, NeXT Inc., and purchase the computer graphics division of Lucasfilm, which he turned into Pixar Animation Studios. Pixar created such animated classics as *Toy Story*, *Finding Nemo* and *Monsters, Inc.* In 1996, Apple bought NeXT Inc. and brought Jobs back as CEO. In about a year’s time, he brought Apple from near bankruptcy to profitability. During his tenure as CEO, he oversaw the development of the iMac, iPod, iTunes, iPhone and the iPad as well the Apple Retail Stores, the iTunes store and the Apps Store. In 2011, Apple became one of the world’s most valuable publicly traded companies.

On October 5, 2011, Apple announced that Steve Jobs had passed way at the age of 56. President Obama said in a written statement, “Steve was among the greatest of American innovators – brave enough to think differently, bold enough to believe he could change the world, and talented enough to do it.”

CLASSROOM DISCUSSION

- Which of Steve Jobs’ inventions (Mac computer, iPhone, iTunes, iPad, iPod or Pixar) is your favorite and why?
- In what ways would the world we live in be different without Steve Jobs’ inventions?

TECHNOLOGY IN EDUCATION

By Gwen Myslinski

Technology has changed the landscape of everything: the way we think, act, work and play. Technology has also affected the teaching profession and the environment within the classroom, thus changing how students learn.

POSITIVE EFFECTS

Collaboration

Team-building is a life-long skill that will benefit students their entire lives. Collaboration increases productivity and it increases peer-to-peer interaction. There are several document sharing sites, like Google™ Docs (now called Google Drive or Dropbox™), which simplifies the idea of team projects. Technology allows collaboration with students from different schools in different states or countries. Projects can now be a global collaboration.

Instant research and knowledge

There is a plethora of information available with the click of a mouse. Students have access to a large amount of information, much faster than ever before.

NEGATIVE EFFECTS

Cheating

With the use of technology and the internet, it is easier than ever to find ways to plagiarize or share homework or tests online. Vigilance does curb the problem, but no one has devised a fool-proof solution to the digital cheating problem.

Lack of focus

Students along with many other people, are easily distracted with cell phones, tablets or some form of technology. According to Buzzle.com, these distractions have "eroded the sense of mental focus, pace and concentration ability from students' life." They went on to state, "teenagers are easily influenced by any new gadget and technology being introduced in the market and this has also made them splurge unnecessarily."

SIDE NOTE

At the start of the 21st century half of U.S. school classrooms had Internet access. Today approximately 98 percent of classrooms have access, according to haysfreepress.com.



CLASSROOM DISCUSSION

- What are some other benefits of technology in the classroom?
- What are some drawbacks of technology in the classroom?

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SMART DEVICE TECHNOLOGY — BREAKING MEDICAL BOUNDARIES

By April Bailey



When most people think about using their phone or tablet, they immediately think of downloading apps designed for gaming, productivity or social purposes. However, in the field of medicine, by combining smart devices with apps, a revolution in the design and use of

medical products that monitor patient conditions is becoming easier. So is the reporting of the resulting data. Often referred to as "eHealth" or "mHealth," this app-based blend of monitoring and reporting attempts to keep the process convenient to the patient while being well-managed by the medical professional.

LESS PAIN AT THE PATIENT LEVEL

One product example is an interesting up-and-coming device for diabetic patients. First, consider that diabetics have to check their sugar levels daily using needles and glucose monitors. This involves multiple needle sticks to obtain blood samples – something that becomes quite painful.

Unlike the traditional method, researchers at the Massachusetts Institute of Technology (MIT) are working on a new way to check and monitor glucose via a "tattoo." With this technology, the patient receives an implant of a special tattoo

ink with fluorescing nanoparticles that reflect infrared light back through the skin. Then, a specially-designed scanner "reads" their implant, at which time data is fed back to an app on a smartphone or tablet. The app then generates a report for the patient and their medical provider.

MEDICAL PROFESSIONALS DISCOVER MOBILITY

Medical professionals are finding more and more uses for eHealth products. Another remarkable option is the mobile ultrasound. Typically the term "mobile ultrasound" refers to a small unit on a wheeled cart. Soon, this term will represent something entirely different. For example, by using smartphone technology (with the internal functionality of satellite signaling) plus a custom app built to actually perform ultrasounds, the MobiUS™ SP1 app created by Mobisante allows the full breadth of functionality of a traditional ultrasound machine in a pocket-sized device that can be carried and used anywhere in the world.

APPS BREAK BOUNDARIES

Blending these technologies is especially advantageous to developing countries. It allows medical professionals who visit remote or underdeveloped areas to bring medical devices with them that they once couldn't – all in an effort to provide better health care on a global basis.

CLASSROOM DISCUSSION

- Name three apps that can be used to help doctors manage patient health
- What benefit would a patient have from using an eHealth app on a smart device?



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SAME VIRUS: MORE FAT, LESS BLOOD SUGAR

By Valinda Huckabay

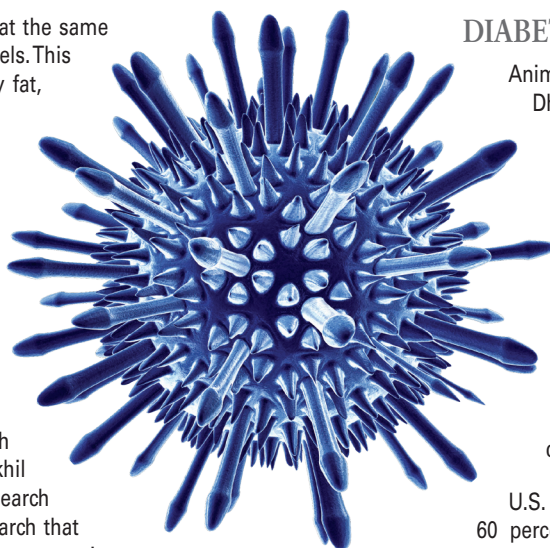
There is a virus that causes fat cell growth while at the same time keeping blood sugar and insulin at healthy levels. This means that, although you would carry more body fat, you would be less likely to become diabetic.

INFECTOBIOSITY

Adenoviruses cause acute upper respiratory tract and other mild infections. Adenovirus 36 (also known as AD-36A) is one of 52 adenoviruses known to infect humans. It was first isolated in 1978, and has long been recognized as a cause of respiratory and eye infections.

The term "infectoobesity" refers to weight gain that is caused by some kind of infectious origin, such as a virus. The term was coined in 2001 by Dr. Nikhil V. Dhurandhar, at the Pennington Biomedical Research Center. There is an emerging field of medical research that is studying the relationship between pathogens (disease-causing organisms such as viruses) and weight gain. A positive correlation has been established between body fat and the presence of AD-36 antibodies in the blood.

Dr. Dhurandhar and his colleagues examined the effects of AD-36 on humans over a 10-year period. Individuals naturally infected with AD-36 acquired a higher body mass index and body fat percentage than those who were not infected, but surprisingly, their blood sugar and insulin levels were healthier.



DIABETES TREATMENT

Animal and cell studies offer an explanation, says Dhurandhar. Under normal circumstances, the number of fat cells stays constant in a human adult, regardless of the dietary choices the person makes. Even though AD-36 increases the number and size of fat cells (adipocytes), these additional "fat depots" store more fat coming from excessive calorie consumption. Because of the extra fat storage caused by the AD-36 virus, less fat ends up traveling to other areas like the liver, where it can have toxic effects. But the adipocytes also store more sugar, helping to keep blood sugar levels lower, which reduces the risk of contracting diabetes.

U.S. obesity and diabetes rates are projected to reach 60 percent and 30 percent of the American population, respectively, by 2030. Dhurandhar thinks AD-36 may ultimately lead to a safer and more effective drug therapy for diabetes. "Can we bypass the whole issue about your weight loss and can we still give you metabolic benefits?" asks Dhurandhar. "In theory, at least, it may be possible."

CLASSROOM DISCUSSION

- Would you rather be thin and have diabetes, or have more body fat and be free from diabetes?
- Do you think they will develop a vaccine for AD-36?

RARE EARTH ELEMENTS COMMON IN TODAY'S DIGITAL TECHNOLOGY

By Patti Dobranski



They may be called rare earth elements, but there is nothing uncommon about them.

The avalanche of new technology emerging over the past 20 years has placed these 17 abundant chemical elements before our eyes and at our fingertips as key components of televisions, cameras, computer monitors, electric car batteries and wind turbines.

Rare earth elements include 15 lanthanides, plus scandium and yttrium. All are metals and were discovered in the 18th and 19th centuries within rare minerals, which is why they were inaccurately labeled "rare earth elements."

MINING FOR RARE EARTHS

Rare earths are found in small concentrations at numerous locations around the world, but China has the lion's share. Consider the rare earth element lanthanum. It contradicts its "rare" classification by being more bountiful than silver or lead. When mining companies starting extracting lanthanum in the late 70's and early '80's, it was set aside because no one knew how it could be used. Today, it is at the forefront of breakthrough technology and is a main component of hybrid vehicle batteries. A key to the continued use of rare earth elements is to improve environmentally-friendly mining methods.

RARE EARTHS AND GREEN TECHNOLOGIES

Wind turbines – one of the fastest-growing sources of emissions-free electricity

according to a study by researchers at the Massachusetts Institute of Technology (MIT) – rely on magnets that use the rare earth element neodymium. Neodymium and dysprosium, although not the most widely used rare earth elements, are expected to cause a price hike due to a boost in demand for high-performance permanent magnets. In fact, the MIT study suggests that these popular elements may price themselves out of the market even though they are plentiful. To avoid this, scientists are exploring economical sources for maintaining access to these elements, such as recycling.



CLASSROOM DISCUSSION

- What two steps must be taken to use rare earth elements efficiently and economically?
- Can you think of other ways to possibly increase the availability of abundant rare earth elements?

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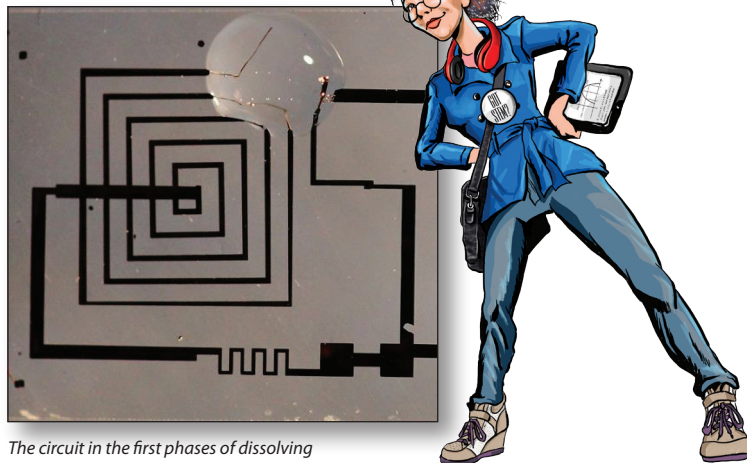
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TRANSIENT ELECTRONICS

By Gwen Myslinski

Fiorenzo Omenetto



The circuit in the first phases of dissolving

Biomedical engineers at Tufts University in collaboration with researchers from the University of Illinois at Urbana-Champaign have developed tiny, fully biocompatible electronics devices that have the ability to dissolve harmlessly into their surroundings after functioning for a precise amount of time.

TECHNOLOGY

Researchers published a paper detailing the creation of these new “transient electronics” in the journal, *Science*, showing how electronic devices can “fully resorb into the environment at a prescribed time — ranging from minutes to years, depending on the application,” states Fiorenzo Omenetto, a professor

of biomedical engineering at Tufts School of Engineering and a senior and corresponding author of the paper.

The circuits are made of silicon and magnesium, but are encapsulated in silk protein, which is one of the strongest and most robust materials. “The electronics are designed to be stable and fully-functioning during their lifetime, says Dr. John Rodgers, a professor of engineering at the University of Illinois at Urbana-Champaign.

Each device is only a few tens of nanometers thick and dissolves in a small amount of water or biofluids. There are several factors that go into the dissolution of the device, and yes, one of them is the thickness. Omenetto and his colleagues have discovered how to adjust the all of the properties accurately so the device dissolves at the appropriate time and in the correct intervals.

UNLIMITED POTENTIAL

These devices have unlimited potential, and the researchers haven’t begun to unlock all of the possibilities. Some of their uses will help the environment by keeping electronics from piling up in landfills, assist with medical implications by monitoring vital signs or delivering medications to patients.

CLASSROOM DISCUSSION

- Go into further detail on how transient electronics will be helpful with the list already described
- What are some other potential uses for transient electronics?



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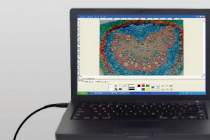
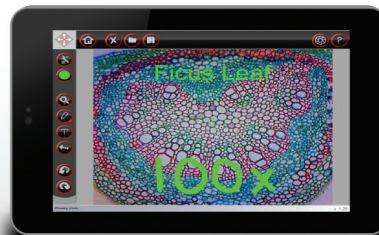
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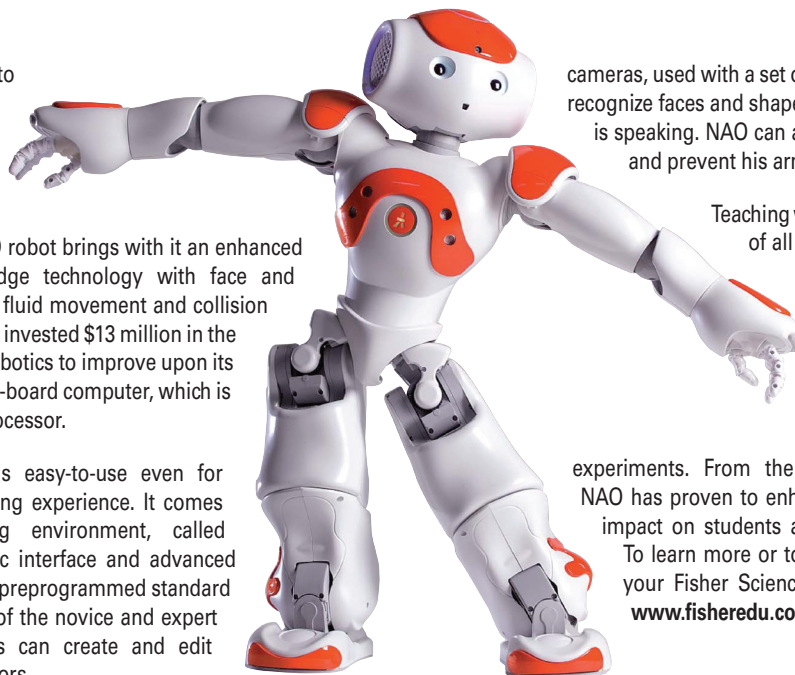
A NEW WAY TO TEACH AND LEARN, NAO

By Brianne McCurley

From computer programming to STEM education to reaching students with autism, the NAO Robot (pronounced "now") provides a new and innovative way to teach different types of students. The next generation NAO robot brings with it an enhanced open source platform, cutting-edge technology with face and speech recognition, and advanced fluid movement and collision avoidance capabilities. Intel Capital invested \$13 million in the Next Gen robot from Aldebaran-Robotics to improve upon its inner workings, including a new on-board computer, which is based on 1.6GHz Intel™ Atom™ processor.

The fully programmable robot is easy-to-use even for someone who has no programming experience. It comes equipped with a programming environment, called Choregraphe. The intuitive graphic interface and advanced programming functions as well as preprogrammed standard behavior library meets the needs of the novice and expert users. Using Choregraphe, users can create and edit movements and interactive behaviors.

Nuance™, the vocal recognition tool on the NAO Robot, is also used on the iPhone® 4s. NAO can recognize specific words within a sentence or conversation using new functionality called "word spotting." The NAO Robot can track, learn and recognize your face using two 920p cameras. These cameras, located on the head and near the mouth, can capture up to 30 images per second. The



cameras, used with a set of algorithms, allow the robot to detect and recognize faces and shapes. NAO can locate a ball or recognize who is speaking. NAO can also dance, maintain balance, resist falling and prevent his arms from colliding with the rest of his body.

Teaching with robots is an ideal tool to reach students of all levels and engage them in different ways.

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CLASSROOM DISCUSSION

- What types of experiments can be performed using the NAO Next Generation Robot?
- How can the NAO Robot be used to help teach children with special needs such as autism?

BUILD ME AN ENGINE, SCOTTY! WHO SAYS SCIENTISTS DON'T HAVE A SENSE OF HUMOR?

By Merry Morris

The University of Alabama's Aerophysics Research Center, NASA, Boeing and Oak Ridge National Laboratory have coined their latest project an "impulse drive" fueled by "dilithium crystals." In doing so they have stoked the imagination of many die-hard Star Trek fans who have been waiting for the advent of a real-life warp drive to go "where no one has gone before..."

HOLD TIGHT TO YOUR COFFEE CUP ON THIS TRIP!

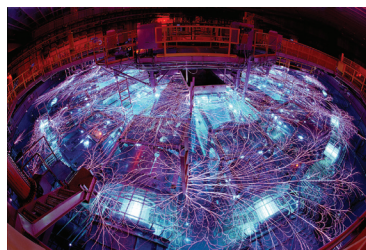
Actually, this is not the warp drive that Star Trek's Scotty kept in working order that these researchers are collaborating on; it's a Z-pinch fusion engine, which is quite remarkable in its own right. An impulse engine, this machine produces a series of powerful pulses and is capable of creating thrust along the lines of a Saturn V-class rocket. According to the collaborators, "Star Trek fans love it, especially when we call the concept an impulse drive, which is what it is. The fusion fuel we're focusing on is deuterium [a stable isotope of hydrogen] and Li6 [a stable isotope of the metal lithium] in a crystal structure. That's basically dilithium crystals we're using."

Z-PINCH FUSION ENERGY

Z-pinch systems have been an important part of fusion research for many years. In this application, the "impulse" engine produces ongoing pulses to propel the (do we dare say it?) spacecraft forward. The term "Z-pinch" is derived from the physics of the system. The "pinch" is created as high currents from a pulsed power source are quickly released through a large number of human-hair-sized wires. This pulsing power released through the minute wires causes creation of powerful magnetic fields that quickly compress to the point of implosion and create a plasma (a state of matter that is neither solid nor liquid nor gas). As

the magnetic field generates the implosion, it "pinches" down on the plasma, releasing tremendous force along the system's Z-axis. Hence, the "Z-pinch" name. In this application, the magnetic fields pinch down on a core of deuterium and lithium, putting into action the fusion of these atoms and unleashing an impressive burst of energy. In this example, the Z-pinch impulse drive might create velocities of 62,600 miles per hour.

Now these velocities don't match the multi-million miles per hour of the Enterprise, and the deuterium and lithium core are not really the same as "dilithium crystals," but they do seem close enough for a good laugh. So as we are chuckling away, may we all "live long and prosper"!



A Z-pinch on the Z Machine at Sandia National Labs.

CLASSROOM DISCUSSION

- Research the difference between fusion energy and fission energy. How are fission reactions generated? How are fusion reactions generated?
- Investigate travel to other planets. How long would a trip to Mars take using today's technology?

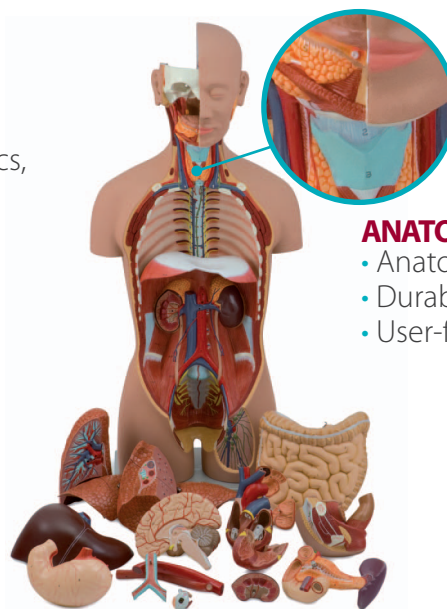
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MINI SATELLITE CIRCLES THE EARTH

By Joe Giacobello

As modern technology becomes more advanced, you've probably noticed that your telephone, computer and other electronic gadgets are gradually becoming smaller and smaller in size. This "shrinking" trend seems to be playing out in the area of space technology, too. On October 4, 2012, NASA launched a tiny cube-shaped satellite into space called "TechEdSat," which measures just 4" (10cm) in length. Equipped with a ham radio transmitter, it will circle in low Earth orbit for several weeks, sending valuable information to NASA engineers and student interns.

SIMPLE DESIGN

Built by San Jose State University students with support from staff at NASA's Ames Research Center, the satellite was put together using only commercial hardware and a highly simplified design. Its mission: to evaluate Space Plug and Play Avionics (SPA), and to perform a communications experiment using a satellite phone network. It will allow the San Jose engineering students to experience a spaceflight project from its inception through its final decommission.

COST EFFICIENT

Extremely inexpensive to build, the TechEdSat satellite cost less than \$30,000 — a far cry from the price tag of a standard satellite, which can range in the hundreds of millions of dollars. "It costs when you send mass to space," said NASA spokeswoman Ann Marie Trotta. "With nanotechnology, the smaller you make things, the cheaper and more efficient it is." A concerted effort among NASA, academia and industry, the TechEdSat mission sets a standard for future projects with small satellites known as CubeSats.

CUBESATS

By definition, a CubeSat is a miniaturized space research satellite that generally has a volume of exactly one liter (10cm cube), a mass of no more than 1.33kg, and typically uses commercial, off-the-shelf components. The first CubeSat was launched in June 2003 on a Russian Eurocket, and approximately 75 of them have been placed into orbit as of August 2012. With a simple infrastructure and small size, CubeSats provide an easy, cost effective means of getting a payload into orbit.

Most carry one or two scientific instruments as their primary mission payload. A fast-growing technology, CubeSats are small devices that can enhance space science and exploration in a very big way.



Credit: NASA

CLASSROOM DISCUSSION

- List five benefits/uses of satellites
- List five advantages that a miniature satellite offers over conventional ones



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VIRTUAL YOU, A NEW VIEW

By Phil DeSimone

When people hear the word avatar, they may likely think of a large, blue being native to the planet of Pandora. Although not exactly on topic, the movie Avatar in this case can be a respectable comparison. An avatar can commonly be defined as an electronic image that represents and is manipulated by a computer user. With innovations from NTT DOCOMO, you yourself can now be represented as an avatar through the electronic world.

NTT DOCOMO is operational out of Japan, and is one of the world's largest companies dealing with mobile communication. They have created very sophisticated glasses that map your facial features to create a real-time avatar. The cameras then translate your facial features through a software program resulting in a surprisingly accurate interpretation of the user displayed on a video screen. On the back of the glasses is also a camera that monitors the background to represent a true dimension of a virtual world.

This product follows the same idea as you would see with services such as Facetime® or Skype®. It is meant to be a communication device, but with a twist. Instead of viewing a self representation, you are being projected as a cartoonish figure. This can produce some curious questions as in why would you want to be portrayed in this way? The intentions at DOCOMO seem to be aimed toward a more informal way to communicate with one another. The video chat glasses can bypass the unnecessary need to prepare for a casual call to the family or even for a meeting. This is also an appealing feature for the more timid users. People

that can relax and focus on conversation would potentially have a better overall experience rather than worrying about their appearance.

DOCOMO plans to release this product commercially within the next five years. They are still developing an easier-to-use, portable version. People might not be jumping out of their chairs to integrate this new technology into their lives just yet, but in due time, this technology may likely replace household phones and change communication forever.



CLASSROOM DISCUSSION

- Would you be more interested in using these video chat glasses over other communication services such as Facetime or Skype? Why?
- Name examples where these glasses may be useful

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ELECTRIC CYCLING, UNCHAINED

By Debbie Kopyta



Electric bicycles have been popular for years. Until now, these machines posed the annoying risk of the chain catching a pant leg and leaving an oily stain or even worse slipping off and needing repaired. The Mando Footloose hybrid does not require a chain to function. It's the first e-bike to use an electric motor to drive the rear wheel.

THE BRAINS BEHIND THE BIKE

Developed by a South Korean auto-parts manufacturer, the Footloose combines automotive technology and design innovation. The chain is replaced by an alternator that converts the rider's kinetic energy into electricity. That energy is stored in a lithium-ion battery within the bike's frame where it is then transformed back into kinetic energy when additional assistance is needed. A cyclist can travel up to 20 miles on electricity alone or recharge the battery using pedal power.

An Electronic Control Unit (ECU), similar to the computerized sensors used in most cars, monitors the terrain and automatically adjusts the gears for maximum efficiency. The ECU also sends details on distance, speed and electricity levels to the detachable Human Machine Interface (HMI) mounted on the handlebars. The HMI doubles as an anti-theft device; removing it disables the motor.

Because there are no bulky gears or oily chains, the lightweight aluminum frame can be easily folded and carried – perfect for loading into a bus or car.

With a top speed of about 15.5mph, the Footloose won't set any records. But the convenient and innovative design may tempt buyers when the bike is released in Europe next year.



CLASSROOM DISCUSSION

- Name other examples of kinetic energy from everyday life
- What can businesses and cities do to become more bike-friendly?



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A BRIEF HISTORY OF COMPUTERS

By Valinda Huckabay

Before 1935, the term "computer" referred to a person who performed numerical calculations using a mechanical calculator. Since then, the definition has changed to mean a machine, rather than a person that accepts input, processes data, stores data and produces output.

COMPUTER MILESTONES IN HISTORY

1896 – Developed by Herman Hollerith, the Tabulating Machine read and sorted data from punched cards. Hollerith formed the Tabulating Machine Company, which later became the International Business Machines Corporation (IBM).

1942 – Built at Iowa State by Professor John Atanasoff and Clifford Berry, the Atanasoff Berry Computer (ABC) weighed in at 750 lbs. and had a memory storage of 3,000 bits (0.4K).

1944 – The Mark I was constructed by Harvard's Professor Howard Aiken - it stood 50 feet long and 8 feet tall.

1946 – The ENIAC (Electronic Numerical Integrator and Computer), the world's first electronic computer. It weighed 30 tons and measured 50 x 30 feet. Since there was no software to reprogram the computer, it had to be rewired to perform different functions.

1951 – The UNIVAC (punch card technology) was introduced by Remington Rand. At over 40 systems sold, it was the first commercially successful computer. It used magnetic tapes that stored 1MB of data.

1969 – The Internet, originally the ARPAnet (Advanced Research Projects Agency network), began as a military computer network.

1976 – The CRAY 1, the world's first electronic digital computer, was a 75MHz, 64-bit machine, the world's fastest processor at the time. That same year, the Apple

computer was designed by Steve Wozniak and Steve Jobs. Apple was the first to incorporate a graphical user interface and a computer mouse.

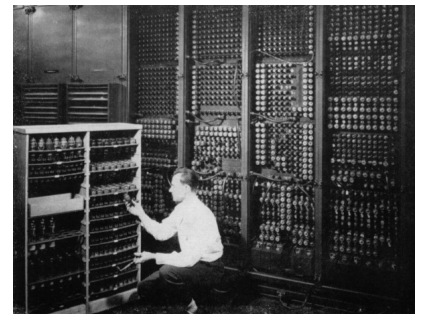
1978 – The age of PCs (personal computers) began. Many versions of desktop computers were developed by startup and existing companies all over the world.

1990 – Tim Berners-Lee invented the networked hypertext system called the World Wide Web.

1996 – PDAs (Personal Digital Assistants) became available to consumers. The first portable computing devices.

COMPUTERS TODAY

We use desktop and laptop computers at home, at work and for play, and depend on servers and the Internet for a multitude of reasons. Today, this vast interconnection of computers has expanded our resources, allowing us instant access to almost any recorded information.



CLASSROOM DISCUSSION

- What do you think will be the next biggest invention in the computer world?
- What is the most productive task you perform with a computer?

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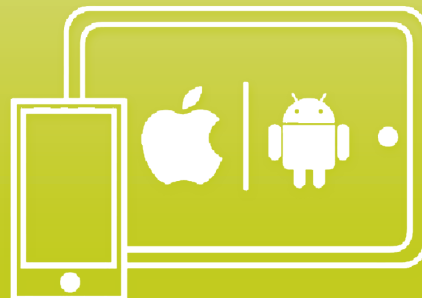
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