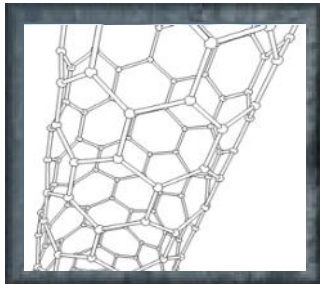




# Career Cornerstone News

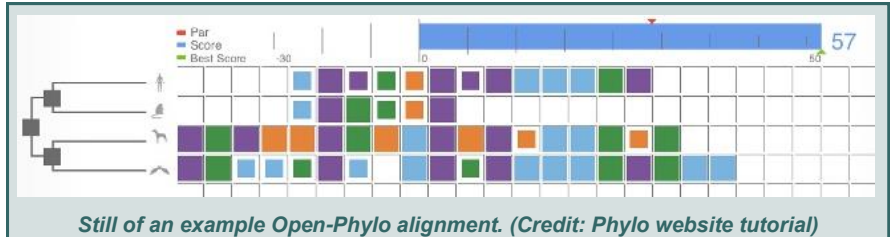
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## Gamers Focus on Genetic Science

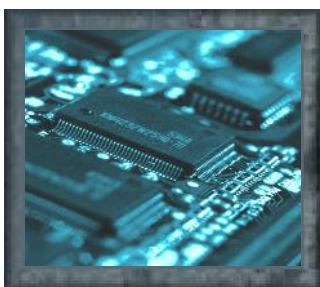
Over the past three years, 300,000 gamers have helped scientists with genomic research by playing Phyllo, an online puzzle game. Now Jérôme Waldispühl, the McGill computer science professor and his colleagues, who developed the game are making this crowd of players available to scientists around the globe.



Career Cornerstone News is a Publication of the Career Cornerstone Center, the Premier Online Resource for Exploring Career Paths in Science, Technology, Engineering, Mathematics, and Medicine.

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The idea is to put human talent to work to improve on what is already being done by computers in the field of comparative genomics.

Phyllo is a cross between Tetris, Rubik's cube and an old-fashioned sliding-tile puzzle game. As gamers line up colored rectangles that represent real genetic material (in the form of DNA sequences), they are helping to pinpoint the genetic anomalies that may be the key to a range of diseases that include diabetes, breast cancer and retinoblastoma (the most common form of malignant tumour in the eyes of children). Since it was first launched,

players who range from teenagers to seniors have suggested solutions for over 4,000 puzzles based on genomic data that has already been gathered. Now these gamers will be put to use helping scientists with a whole new range of research.

Phyllo is available in ten languages and is free to play.

You can find Phyllo at <http://phylo.cs.mcgill.ca/>, and explore science and engineering careers at [www.careercornerstone.org](http://www.careercornerstone.org).

## Here Comes the Sun!

Rjukan, Norway has no sunlight six months of the year because it is situated deep in the narrow Vestfjord Valley.

But this year, the darkness finally came to an end after the town installed three giant mirrors to reflect the sun. Engineers worked to develop this system to bring a little light to the town square. Previously, residents took a gondola to the top of the surrounding ridge to see the sun. The idea of a sun mirror was conceived in 1913 by town resident, Sam Eyde, who wanted to give his workers the

opportunity to experience the sunlight during the winter.

Today's engineering has made an idea that was first conceived in 1913 possible: to finally deliver the sun to the people of Rjukan.

To make the dream come true a century to the day later, a computer-driven heliostat, placed at the top of a steep mountain wall 400 meters over the town, captured the sunrays and direct them down to the center



Sun-tracking mirrors capture sun rays and direct them down to the center of Rjukan, Norway (Image Source: visitnorway.com)

of Rjukan. It just shows how engineering can make a personal difference to the lives of many!

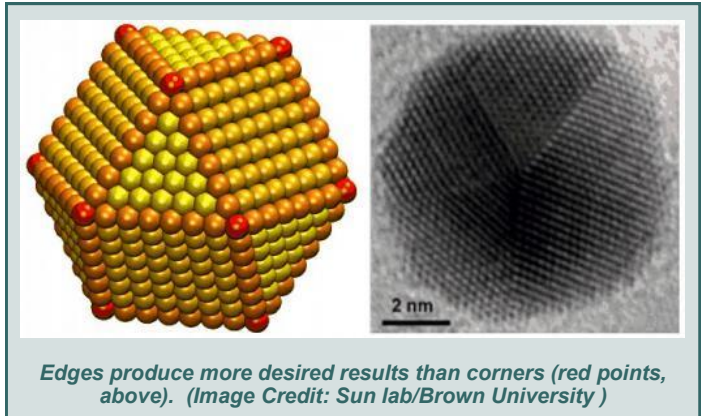
## Gold Nanoparticles Help in Recycling CO<sub>2</sub>

It's a 21st-century alchemist's dream: turning Earth's superabundance of carbon dioxide — a greenhouse gas — into fuel or useful industrial chemicals. Researchers from Brown have shown that finely tuned gold nanoparticles can do the job. The key is maximizing the particles' long edges, which are the active sites for the reaction.

By tuning gold nanoparticles to just the right size, researchers from Brown University have developed a catalyst that selectively converts carbon dioxide (CO<sub>2</sub>) to carbon monoxide (CO), an active carbon molecule that can be used to make alternative fuels and commodity chemicals. Converting CO<sub>2</sub> to CO isn't easy.

Prior research has shown that catalysts made of gold foil are active for this conversion, but they don't do the job efficiently. The gold tends to react both with the CO<sub>2</sub> and with the water in which the CO<sub>2</sub> is dissolved, creating hydrogen byproduct rather than the desired CO.

The Brown experimental group wanted to see if shrinking the gold down to nanoparticles might make it more selective for CO<sub>2</sub>. They found that the nanoparticles were



indeed more selective, but that the exact size of those particles was important. Eight nanometer particles had the best selectivity, achieving a 90-percent rate of conversion from CO<sub>2</sub> to CO.

Explore science career options at [www.careercornerstone.org](http://www.careercornerstone.org).

## Degree Profile: Computer Scientist

The widespread and increasing use of computers and information technology has generated a need for highly trained, innovative workers with extensive theoretical expertise.

These workers, called computer scientists, are the designers, creators, and inventors of new technology. By creating new technology, or finding alternative uses for existing resources, they solve complex business, scientific, and general computing problems. Some computer scientists work on multidisciplinary projects, collaborating with electrical engineers, mechanical engineers, and other specialists. Computer scientists conduct research on a wide array of topics. Examples include computer hardware architecture, virtual reality, and robotics.

Employment of computer and information research scientists is

expected to grow by 19 percent from 2010 to 2020. Computer scientists will be needed to develop the software that controls increasingly complicated electronics. These electronic components, called embedded systems, are in many products, from cars to machines that are used for performing some healthcare procedures remotely. A growing emphasis on cyber security also should lead to new jobs, as computer scientists will be needed to identify innovative ways to prevent attacks or track hackers.

According to the US Department of Labor, Bureau of Labor Statistics, median annual earnings of computer and information scientists is \$100,660 in the United States.

Computer and information research scientists held about 28,200 jobs in 2010. Most



computer and information research scientists work for computer systems design and related services firms, scientific research and development companies, or the federal government. Some also work for software companies.

Find out more about careers in computer science at [www.careercornerstone.org](http://www.careercornerstone.org).

## And the Winners of the Google Science Fair are...

The Do you have an idea to change the world? That's what we asked the 2013 Google Science Fair participants back in January, and students ages 13-18 from around the world met our challenge. The top 15 projects were selected from thousands of entries submitted by talented young scientists from more than 120 countries around the world. These projects were impressive and represented a vast range of scientific ingenuity—from a multi-step system created for early diagnosis of melanoma cancers to the invention of a metallic exoskeleton glove that assists, supports and enhances the movement of the human palm to help people who suffer from upper hand disabilities.

The three winners for 2013 are:

**13-14 age category:** Viney Kumar (Australia) — The PART (Police and Ambulances Regulating Traffic) Program. Viney's project looked for new ways to provide drivers with more notice when an emergency vehicle is approaching, so they can take evasive action to get out of the emergency vehicle's way.

**15-16 age category:** Ann Makosinski (Canada) — The Hollow Flashlight. Using Peltier tiles and the temperature difference between the palm of the hand and ambient air, Ann designed a flashlight that provides bright light without batteries or moving parts.

**17-18 age category AND Grand Prize Winner:** Eric Chen (USA) — Computer-aided Discovery of Novel Influenza Endonuclease Inhibitors to Combat Flu Pandemic. Combining computer modeling and biological studies, Eric's project looks at influenza endonuclease inhibitors as leads for a new type of anti-flu medicine, effective against all influenza viruses including pandemic strains.

Each of the winners received prizes from Google and their Science Fair partners: CERN, LEGO, National Geographic and "Scientific American." Find out how to get

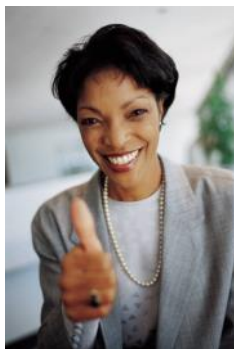
involved in next year's competition at [www.google-sciencefair.com](http://www.google-sciencefair.com).

Participating in programs and projects can really give students a chance to explore first hand what a career in science, technology, engineering, and mathematics might be like. And the teamwork experiences are very valuable too! The Career Cornerstone Center provides links and list of a wide range of competitions from local to international opportunities. Find out more at [www.careercornerstone.org/pcproj.htm](http://www.careercornerstone.org/pcproj.htm).

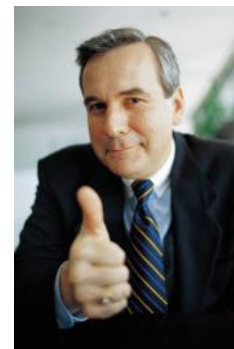


2013 Google Science Fair Winners: Viney, Ann, Elif and Eric (Image Credit: Google Science Fair, Google, Inc.)

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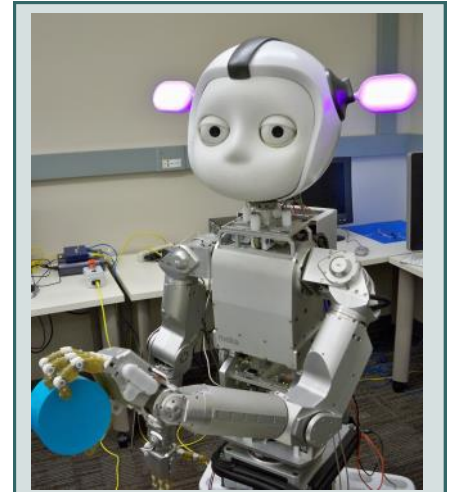
## NSF Support for Next Generation Robots

The National Science Foundation (NSF) recently announced new investments totaling approximately \$38 million for the development and use of robots that cooperatively work with people to enhance individual human capabilities, performance and safety. Funded projects target the creation of next-generation collaborative robots, or co-robots, for advanced manufacturing; civil and environmental infrastructure; health care and rehabilitation; military and homeland security; space and undersea exploration; food production, processing and distribution; independence and quality of life improvement and driver safety.

This year's projects include research to improve robotic motion--advancing bipedal movement, dexterity and manipulation of robots and

prostheses--and robotic sensing--advancing theories, models and algorithms to share and analyze data for robots to perform collective behaviors with humans and with other robots. The projects also aim to enhance 3-D printing, develop co-robot mediators, improve the training of robots, advance the capabilities of surgical robotics and provide assistive robots for people with disabilities. In addition, the projects will improve the capability of robots for lifting and transporting heavy objects and for dangerous and complex tasks like search and rescue during disaster response.

Robotics development is a great example of a project that requires a team including individuals from a variety of fields including mechanical engineering, electrical and electronic engineering, computer engineering, and



*Simon the robot, developed by Georgia Tech researcher Andrea Thomaz, learns from human users.  
Image Credit: Georgia Tech)*

depending on the application, bioengineering. Find out more about career paths in all fields of engineering and what courses are useful to take in high school if these fields interest you at [www.careercornerstone.org](http://www.careercornerstone.org)!

## Verizon Foundation Launches Student App Challenge

The Verizon Foundation, in partnership with the Technology Student Association, has opened the 2013-2014 Innovative App Challenge, giving middle and high school students across the country a chance to develop a concept for a mobile app and bring it to market. The mobile app design competition aims to engage students in science, technology, engineering and math (STEM) subjects and empower them to create STEM-related app concepts that solve real-world problems in their community or school. Students have a chance to win Samsung Galaxy Note 10.1 tablets courtesy of Samsung Telecommunications America, cash grants of up to \$20,000 for their school, and the opportunity to team up with app development experts from the Massachusetts Institute of Technology Media Lab to build and bring their apps to life.

The fastest-growing careers in the United States are STEM-related, yet the country is not graduating enough young professionals in these fields to meet this need. To address this issue, the first Innovative App Challenge was introduced in 2012. More than 1,000 schools from every state and Washington, D.C., registered for the competition, and 471 teams submitted app concepts. The competition engaged more than 3,000 boys and girls from major cities to rural areas including many underserved communities. Nearly 60 percent of the winning team members were girls. Submissions will be accepted now through December 3. Teams can submit their app ideas, access tips and instructional videos on app design, and learn more about the Verizon Innovative App Challenge at [www.verizonfoundation.org/appchallenge](http://www.verizonfoundation.org/appchallenge).



*Applications will be accepted through December 3, 2013.  
(Image Credit: Verizon Foundation)*