

New modeling method analyzes axons in seconds.

Biomedical engineers at the Case School of Engineering have developed a new computer modeling method to help researchers quickly evaluate how nerves respond to electrical stimuli.

Analysis with traditional modeling methods took weeks, but the new program slashes that time down to just a few seconds.

More efficient computer modeling could help researchers build better electrodes to stimulate nerves in paralyzed patients and amputees, according to Dustin Tyler, associate professor of biomedical engineering. He is senior author of the study published in the August issue of the *Journal of Neural Engineering*.





ЕХ

Carbon nanotubes could make energy storage and conversion systems more affordable.

Swapping catalysts in fuel cells could lead to significant cost savings in energy conversion systems, according to Liming Dai, Kent Hale Smith Professor in the macromolecular science and engineering department at the Case School of Engineering.

Dai found that carbon nanotubes can be used as a catalyst instead of platinum, cutting the cost of the system overall while actually outperforming its pricier counterpart. Platinum represents at least a quarter of a fuel cell's cost, and prices have ranged from \$50,000 to \$65,000 per kilogram over the past year. The carbon nanotubes cost about \$100 per kilogram.

In addition, Dai recently won a \$7.5 million grant from the Department of Defense Multidisciplinary University Research Initiative to support his work on building 3-D nanotubes for energy-related and other applications.





case school of engineering CaseWestern Reserve university

Engineering school introduces Certificate in Wireless Health.

The American Medical Association reports that the use of wireless technology in medicine grew by 60 percent globally last year. It is expected to double in the U.S. health market by 2015.

To meet this growing demand, the Case School of Engineering has launched a new academic program in wireless health care. The one-year, three-course Certificate in Wireless Health allows non-biomedical engineers to study this emerging field. With 30 certificate students enrolled, the school plans to expand its program offerings in the coming year, including adding a master's degree program.

More information is available at engineering.case.edu/ wireless_health.



>>>OUT OF THIS>>> WORLD

Aerospace engineers design the next phase in space flight.

Matthew Deans, PhD candidate and a member of the Case School of Engineering and NASA Glenn Research Center co-op program, is developing a catalytic igniter that could be part of a propulsion system in the next generation of spacecraft.

Engineers want to design propulsion systems that weigh less, require less energy than past models and use safer fuels. Deans's igniter would be part of a system that uses oxygen and methane instead of the ultra-combustible—but toxic—hypergolic propellants that powered the space shuttles.





BREATHING EASIER Engineers develop more portable artificial lung.

For the 200 million people with lung disease, a more portable artificial lung is one step closer.

Joe Potkay, a Case School of Engineering research assistant professor of electrical engineering and computer science and a Louis Stokes Cleveland VA Medical Center researcher, has developed an artificial lung that works with air, more closely mimicking the real thing. His reasearch team included scientists from Case Western Reserve University School of Medicine.

Current systems need heavy tanks of pure oxygen, which limits their portability. Potkay's prototype is built to the scale of an actual human lung and is filled with breathable silicone rubber versions of tiny blood vessels—some thinner than a human hair.

Researchers envision patients would tap into the devices while allowing their own diseased lungs to heal, or would have one implanted while awaiting a lung transplant. Within a decade, the group expects to have human-scale artificial lungs in use in clinical trials.

>>>SCRATCH THAT >>>>> >>

New polymer heals itself just add light.

The days of living in fear of wayward shopping carts in parking lots might be numbered, thanks to a self-healing material discovered at the Case School of Engineering.

A team led by Kent Hale Smith Professor Stuart J. Rowan, director of the school's Institute for Advanced Materials, has developed a polymer-based coating that repairs itself in seconds when exposed to UV light. Researchers say the material could be used in a range of products from automotive paints to varnishes for furniture and floors.

The discovery still has a long way to go before self-healing paints and varnishes are available on the market, but researchers say proving the concept works is an exciting first step.



Didn't see that shopping cart? Don't panic—a new coating repairs itself under UV light.



SOLAR POWERHOUSE University establishes solar energy research center.

Launched in the spring with a \$2.88 million grant from Ohio's Third Frontier Commission, the university's Solar-Durability and Lifetime Extension (S-DLE) Center will help engineers develop longer-lasting solar technology.

Led by Roger French, the F. Alex Nason Professor of Materials Science, the center includes new labs and a sun farm that will allow researchers and industry partners to expose solar products to the equivalent of 25 years' worth of solar radiation, fluctuating temperatures and other environmental factors in a fraction of the time. Evaluation of the sample products will establish lifetime and degradation science, and that data could help researchers develop products that last longer and cost less than today's technology.

The center builds on French's research partnership with Mt. Vernon, Ohio-based manufacturer Replex Plastics to develop mirror-augmented photovoltaics that could boost the power—and cut the costs—of solar power.

The S-DLE Center allows engineers to test the durability of solar energy products.

BUILDING A < <<<<<< BETTER TURBINE

Civil engineers focus on firmer foundations.

Arthur Huckelbridge Jr. and Michael Pollino, professor and assistant professor of civil engineering, are exploring how to build a better wind turbine from the ground up. They have placed strain gauges in the concrete foundation and on the steel tower of the campus wind turbine, which was erected last fall as part of the Ohio Wind Energy Research and Commercialization Center.

The sensors measured structural demands during installation and continue to track service stresses during operation, gathering data to help the industry design more effective foundations for future wind turbines. STUDENT FOCUS

>> GLOBAL PERSPECTIVE >>>

Students take core engineering course at the University of Botswana.

Typically, core engineering courses, required for all engineering students, are taught in lecture halls on campus. But a new program at the Case School of Engineering offers students the chance to take a core course in a three-week summer session at the University of Botswana.

In May 2011, 21 undergraduate students traveled to Botswana to study ENG 225B—Thermodynamics, Fluid Mechanics, Heat and Mass Transfer—with chemical engineering professors R. Mohan Sankaran and Daniel Lacks from the Case School of Engineering and mechanical engineering chair Clever Ketlogetswe from the University of Botswana. The course intertwines technical content with regional issues. For example, a visit to the world's richest diamond mine motivated study of the thermodynamics of phase transitions, and fluid mechanics was addressed in the context of a water well the students visited in a local village.

Students also had the opportunity to explore the culture and environment of sub-Saharan Africa by taking safaris, a trip to Victoria Falls, and enjoying traditional foods, sports, music and dancing.

A CUT ABOVE

Case School of Engineering students mowed down their competition and won first place at the national Institute of Navigation's Autonomous Robotic Lawnmower Competition.

NEXT

A Cost-Saving Catalyst

Self-Healing Polymer Fixes Scratches in Seconds

Artificial Lung Goes Portable

University Launches Solar Research Center

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