Smart card research delivers better, cheaper data security

Buckeye engineers won’t protect your credit card. Data breaches at credit card companies are too expensive, using sophisticated encryption as basic as integrated circuit technology and the engineering needed to create it, said Paul Berger, professor of electrical and computer engineering and physics.

Berger’s solution is to create credit cards that integrate the user’s data into the plastic itself. A specialized process enables printing plastic semiconductors onto the outside of the cards, rather than embedding expensive silicon semiconductors inside them. The result becomes a key computer with micro-antennae that turn radio frequencies into voltage to power the printed plastic circuit.

Like smart cards embedded with silicon, smart cards would be almost impossible to counterfeit, but at a fraction of the cost. In contrast to cards that store static data on magnetic strips, the embedded computer chip would create a new, temporary encrypted key each time it was used. As a result, major breaches of customers’ personal and financial data could become a thing of the past.

By collaborating with researchers in Finland and at Wright State University, these new cards could be in the marketplace very quickly, Berger said, perhaps in two to three years.

Learn more: go.osu.edu/sc

Top photo: Professor Paul Berger; bottom photo: Graduate student Conner Chambers at work in the lab.
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Buckeye engineers want to protect your credit card. Data security of credit cards could be dramatically improved by using equipment as basic as a high-end ink-jet printer and changing the way secure information is communicated, said Paul Berger, professor of electrical and computer engineering and physics.

Berger’s solution is to create credit cards that integrate user data into the plastic itself. A specialized process enables printing plastic semiconductors onto the outside of the cards rather than embedding expensive silicon semiconductors inside the card. This makes the card much more difficult to counterfeit.

The plastic semiconductors become a tiny computer with micro-antennae that turn radio frequencies into voltage to power the printed plastic circuit. Like silicon-chip embedded cards, smart cards would be almost impossible to counterfeit, but at a fraction of the cost. In contrast to cards that store static data on magnetic strips, the embedded computer chip would create a new, temporary encrypted key each time it was used. As a result, major breaches of customers’ personal and financial data could become a thing of the past.

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Scholarships: Making an impact

By Jack L. May

The Ohio State University

The academic calendar wasn’t the only thing that flipped when Ohio State switched from quarters to a semesters system in 1999. The First-Year Engineering Program transitioned to an inverted classroom model by flipping lecture and homework activities. This small Classroom Team (C'Team) that opened with just 10 students expanded exponentially.

Chugging along at a flip classroom model is a joint venture between the College of Engineering and the College of Arts and Sciences. Running since 1999 to provide the best engineering education possible, the program has evolved since.

What really sets Ohio State’s program apart is that it is filled with as much active, experiential learning as possible. This means that the focus is on learning by doing. While many universities have begun to adopt flipped class models, Ohio State was one of the earliest to do so.

The First-Year Engineering Program is a national model in the way it is taught. C’Teams are supported by an academic advisor and a faculty member who leads them. The program is designed to be a community of learners who are all first-year Buckeye engineering students—2,300- plus students.

What students learn in the First-Year Engineering Program is unique. The program includes a multidisciplinary approach and the communication, presentation and documentation skills that students have leaned all year—including MATLAB. The projects take the engineering and professional design process and principles—and put them to the test.

Providing scholarship support for a College of Engineering student is truly the single most impactful way to make a direct difference in a student’s life. It’s a gift that helps ensure the very brightest can afford an Ohio State education.

Learn more: go.osu.edu/dua

Moving manufacturing ahead

In February, The Ohio State University, MIT, and the American Lightweight Materials and Manufacturing Innovation Institute (ALMMII). The collaboration will advance development of high-strength, lightweight materials and manufacturing methods, train a new workforce for the evolving advanced materials and manufacturing industry.

The award is an essential thread of a larger push to propel the region to a national and global manufacturing hub. In February, the region was named one of 10 finalists in the U.S. Department of Commerce’s National Defense Industrial Association’s Manufacturing USA Initiative, a competition to create a manufacturing innovation hub in the region.

The American Lightweight Manufacturing Consortium, a partnership between the Department of Defense, MIT, and the University of Michigan, was recently awarded $1.2 million by the National Institute of Standards and Technology to establish an Innovation Hub. The Ohio State University, MIT, and the University of Michigan are all partners in the Innovation Hub.

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The Ohio State University

Ohio State’s College of Engineering

Learn and see more: go.osu.edu/fep

employers alike.

extensive integration of peer mentors, Ohio State’s

Combined with a multidisciplinary approach and the

communication, presentation and documentation skills.

- programming, graphics, CAD, and the engineering

skills students have learned all year—including MATLAB

The projects take the engineering and professional

education possible.

innovation to the first-year program, which has been

Changing to a flipped classroom model is just the latest

homework activities. The result? Classroom time

First-Year Engineering Program transitioned to an

semesters in 2012. The College of Engineering's

The academic calendar wasn't the only thing that

Engineering the right start

Around the same time Design Outreach was getting started, Bixler returned

After being unable to find replacement parts for commonly installed water

Greg Bixler never set out to build a groundbreaking water pump or start a

humanitarian engineering organization. But once the mechanical engineering

funds to send 100 more to Africa.

to academia to pursue humanitarian engineering work full-time. Today the

Lewis said.

Ben Lewis dropped out of college three times

The award is an essential thread of a

in the region.

materials and manufacturing methods, train

advance development of high-strength

Materials Manufacturing Innovation

In February, The Ohio State University, EWI, the University of Michigan, and the

because the materials and their processing are so different. The designs that worked

students earn

Driven to fight cancer, students earn national recognition

The Ohio State University student team and now startup, OncoFilter, won the NSTL-NSF/Ohio State National Collegiate Student Prize – one of the nation's most prestigious collegiate innovation awards.

The event provides students with a unique chance to gain insights into how not just engineers and doctors come up with new 

OncoFilter won top honors at the 2013 Ohio State

The event provided students with a unique chance to gain insights into how not just engineers and doctors come up with new ideas, but how real-world challenges are translated into products and processes that can change the healthcare category.

Brett Geiger (left) and Kinshuk Mitra (right), and their colleague, Andrew Duda, were selected as finalists in the

Competition, one of the nation's most prestigious collegiate innovation contests.

Mitra co-founded and is CEO of OncoFilter, the volunteer-powered startup company—OncoFilter—was a finalist in the

Researchers from Mitra's biomedical engineering team participated in the earliest physiological signs of cancer.

October 11, 2013.

between primary tumors into the bloodstream are one of the

For the past three years, the oncofilter team, including founder and CEO Kinshuk Mitra, has participated in the

Senior Kinshuk Mitra and Brett Geiger (biomedical engineering) are commercializing a novel cancer diagnostic technology invented by Mitra.

Driven to fight cancer, students earn national recognition

OncoFilter team members, from left: Brett Geiger, Kinshuk Mitra, and Andrew Duda.
The Ohio State University has been a leader in engineering education for decades. Engineering is a field that requires both knowledge and practical experience. The university’s engineering programs are designed to provide students with a solid foundation in their chosen field while also giving them hands-on experience through internships, research projects, and service learning opportunities.

### Scholarships: Making an Impact

Students at Ohio State have access to a wide range of scholarships to help offset the cost of tuition and other expenses. Scholarships can come from a variety of sources, including the university, state governments, and private organizations. Ohio State has a robust scholarship program that is designed to support students throughout their academic career.

### Moving Manufacturing ahead

In February, The Ohio State University, Materials and Manufacturing Innovation Institute (MMII), MIT’s Institute for the Future, and MIT’s Auto Industry Mobility and Manufacturing (ALMMII) announced the awarding of the newest manufacturing innovation challenge. The challenge, called “From 3D to Life: Engineering the Right Start,” focuses on developing innovations that will enable the next generation of manufacturing. The challenge is open to students and professionals from around the world.

### Driven to fight cancer, students earn national recognition

The Ohio State University Biomedical Engineering and Computer Science students received the Lemelson-MIT Competition National Collegiate Student Prize for their work on a cancer diagnostic technology. The technology, called OncoFilter, is a novel device that can quickly and cost-effectively separate cancer cells from healthy cells in blood samples. The technology was developed by a team of engineering students and is now being commercialized by a start-up company.

### Job Shadow Week 2014: A day in the life of an engineer

University students interested in engineering, computer science, or related fields can participate in “Job Shadow Week,” a program that allows students to shadow engineers on the job. The program is designed to give students a realistic understanding of what a career in engineering might look like.

Learn more: go.osu.edu/jobshadowweek

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- Cancer research: go.osu.edu/jsw
- 52 COMPANIES would participate again
- 245 STUDENT participants
- 67 COMPANIES
- 461 SHADOW PROGRAM participants
- 3
- 16
- 2
- 2
- 100%
- 1404
- 100%
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