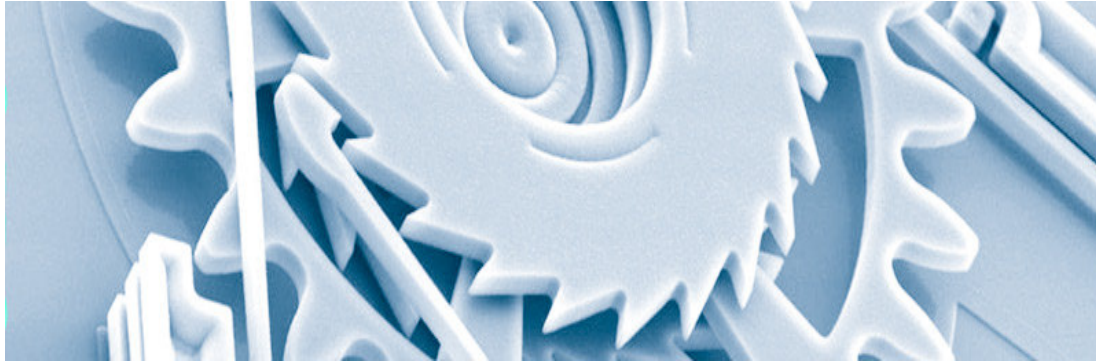


Innovations



Research & News from Berkeley Engineering

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Research and news from Berkeley Engineering. Published online monthly, the mission of *Innovations* is to illuminate groundbreaking research at the College of Engineering that will dramatically change our lives tomorrow.

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Dean's Message

Road test



UC Berkeley just conducted an unprecedented collaborative experiment involving 100 cars equipped with GPS-enabled cell phones to monitor real-time traffic flow over a seven-hour period on a 10-mile stretch of I-880. You can

In This Issue:

[Debugging Election Codes](#)



Are voting machines secure? Not according to EECS professor David Wagner. Wagner, a computer security expert, explains that the main problem with current voting machines is that

read more details about the project and its success in Abby Cohn's [delightful story](#) in this month's issue.

Between the lines is some wonderful background on how our researchers prepared for the experiment. On top of testing the actual technology, they thought of how every conceivable facet of their research would affect actual implementation. Privacy? Mobile phone users could disable their devices, but even for devices that participate, data would be immediately disassociated from the actual phone and encrypted.

Safety? Phones transmitted and received data with the help of a command center to track the position of the cars and coordinate the dataflow to ensure the driving safety of the student participants.

Exorbitant bandwidth costs? This was one of the "critical deployment factors" being tested, to evaluate the trade-offs between traffic estimation accuracy, personal privacy and the cost of collecting data. Although the phones were equipped to transmit their speed and position every three seconds, data transmission would not actually need to be this frequent to effectively monitor traffic.

According to a 2007 report from the Texas Transportation Institute, traffic congestion in the United States alone wastes 4.2 billion hours of travel time and 2.9 billion gallons of fuel, for a total annual cost of \$78 billion. A system—especially one using the increasingly ubiquitous technologies of cellular and GPS—could be invaluable in helping drivers worldwide make better-informed decisions about their routes, timing and method of travel.

It was a privilege to be on the inside observing this project, one that demonstrates perfectly how the university can bring campus resources together with industry and the public sector to achieve innovative research. And it is a tribute to the success of the researchers that the U.S. Department of Transportation has expressed interest in seeing Alex Bayen and his team develop a larger-scale version of this

they are built on top of standard, non-secure computer hardware and operating systems. To ensure proper security for something as important as a voting machine, the security must be designed into the system from the ground up. Superficially, voting machines seem like ATMs. But what makes voting machines much more difficult, Wagner explains, is the secret ballot. A trustworthy system must break the link between the voter and votes in a way that cannot be reversed. [Read more.](#)

[Rethinking Risks](#)



Early in his career, Network Appliance cofounder James Lau ventured out in hopes of developing one of the first hand-held personal computers. His PDA would have used a stylus to enter notes, appointments and other data, but after six months of work in 1991, he scrapped the project. But Lau never regretted his unsuccessful quest. When it comes to innovation, "there's no guarantee," he says. "That's part of the exploration. You just need to move on." Move on, he did. Today, Network Appliance has Fortune 1000 status, and last month James Lau received the 2007 Berkeley Engineering Innovation Award for lifetime achievement. [Read more.](#)

[Dial "T" for Traffic](#)



On February 8, 26-year-old mechanical engineering student Kenneth Armijo hit the

demonstration for ITS America later this year.

I welcome your thoughts and ideas.

S. Shankar Sastry
Dean, College of Engineering
NEC Distinguished Professor of Electrical
Engineering and Computer Sciences
Roy W. Carlson Professor of Engineering
[Email Dean Sastry](#)

road in a unique experiment exploring the use of GPS-equipped cell phones as traffic monitors. Nearly 150 UC Berkeley students were behind-the-wheel participants in the "Mobile Century" test. Navigating a fleet of 100 cars carrying special mobile phones, the student drivers traveled up and down a 10-mile stretch of the Nimitz Freeway for more than seven hours. The result was a computerized map bristling with tiny flags for each car and its velocity, creating a detailed picture of actual traffic conditions. [Read more.](#)

Upcoming Events

March 18 [View from the Top Lecture:](#) Tony Stelliga, Chairman and CEO of Quellan Inc., will present "Engineering your Roadmap to Success: Trends, Thoughts and Lessons Learned in the Engineering World."

April 12 [Cal Day:](#) Please join us for our annual festival of demonstrations, lab tours, exhibits, and lectures.

May 31 [Tribute to Honor Jim Gray:](#) Join the family and colleagues of Jim Gray in a tribute to the legendary computer science pioneer, missing at sea since Jan. 28, 2007.



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