

UIC ENGINEER SHARES \$4 MILLION INFRASTRUCTURE SENSOR GRANT

UIC News Release
January 16, 2009

A University of Illinois at Chicago civil engineer, widely known for his innovative work with infrastructure sensors, is partnering with two California-based businesses to develop a cheaper, better and faster fiber optic sensor system to monitor both new and crumbling infrastructure.

[Farhad Ansari](#), professor and head of civil and materials engineering at UIC, is partnering with Optiphase, Inc. of Van Nuys and Redfern Integrated Optics, Inc. of Santa Clara to develop the new system, funded by a \$4 million, three-year grant awarded this month through the National Institute of Standards and Technology's technology innovation program.

The new joint venture, Distributed Sensor Technologies, Inc., is based in Santa Clara. UIC's research will be funded by \$1.1 million from the grant.

The goal is to replace the array of various types of sensors now used on structures such as bridges and water pipelines with a single optical fiber sensor cable, capable of high-resolution distributed monitoring of the entire structure at intervals of just a few inches. Such a system would allow real-time monitoring for problems such as multiple cracks, and would permit long-term monitoring for subtle but important shifts that occur over months or years.

"It would be a very powerful technique," said Ansari. "In a structure such as a bridge, it would be ideal to know the extent of damage at what locations, irrespective of the number of damaged areas in the structure. It would take the guesswork out of our work."

Presently, individually wired sensors on large structures such as bridges and pipelines are separated by gaps of up to 30 feet and can only paint broad-stroke pictures of a structure's condition. The new system would feature much higher resolution. Ansari and his associates work in his Smart Sensor and Non-Destructive Testing Laboratory at UIC. Under the new joint venture, the partnering California firms will focus work on improving laser and monitoring device technology for the new system. Ansari will concentrate on developing sensors and on ways to attach and integrate them with structures to provide the most useful information about strains, cracks and deformations. He will also determine how to install and route the optical fiber in the most cost-effective manner.

"Measurements need to be taken simultaneously from hundreds or even thousands of spots so it doesn't become a challenge for installers who worry about whether they're connecting at the right locations," he said.

If successful, the new sensor system may find widespread application. A 2007 Federal Highway Administration study rated more than 25 percent of U.S. bridges as structurally deficient or functionally obsolete. Structures suited for these sensors include more than 1 million miles of

water mains pipelines, 600,000 bridges and 4 million miles of public roadways in the United States alone.

For information about the Smart Sensor and Non-Destructive Testing Laboratory, visit www.uic.edu/depts/cme/research/ssndtl/facilities/index.html