FROM THE DIRECTOR

Right: Because bridge failures have disastrous consequences, NSF-funded researchers from Washington University and the University of Virginia are working with the Missouri Department of Transportation to improve bridge safety by equipping vulnerable bridges with networks of sensors to monitor the bridge's structural condition. The research team developed a network of sensors—strain gauges coupled with tiny "mote" computers that can measure conditions at many structural points. This project takes advantage of recent developments in high data-rate sensor networks, in particular networks that can manage high-performance queries over wireless sensor networks. Such large and high-rate sensor networks are extremely difficult to design because data streaming from sensors can flood the analytic system. Sensing devices can fail and energy consumption must be carefully managed to sustain monitoring capability. Mission-critical sensor network applications, such as structural maintenance systems for bridges, must balance the conflict between tight resource constraints and the need to achieve real-time performance.

The sensors have been installed on the Bill Emerson Memorial Bridge in Cape Girardeau, Missouri, a main Mississippi River crossing that lies within an active seismic zone. This bridge experiences high traffic volume and is a crucial component of the U.S. transportation network. With a sensor network embedded within its structural elements, the bridge can be continuously monitored for changes that may predict component failures before they happen, thus helping to prevent a catastrophic collapse such as the one that occurred on the I-35W bridge in Minneapolis–St. Paul, Minnesota, in August 2007.

For more information:

www.cse.wustl.edu/~lu/itr.htm

Arden L. Bement, Jr.
Director

The National Science Foundation (NSF) is the only federal agency dedicated to supporting fundamental research and education across all fields of science and engineering and at all levels of education. In FY 2007, NSF received nearly 45,000 proposals and made 11,484 new awards to nearly 1,900 colleges, universities, and other public and private institutions throughout the country.

The discoveries resulting from these investments are both exciting and transformative, resulting in new discoveries and innovations that enable the United States to remain competitive in the global marketplace, sustain economic prosperity, protect the environment, maintain a high standard of living, and ensure national security. As an example, in FY 2007, NSF-supported researchers at Rensselaer Polytechnic Institute developed a nanocomposite paper—infused with carbon nanotubes—that was used to create printable, flexible batteries that are more resilient than many existing batteries yet can be cut, folded, and worked just like paper. The rechargeable material could find uses in a range of devices, from portable electronics to automobiles. Since these nanotube batteries can withstand extreme temperatures and be powered by liquid salts, they are also ideal for medical applications. At the University of South Florida and the University of Florida, NSF-supported researchers are exploring new ways to reduce Internet energy consumption that could potentially save hundreds of millions of dollars annually in the United States alone.

Underlying NSF's programmatic achievements is a commitment to effective and efficient management practices and sound financial oversight.

- NSF received its tenth consecutive unqualified "clean" audit opinion from an independent audit of its financial statements, with no material weaknesses reported.

For more information:

About the Director
www.nsf.gov/news/speeches/bement/bement_bio.jsp

NSF's FY 2007 Annual Financial Report
www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf0802

NSF's FY 2009 Budget Request to Congress
www.nsf.gov/about/budget/

- NSF is in substantial compliance with the Financial Managers' Financial Integrity Act of 1982. A qualified management assurance over internal control is being reported because of the scope limitation of the internal review of financial reporting. This scope limitation is in line with the Foundation's new three-year program to meet Office of Management and Budget (OMB) requirements for agency internal control by the end of FY 2008.

- NSF maintained "Green" successful ratings in three of the five President's Management Agenda initiatives.

- NSF achieved all of its annual strategic outcome goals. I am pleased to report that the performance results presented by NSF are complete and reliable and, moreover, have been verified and validated by an external, independent management consultant.

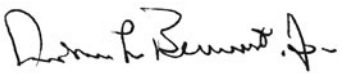
Looking ahead, NSF welcomes the potential opportunities brought by the President's American Competitiveness Initiative and the recently enacted America COMPETES Act. Both call for expanded federal investment to drive innovation and sharpen the nation's competitive edge. NSF will direct its funding toward generating fundamental discoveries that produce valuable and marketable technologies; providing cutting edge infrastructure that will transform and enable discovery; and preparing the nation's workforce with the science, technology, engineering, and mathematics skills necessary in the 21st century global labor market.

NSF has a long record of success in leveraging its agile, motivated workforce, management processes, and technological resources to enhance productivity and effectiveness. The agency nonetheless has major challenges that place new requirements and expectations on its workforce and IT infrastructure. For example, multidisciplinary collaborative projects, international activities, and major research facility projects all add to the complexity of the agency's workload. Moreover, meeting new external administrative, oversight, and accountability requirements is an additional burden on limited staffing and operational resources. In recent years, the agency has undertaken efforts to address workload issues. NSF is continuing pilot activities to re-engineer major administrative functions, including the testing of new organizational structures and processes.

The NSF Inspector General has also identified management challenges in several areas, including award administration, human capital, information technology, and merit review. NSF management recognizes these as long-term, continuing issues, and significant efforts have been made in these areas. NSF has invested in essential business models and instituted policies and practices to safeguard public funds. A report on recent activities addressing the Inspector General's FY 2007 management challenges can be found in NSF's *FY 2007 Annual Financial Report*.

A final item of note is NSF's participation in the pilot program led by OMB for performance and accountability reporting. This *Performance Highlights* report is one part of this activity. On November 15, 2007, the Foundation issued an *Annual Financial Report* that focused on the agency's financial condition, the results of the agency's financial audit, and its systems, controls, and legal compliance. NSF's *FY 2009 Budget Request to Congress*, available on February 4, 2008, will include the Foundation's FY 2007 performance report. Both can be found on NSF's website, *www.nsf.gov*.

Thank you for your interest in the National Science Foundation. To learn more about the latest discoveries emerging from NSF's investments in science, engineering, education, and technology, visit *www.nsf.gov/discoveries/*.



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