Getting There

Transportation research is in high gear at the College of Engineering.
Pollution Sensor Makes Top Inventions List

A pollution sensor invented by Ohio State researchers Prabir Dutta, chair of the Department of Chemistry; Sheikh Akbar, professor of Materials Science and Engineering; and former graduate students Nicholas Szabo and Juin Chan Yang has received a 2007 R&D 100 Award from R&D Magazine. The list salutes the best inventions to emerge from industry, government and academia each year. The Ohio State team earned the spot for its work on a ceramic-based NOx sensor.

The patented sensor detects the total amount of a pollutant commonly referred to as NOx, which is primarily a combination of nitrogen oxide and nitrogen dioxide. It also removes the interference from carbon monoxide, hydrocarbons and ammonia that can cause sensors to produce inaccurate readings. The tiny, matchtip-sized device could eventually lead to even smaller sensors that offer new ways of controlling combustion.

This work was carried out at Ohio State’s National Science Foundation Center for Industrial Sensors and Measurements with supplemental funding from the U.S. Department of Energy and NASA.

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Software Aids Remote Internet Research

Software under development at Ohio State is helping scientists operate big-budget research instruments, such as high-powered microscopes and telescopes, over the Internet more safely and efficiently than was possible before.

The need for such remote operation is growing, driven by the costs of doing research, explains Prasad Calyam. Calyam is a doctoral student in electrical and computer engineering and a senior systems developer at the Ohio Supercomputer Center, where he and other researchers are developing the software in collaboration with materials scientists at the College of Engineering’s Center for the Accelerated Maturation of Materials.

Calyam and his colleagues began developing RICE, short for Remote Instrumentation Collaboration Environment, to prevent remote researchers from making mistakes, particularly during Internet traffic congestion. It also helps them perform experiments more efficiently.

On the surface, RICE would look very familiar to anyone who’s used Internet videoconferencing software or even an Internet chat program. A window lists the names of researchers who are logged in, and another window is used for text messaging. A third window shows a video feed of the object being studied, along with buttons to control the instrument. One primary user, presumably the lead researcher on an experiment, can transfer control of the instrument from one remote researcher in one location to another.

RICE works so well because it relies on the economic principles of supply and demand to utilize network bandwidth.

Special algorithms take control of the software when a user’s commands — in effect, the user’s demands on the system — outweigh the supply. In this case, the “supply” is bandwidth consumed by the video feeds from the instrument. For example, when Internet congestion has caused the video feed to freeze up, RICE blocks commands from the user, who may mistakenly think that the instrument hasn’t moved, when it actually has.

“It’s just human nature: When we hit a button and nothing happens, we hit the button again,” Calyam says. “We know from our previous studies that people using Internet software tend to click more buttons when the network is slow, and they also get less done.

“RICE notices when a user issues commands that are probably caused by network congestion, and it blocks those commands. In addition, it allows the user to tune their supply to cope with network congestion. In the end, the user is less frustrated, because they’ve gotten the result they wanted with fewer clicks and without worrying about potentially damaging the instrument.”

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On the Web: Read more about Calyam’s research at researchnews.osu.edu/archive/remotesci.htm, or watch him explain his project at www.osu.edu/features/2007/rice.

Efficiency in the Skies

Chul Lee, assistant professor of aviation, is working to determine the optimal combination of network, fleet and schedules that would make airlines more efficient. Because of the complexity of the planning process, he has devised a series of sequential functions that support the overall goal of airline profitability.

He has found that with decision support built into each individual step that has unique time horizons, objectives and constraints, airlines can achieve a global solution to the planning problem.

Lee’s work is enhanced by expertise he gained in fleet planning, network optimization, and demand analysis at Bombardier Aerospace, where he was a senior associate and senior analyst in the Commercial Aircraft Group. He is involved in developing the college’s undergraduate and graduate curricula in Air Transportation Systems.

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