Better business decisions with real-time data

May 21 2008

They may look like ordinary washers and dryers to you, but to Hemant Jain they are the first steps into the future.

In the laundry room at the University of Wisconsin–Milwaukee's Kenilworth Square Apartments, the appliances operate on "real-time." Residents can go online to check which washers and dryers are available, and can opt to receive an e-mail message when a machine's cycle is finished. The company that maintains the machines monitors them via the Internet.

"Time may well be the single most important factor affecting enterprises in the 21st century," says Jain, Wisconsin Distinguished Professor and Tata Consulting Services Professor of Management Information Systems in the Sheldon B. Lubar School of Business.

Jain is working on developing a cross-disciplinary Real Time Enterprises Research Program. By attaching intelligent cyber-devices (connected through the Internet) to physical objects, all kinds of enterprises can suddenly have "situational awareness." That is, they can quickly "sense and respond" and "track and trace."

Examples fire the imagination. "Smart" appliances are connected through the Internet to an electric utility that varies pricing in real-time, based on demand. As a result, appliances may shut down or turn on based on the "decision rules" that have been programmed into them. For example, a clothes dryer can be shut down during peak times – saving the homeowner money, smoothing out demand for the utility and

benefiting the environment.

To assure a great experience for fest-goers, a summer festival can constantly track attendance through ticket bar codes. On the health care front, hospitals are able to continuously monitor patients in the hospital and at home to provide better care and reduce costs.

Public safety applications include capitalizing on the information provided by cell phones with built-in GPS. “During an emergency situation, you can track exactly where people are and provide them with appropriate information,” says Jain.

Security applications include tracking storage containers during shipping and at ports.

From the university to industry

For the most part, Jain’s research has focused on manufacturing applications.

“The decreasing cost of sensors – RFID, bar-code and GPS-based devices and networks – has made it practical for many businesses to acquire real-time information,” says Jain. “However, organizational structures, processes and systems need to be aligned to take advantage of this.”

The promise of this technology for manufacturing has drawn research partners Rockwell Automation and Tata Consultancy Services.

Rockwell Automation, a leader in industrial automation products, software and services, has partnered with Jain on real-time enterprises to enable visibility and tracking of manufacturing data throughout the enterprise.

“Real-time access to manufacturing data is essential to optimizing factory production,” said Sujeet Chand, senior vice president and chief technology officer at Rockwell Automation. “Dr. Jain’s research on novel software solutions for enterprise-wide decision-making enables flexible manufacturing, as well as tracking and tracing of raw materials to finished products.”

Manipulating the manufacturing chain

At UWM, real-time research has proven to be a “good multidisciplinary umbrella, with a number of people in the College of Engineering and Applied Science working with us,” says Jain.

Matthew Petering, assistant professor in Industrial and Manufacturing Engineering, is working on the programming and software aspects. He describes as “explosive” the growth in the use of micro- to nanoscale embedded devices and sensors in all aspects of manufacturing.

“We are developing control software that takes advantage of the real-time data generated by these devices to support real-time decision-making,” Petering says.

While human decision-makers need to monitor operations and take action, decision-making needs to be decentralized at the various levels of manufacturing. For example, the decision to “make 500 of an item by evening” triggers a sequence of interdependent decisions.

“We are working to develop a service-oriented, event-driven, smart cyber-agent (SES) approach for real-time management of global manufacturing enterprises that combines the ideas of both centralized and decentralized control,” says Petering.

Source: University of Wisconsin - Milwaukee