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Local Weather

UMR researchers 'play tag' in unique auto-id testbed

ROLLA--As Wal-Mart's top 100 suppliers scurry to get radio-frequency identification (RFID) tags on their pallets in time to meet a January 2005 deadline, two researchers at the University of Missouri-Rolla are joining forces to figure out how to use data from those tags in the most efficient way.

Sophisticated cousins of UPC barcodes, RFID tags use radio frequencies and can be read quickly and wirelessly by a scanner that relays information directly into computer systems. "RFID tags will save Wal-Mart billions of dollars," says Dr. Jagannathan Sarangapani, associate professor of electrical and computer engineering at UMR. "When supply trucks come into Wal-Mart's distribution centers, antennas will scan entire pallets, eliminating the need for manual tagging."

Wal-Mart isn't the only organization with a January 2005 deadline. Although the U.S. Department of Defense has been working with RFID technology for more than a decade, the department has selected two pilot depots - one in California and another in Pennsylvania - to use the technology to hasten getting equipment, food and clothing to war theaters.

"Everybody's putting on those tags because of mandates by the Department of Defense and Wal-Mart," says Dr. Can Saygin, assistant professor of engineering management and systems engineering at UMR. "But companies don't know what to do with the data because the tags are going to tell you they are there every split second. If you start storing the data, you're going to need a lot of memory and capability to process the data and make sound decisions."

The two UMR researchers are taking an integrated, bottom-up approach by looking at how RFID could be used on the shop floor, such as in an assembly line, to ensure the right parts are available at the right time and place, as well as at the supply chain level, as in the case of geographically distributed manufacturing plants and warehouses.

"Since you have full product visibility, you don't have to order just-in-case products, which will also save money," Saygin explains. "In addition, those tags will provide a clear picture of your shop floor level performance because the tags -- in addition to several sensors - are going to tell you what's going on in real time on the shop floor. If parts are exiting a transfer line at a certain rate, as shop supervisor I will get the time-stamped data and look at my throughput. As opposed to what has been done the in past, if there is something wrong with the flow, I can fix those immediately if I have the right decision support tools available."

Tomorrow's food items and other time- and temperature-sensitive materials will likely have individual RFID tags, says Sarangapani. "If the food item is going to expire,

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- The Lake Sun Leader

grocers can change the rates automatically," he says. "The price will automatically go down. Even the milk in your refrigerator could email and tell you it's going bad."

Saygin and Sarangapani are using a $268,000 grant from the Air Force Research Laboratory through UMR's Center for Aerospace Manufacturing Technologies (CAMT) in cooperation with Boeing Co. to develop techniques to collect and make sense of the information from individual tags for use on time- and temperature-sensitive materials, shipping and receiving operations in warehouses, and assembly line operations. By putting together their two labs, the researchers are able to develop data-collection models that are integrated with decision-making, manufacturing execution and control systems, and network simulation tools.

"The product we are looking at for Boeing is stored in an environment where the temperature has to be maintained pretty tightly and these storage bins are distributed in over 100 storage areas," Sarangapani explains. "We want to have the product available in the storage areas for just-in-time manufacturing, which will lead to cost savings due to reduced inventory, fewer purchasing transactions, and less involvement of humans in the tedious tasks of managing the inventory items.

The RFID technology isn't without problems: tags have to be in the readable range of the antenna; some materials absorb the radio frequency signal; current readers can only guarantee reading up to 80 percent of the transmissions; and tags can continuously transmit data, ultimately flooding the computer, or never transmit once. "If these tags send themselves several times, we need a filtering system to say, 'Ok, I've read you and I don't need any more data until another hour," says Sarangapani. "If it's only one tag in an open area, then it's no big deal. But there are thousands of tags always there on the manufacturing floor."

"Imagine having 3,000 elementary school kids sitting in a classroom and talking all together," adds Saygin. "That's what we're talking about."

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