# Saic, hewlett-packard, ge, and others: the business case for wireless sensor netw...

Hewlett-Packard, GE, and Others: The Business Case for Wireless Sensor Networks Some big companies are trying to make the worldand almost everything in it-smarter. Science Applications International Corp. (SAIC), the big government IT contractor, is developing technology for the Departments of Defense and Homeland Security that could use hundreds of tiny, wireless sensors packed with computing power to help secure U. . borders, bridges, power plants, and ships by detecting suspicious movements or dangerous cargo and radioing warnings back to a command center. BP pic, the world's second-largest independent oil company, aims to knock down the cost of monitoring equipment at a Washington State oil refinery, from thousands of dollars per measurement to hundreds, by replacing big, dumb, wired sensors with wireless ones in a network. And Hewlett-Packard is experimenting with wireless networked sensors at a warehouse in Memphis, Tennessee, trying to reinvent how companies manage the flow of goods.

A prototype wireless network of small video-camera sensors hooked to image-recognition software works in concert with radio-frequency identification (RFID) technology to make sure inventory is put in the right place. The cameras track goods as they move through the warehouse, and those images get matched with RFID tag numbers that describe them. Wireless sensor devices, or " motes," package together a circuit board with networking and application software; interfaces to sensors that can detect changes in temperature, pressure, moisture, light, sound, or magnetism; and a wireless radio that can report on their findings-all powered by a pair of AA batteries. Enabled by the fusion of small, low-cost chips, low-powered radios, and the spread of wireless networking, motes are a giant leap ahead of

traditional sensors that for decades have measured everything from temperature in buildings to factory machines' vibrations. Those sensors require wiring to electrical systems, which can cost $200 to $400 per sensor, and are expensive to service. Motes cost about $100 each and are much cheaper to install.

That price could drop to less than $10 in a few years, as mote components follow computing's march toward higher volume, better performance, and lower prices. One breakthrough of mote technology is special " mesh networking" software that lets each device wake up for a fraction of a second when it has an interesting result to transmit, then relay that information a few yards to its nearest neighbor. So instead of very sensor transmitting its information to a remote base station, an electronic bucket brigade moves data mote by mote until it reaches a central computer where it can be stored and analyzed. Built-in logic corrects for the failure of any sensor to transmit its data by having its neighbors cover for it. The wake-up-to-transmit feature is key, since devices need to conserve power so networks can last for years unattended in the field or anywhere data gets acquired nonstop." This technology enabled a major advance," claims Tom Sereno, a division manager at SAIe. Just 2 percent of the t! U.

S. order is outfitted with ground-sensor networks that can detect illegal crossings of people or vehicles. And those sensors have shorter life spans than the wireless motes with which SAIC is developing its applications. The potential for cost savings over traditional wired sensors is enormous.

BP installed five wireless sensors at its Cherry Point refinery in Washington to monitor the temperature inside giant onsite fans. Using the motes willprobably cost about $1, 000 per measurement point-and maybe drop to $500 within a year or two, says Harry Cassar, technology director in BP's emerging-tech group. Each connection measured the old way cost $10, 000. BP achieved the $500-per-point measurement in a test last summer to measure conditions in the engine room of an oil tanker. • And BP envisions using wireless networks of sensors to: monitor industrial plants and ships, remotely adjust lighting> and heat in office buildings, test soil for pollutants, andde-l teet whether chemicals are stored properly. " Wireless mote technology has got applications in almost every part ofout business," Cassar says. " We're not going to be putting inte of these devices, or even hundreds. Ultimately, it's going be thousands.

"