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News Search Archive: Section: -All- browse all titles Best of the NanoWeek Newsletter The Small Tech Prospector What is the Nanotechnology.com index? New to Nanotechnology? About Us RSS XML	Fri 17 Aug 2001 06:16:00 Privacy may be blown away like "smart dust" in the wind By Rosemary Clandos Small Times Correspondent Aug. 16, 2001 -- Kris Pister's tiny sensors, devices so small he calls them "smart dust," can monitor light, heat, movement and sound. Larger versions of these dust bunnies are already being developed commercially as wireless infrared sensors and as security monitoring tags to keep employees out of restricted areas. But as Pister continues to miniaturize the technology, a nontechnical question is nagging him: Will his tiny technology open a door into private lives -- a door that could never be closed? Read more "We're pushing back the frontiers of knowledge," said the electrical engineering professor at the University of California, Berkeley (UCB). "There's profit to be made and advantage to be had. Let's get people aware of it so we do it right. Well, we'll never do it completely right, but we don't want to do it horribly, horribly wrong." Pister and his research team have been working on a smart dust prototype that is 1 cubic millimeter in size. He expects that soon it'll be able to float. He's also working to shrink the cost of a prototype from \$100 to less than a dollar per unit. At that size and price, smart dust would have an enormous capability for good uses and misuses. Pister said he's well aware of the privacy issues. "I think about them more than anyone on this planet." He's searching for answers in conventional and unconventional ways. The unconventional has led him "to mess with people's minds in a big way in a university setting" so they'll confront the issues before the technology is mass marketed. For example, Pister wants to record students' conversations and play them back. "If I start doing weird things to people with the data they're gathering about sensors, people will start to think about the hardware, software, laws and what's culturally accepted," Pister said. A more conventional approach has been to assemble a group of sociologists and legal specialists to discuss the possible ramifications of the technology. One of the big questions is how the public will respond to increased monitoring. Dorian Liepmann, associate professor of bioengineering at UCB, said that the technology is very close to being ready now. But in many cases it's a question of attitude. "Do people want to be wired this way?" he said. When placed in buildings, the light and heat sensing devices can already evaluate energy use and eventually the technology will be smart enough to turn off heat, air conditioning or lights when they're not needed. Researchers at Berkeley estimate that, with the devices, between \$7 billion and \$8 billion in energy costs could be saved every year. Smart dust will find its way into household appliances where they could, for example, regulate when a refrigerator should fire its compressor - during off-peak periods when energy prices are low. The sensors will act as early warning systems for fires and automatically communicate with local fire departments. Crossbow Technology Inc., a privately owned San Jose-based company, is working with Pister to commercialize the technology. The company is supplying a 1-inch-diameter version of the sensors to universities, military and civil research facilities and businesses for avionics, along with commercial and industrial use. Customers can pick up a starter kit for \$950 and get three sensors, or "motes," and a personal computer interface board for their own advanced research and development. Crossbow is in the process of expanding the battery life of the motes and the company's product line. With the research funded by U.S. Department of Defense, the motes would also monitor people. Military personnel would be able to track the movement of soldiers in the battlefield. On the home front, heart patients with severe conditions could wear wristbands equipped with global positioning systems and the capability to take vital signs. When the first indicators of cardiac arrest are recorded, emergency personnel could be sent to the patient. And parents may worry less when they attach a sensor to babies' and toddlers' clothing - so they'll know	

may worry less when they attach a sensor to babies and toddlers' clothing, so they'll know where their kids are all the time.

But what about people who unwittingly end up traveling with a smart dust sensor recording their whereabouts?

"With new technology, there are often unforeseen uses which crop up," said Daniel Neyland, a sociologist and research associate at the University of Oxford in England. Neyland has just completed a study of surveillance technologies in Britain, where cameras have been monitoring motorists and pedestrians on the main streets in towns and cities.

Sociologist Valerie Young of the University of Luton in Buckinghamshire, England, said that young people are more accustomed to being monitored in the United Kingdom -- they've grown up with it. Older people see it as more intrusive.

In Neyland's research, street security cameras were identified as having a positive benefit at night, making people feel visible, protected and in contact with local authority. But, he said, "By day, the cameras were identified by the same people as invasionary, intrusive, making themselves unnecessarily visible and unnecessarily in contact with the local authority. 205 In my research, there have been very few entirely negative responses to cameras, but neither were there any entirely positive ones."

The contradictory answers do not suggest tolerance of surveillance, but a continuing ambivalence, Neyland said.

"Ambivalence is hard to keep up, so a more definite opinion of, and opposition to, cameras may develop over the new few years. Certainly, at the moment in Britain, the use of cameras to track terrorist bombers in London is raising several positive points," Neyland said.

In the future, Pister wants to have hundreds of thousands of sensors in homes, buildings and streets all communicating with each other. But now, he said, it's time for people to communicate what they think about the technology that could change society's concept of privacy.

Dr. Kristofer Pister will deliver a keynote speech on the future of small technology at the [Small Tech 2001](#) conference Sept. 18-21 in Washington, D.C.

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