



Maria Lijding

The first applications of ubiquitous computing and smart surroundings are on the horizon. Technology is ready for it. But as soon as 'smart' also implies that privacy is relegated to the background, Maria Lijding wants to be informed. She wants to avoid the unnecessary storage and possibly improper use of data.

## Smart Signs won't remember you

'It's not the first thing you think of. A sensor network measures luminosity, air humidity and temperature in offices. Innocent data, at first glance, but when you subject it to sophisticated data mining, you can monitor people, recognize tracking patterns and collect much more information than just these simple parameters. If these measurements are only used to detect emergencies, you can check to see whether there is an event or not. If not, it will not send any data. I want to do away with these large quantities of data, also because it consumes a lot of energy to transport them over the network. Above all, it demonstrates that privacy is not something to think about after the fact; it should be considered early on.'

A good example are the 'Smart Signs' Maria Lijding and her colleagues are developing. These are displays showing personalized information when a user with a smart tag, such as a mobile phone with Bluetooth, is in the vicinity. It does not establish a route beforehand and there is no tracking. 'When I expect visitors at my



office on the campus, I can register them in the system. Smart Signs will then show them the way and give them the authorizations they need to enter buildings. I can also send my visitor a message while they are on their way. The system can be designed to trace visitors' footsteps exactly, but that's something we want to avoid. A sign receives the information it needs to help the visitor at that given point in time, and the data is gone a little later. All the logic is installed in the sensor. If the displays were cheaper, you could hang one next to every door.' The researchers currently use WLAN, GSM and Bluetooth, but more energy-efficient alternatives with ad hoc radio are also conceivable. These already require economical use of data communication anyway.

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'It is conceivable that applications might be needed that track people part of the time. We are currently investigating similar possibilities for healthcare applications. Closed wards of healthcare institutions have locks with an access code, which is often quite easy to crack. You lose sight of your patients entirely once they are outside. But if you supervise access using smart tags, you can define the areas in which people are free to move and areas in which they need to be tracked, triggering an alert to staff. To this end, we are collaborating with health care institutions in the region.'

'In addition to my own research, I am project manager for the 'Smart Surroundings' project. This project requires a lot of coordination because of the number of partners involved. One area we have identified is 'stress': is it possible to use a sensor network to create an environment that causes less stress for the user? We also need researchers who know how to design its physical environment and how to evaluate its effect on users. A whole range of people are involved, from those working with radio connections to industrial designers and social scientists. I learn a lot from them. Initially, you might be inclined to create a single technology platform together, but that's an illusion. As long as you agree on the applications, the different partners can still choose their own approach.'

'I was interested in ubiquitous computing at an early stage. Too early, perhaps, because when I wanted to take my degree, it was not yet an option. After detours to scheduling and 'tertiary storage', I am now focusing completely on this discipline. All kinds of things I could only dream of at the time have since become technologically feasible. It has become a mature domain, and many different types of location-based products and services are appearing on the market. It's wonderful to see this happening.'

