

Special session

Ambient functionality

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The motivation for this session is based on a vision of a future where there will be a number, however large, of processors integrated into artefacts in our environment. These objects will have an identity, an IP address of their own, or at least a tag attached to them, so that they can be activated and enabled to receive and transmit RF signals carrying information on their state, behaviour and location. The sensors will communicate autonomously. This is an era in which wireless internet will connect objects rather than just people.

Radio frequency identification (RFID) is a major technology facilitating ambient intelligence and communication. Such short-range radio systems will provide the means to embed a degree of intelligence into our immediate environment. Other types of communication systems are foreseen on a larger physical scale.

Contrary to the common hype, not every single sensing device need be smart. There may be a lot of rather stupid artefacts possessing just a minimum amount of memory and even no power source of their own. The intelligence is rather placed in the network in a smart way or handled by a person or an artefact moving physically across the network. This is why the title of our session refers to ambient functionality rather than intelligence.

RFID is spreading to many places and is being married with many other technologies. Some applications are well advanced while others call for further development. This applies to new RFID tags and sensors, to their fabrication by novel techniques, such as MEMS, and to their integration into modules. For a wireless processor network to be useful, as an independent agent controlling systems, managing services or serving the needs of an individual, one needs to develop application interface middleware to fit the network to existing infrastructure. And while new concepts are tested in the marketplace, one has to study and improve their acceptance by the public at large. In some cases it is relevant to ensure that a potential user is properly authorised to access the network and subscribe to the information therein.

This is why the whole value chain from the semiconductor industry to telecom vendors and service developers and providers has a vested interest at stake. A coherent interplay between these stakeholders and an orderly introduction of new terminal equipment and services serve the best interests of not only the industry but also the end-users.

In order to address the entire value-chain from research to production, the session is intended to explore how theoretical inventions and laboratory experiments can be carried through to commercial products and market launches. One can only imagine how many bright ideas are needed to come up with a commercial product – and how many more for a successful product! Research, development and industrial testing should be carried out in parallel not in linear sequence.

Ambient functionality can be based on autonomous wireless sensor networks, or RFID-enabled mobile handsets can be used as a gateway. In hot spot areas the information can be shown on large fixed displays. All these approaches, and their combinations, will certainly find their uses. The emphasis in the papers in this session is on the application where the information is received directly by an individual or a group of people.

Most people almost always have a handset available as the penetration of mobile phones is already exceeding 100 per cent in some communities. A mobile phone is handy when seeking additional information in a system where the intelligence is smartly located rather than dispersed all over. If the microchip has no power source of its own, it can be interrogated by smart devices, such as a cellular phone or personal electronic assistant. The sensor can catch the energy from the handset radiation field. And finally, handheld devices equipped by camera facilitate an element of security.