Palpable computing: a taste of things to come

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Virtually everyone stands to benefit from the more pervasive use of computer technology. But while adding microchips to more everyday objects can make lives easier – and even save them – the approach creates some unique problems of its own. “Palpable” rather than “ubiquitous” computing promises a solution.

“Palpable computing”, a term coined by Morten Kyng, a researcher at the University of Aarhus in Denmark, refers to pervasive computer technology that is also tangible and comprehensible to its users.

Ubiquitous computing, in the traditional sense, is based on the vision of making the computers invisible, Kyng suggests. “The problem is that when the technology is invisible you can’t see what it is doing, how it functions or comprehend it.”

Anyone who has tried to connect their mobile phone to their laptop can

attest to that. But while the invisibility of ubiquitous computing technology may be a mere inconvenience for many, in some cases it can be a serious, even life-threatening problem. A breakdown in communications that cannot be quickly fixed during a natural disaster can cost lives, as too can interoperability failures in hospital equipment.

By making the technology visible when it needs to be and comprehensible all the time, palpable computing reduces the complications of using the technology, while opening the door to developers creating new applications more easily.

Putting the user in control

The vision of ubiquitous computing has focused on tools honed through use over time and well suited to what they are designed to do, comments Kyng. “The problems arise when you want or need to do something new or different from what the designers intended: the user is not really in control,” he adds.

Over the last four years, Kyng has led a team of more than a hundred researchers from across Europe working on making palpable computing a reality. They have developed software architecture for palpable computing systems as well as a toolbox for developers to create applications that has recently been made available under an open source licence. The researchers, who received EU funding in the PalCom project, also developed several test platforms that have served to highlight the benefits of their approach.

One of them was used when the Tall Ships’ Races – the world’s biggest competition for sailing ships – visited Aarhus in July 2007. The platform enabled police and fire fighters to interact with a three-dimensional (3D) workspace of the Aarhus harbour and its surroundings, displaying the location of key personnel, cars, ships and equipment to give a general

overview of what was going on.

“Large-scale events, such as the Tall Ships’ Races, can be very hard to gain an overview of. With a million visitors and a huge area, it is challenging to monitor every critical spot. In my opinion, PalCom’s technology has enormous potential – not only for events [like this] but also for monitoring major accident scenes,” notes Aarhus fire chief Jakob Andersen.

A second test platform was created to enhance therapy for disabled children, while a third was designed to help landscape architects visualise the location and assess the visual impact of large development projects (wind farms, industrial buildings, etc.).

The system involves a camera, placed on the roof of a car, connected with a laptop running an advanced 3D-visualisation programme which provides landscape architects with a much more precise indication of where a new building will be located and its impact on the surrounding landscape as they drive around.

Key markets: emergency response and healthcare

“The potential uses for palpable computing are diverse, although initially I think the key markets will be in areas, such as emergency response and healthcare, where there is an urgent need for increasingly more efficient and effective technology,” Kyng says.

The University of Aarhus and several other project partners are concentrating on the development of applications using PalCom’s architecture in those fields. Kyng’s team, for example, is applying the technology to help women through pregnancies and to improve the treatment of hip-replacement patients. One palpable computing system being developed to enhance post-surgery monitoring will allow hip

patients to leave the hospital 24 hours after surgery, he estimates, rather than the current three or four days.

The PalCom coordinator notes that the trial systems have elicited considerable interest and expects the open source release of the toolbox to lead to new applications.

“Ultimately, success in the marketplace will drive the technology forward,” he says.

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