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Ubiquitous Computing

Guest Editors:

Friedemann Mattern, Manuel Ortega Cantero and Jesús Lorés Vidal

Joint issue with NOVÁTICA and INFORMATIK/INFORMATIQUE

- 2 Presentation: The Computerization and networking of All Things –
Friedemann Mattern, Manuel Ortega Cantero and Jesús Lorés Vidal
- 3 The Vision and Technical Foundations of Ubiquitous Computing
– *Friedemann Mattern*
We illustrate the vision of Mark Weiser, the visionary behind ubiquitous computing, and describe its technical foundation and current trends. We also give a brief overview of its implications for privacy and outline possible applications.
- 7 The Dreaming – *Jakub Wejchert*
Vision and underlying motivation can play an important role in research – yet these aspects are often overlooked. Using the disappearing computer initiative as a starting point, this article describes how the germ of a vision was used as the basis for a call for research proposals in the area.
- 12 Where Computation and Artefacts Meet – *Hans-Werner Gellersen*
Ubiquitous computing is a vision in search of a fundamentally new quality of computer use, approached by deep interconnection of computation with the designed environments of modern life.
- 17 AULA: A Ubiquitous Language Teaching System – *Manuel Ortega Cantero, Maximiliano Paredes Velasco, Miguel Ángel Redondo Duque, Pedro Pablo Sánchez Villalón, Crescencio Bravo Santos, José Bravo Rodríguez*
A ubiquitous system being developed with the aim of studying ways and means of bringing new technologies into the classroom.
- 23 A Ubiquitous Interactive Computing Model applied to the Natural and Cultural Heritage of the Montsec Area – *Montserrat Sendín, Jesús Lorés, Carles Aguiló, Alexandra Balaguer*
The mountains of Montsec is an area of outstanding geological, historical, paleontological and scenic wealth. It is regarded as a truly natural laboratory. The application of the model presented here will help to conserve and make people more aware of the park's natural resources and cultural heritage, by turning the area into an "interactive space".
- 27 Pervasive and Mobile Computing Middleware
– *Klaus Rindtorff, Martin Welsch*
Internet access is no longer primarily a domain of browsers based on desktop PCs. The number of non-PC mobile access devices is fast outgrowing that of traditional PC based access devices. How can existing content as well as new services be delivered to all kinds of mobile Internet devices?
- 32 A World Model for Location-Aware Systems – *Matthias Grossmann, Alexander Leonhardi, Bernhard Mitschang, Kurt Rothermel*
Advanced location-aware applications require a detailed model of the real world. We describe the characteristics of the Augmented World Model and the architecture of the Nexus platform.
- 36 A Comparative Study of Communication Infrastructures for the Implementation of Ubiquitous Computing
– *Pablo Haya, Xavier Alamán and Germán Montoro*
This article focuses on communication networks that could be used in a ubiquitous computing environment. These networks are heterogeneous due to the variety of device types that can be connected and the different kinds of traffic that can be transmitted.

Coming issue:

“Free Software / Open Source: Towards Maturity”

Presentation

Ubiquitous Computing – the Trend Towards the Computerization and Networking of All Things

Friedemann Mattern, Manuel Ortega Cantero and Jesús Lorés Vidal

We are at the dawn of a new era of computing, one that will change our lives dramatically – this is becoming ever clearer. While the personal computer, the Internet, and the World-Wide Web have already affected many aspects of business, and there are clear signs of a wider convergence of whole industries such as media, entertainment, consumer electronics, telecommunications, and information technology, the next wave of the technological revolution will affect us much more directly and in every aspect of our daily lives.

Where are we heading? Contrary to previous popular predictions, the 21st century is likely to be characterized less by settlements on the moon, underwater cities and nuclear-powered cars (all of which require huge investments in infrastructure), than by applications based on miniaturized and therefore almost invisible technologies such as biotechnology, nanotechnology and microelectronics – and it will be very interesting to see what synergies develop between these areas.

Of course, advances in microelectronics are nothing new. On the contrary, for more than 30 years Moore's well-known law, according to which processor performance doubles every 18 months, has held true. A similar performance improvement applies to some other important technology parameters as well. We are now certain that the present trend will continue for a good few years to come, which makes this whole area of development so intriguing. It is now apparent that the near future will be characterized by tiny, spontaneously communicating processors that, because of their small size and low price, will be integrated into almost all everyday objects. Information

technology will therefore become ubiquitous and pervade all aspects of our lives.

Internet-enabled mobile phones and Personal Digital Assistants that communicate wirelessly with other devices in their vicinity are only the first indications of the coming "post-PC era". Initially, the main aim is to permit access to information of any kind from anywhere, at any time, evidenced by the current efforts of industry to integrate mobile and wearable information appliances into Web-based business processes and electronic commerce scenarios. In the long term, however, the continuing technological trend may result in the computer merging with typical everyday objects so that it becomes literally invisible.

Even if the physical world is not transformed into a single huge interactive computing platform as quickly as some experts believe, it is clear that, with the increasing computerization and networking of everyday objects, we are becoming ever more dependent on reliable IT systems. Hence, adequate IT concepts, well-trained experts, and computer science as a whole will play an even more important role in the future than they do today.

This issue is dedicated to the current trend towards the "computerization and networking of all things" which is often denoted by the terms *ubiquitous computing* or *pervasive computing*. It aims to provide a first insight into the techniques, expectations, and background of this exciting development, leading to a future pervaded by information technology. Thanks to the authors for their valuable contribution and happy reading!

Friedemann Mattern is professor of computer science and head of the Distributed Systems Group at the ETH Zürich. He was previously professor at the University of Saarbrücken from 1991 to 1994, and at the University of Darmstadt from 1994 to 1999. In 1999, Friedemann Mattern started a new research group focusing on ubiquitous computing and has since been involved in a number of projects in this area.

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