Mobile Computing: Looking to the Future

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Innovations in mobile and embedded computing are transforming the way people access information and use network services.

It has been almost 20 years since technology visionary Mark Weiser predicted the proliferation of inch-, foot-, and yard-size computers ("The Computer for the 21st Century," *Scientific American*, Sept. 1991, pp. 94-104). To a large extent, Weiser's predictions have come to fruition, with smartphones (inch), tablets (foot), and Web-enabled televisions (yard) dramatically changing the Internet landscape.

Moreover, the "Internet of devices" is growing much faster than the desktop Internet, and many experts predict that more users will connect to the Internet from mobile and embedded devices than from desktop PCs within the next few years.

Smart devices are becoming pervasive in part because megahertz, megabits per second, and megabytes have become utilities much like water, gas, and electricity. I call these technologies "mega-utilities" because, like their Industrial Age counterparts, their vast economies of scale and broad-based availability have greatly benefited users.

For example, high-speed integrated circuits are making it economical to transform everyday objects including phones, cameras, and TVs into smart devices. Superfast wired and wireless networks make it economical to transmit audio, images, and high-definition videos to these devices. And the mega-storage trend is transforming computers from processors of compact, computer-friendly ASCII data to processors of people-friendly audiovisual data. These mega-utilities have been a major technological driver for the past decade.

IN THIS ISSUE

This issue presents a collection of articles covering innovations in mobile computing. In reviewing the submissions for this special issue, it became clear that more technology drivers are on the horizon, in particular embedded Web browsers and smartphones. Because of their broad-based availability on so many kinds of devices, browsers might well compete with native applications as a platform; they might also enable new interactions in the Internet of Things. Smartphones that flourished in the rich mega-utility ecosystem can now be viewed as their own technology drivers. Among many other benefits, they enable new classes of persuasive applications and help users take advantage of smart spaces.

Traffic from video, music, and e-books now dwarfs HTML, and app stores for custom-native applications are popping up everywhere. However, in "Reports of the Web's Death Are Greatly Exaggerated," the authors argue that the

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Web will continue to be the premier software platform for the next generation of applications.

Smartphones are not only tools for communication and information but also for persuasion, helping individuals and groups achieve their everyday goals. The authors of "Eco-Feedback on the Go: Motivating Energy Awareness" explore how combining personal phones with principles from human-computer interaction research and psychology can promote energy awareness and help users reduce their carbon footprint.

The common Web browser has had phenomenal success as a viewer for the Internet's information space. Now, a new phase of the Web is developing in which everyday objects such as TVs, thermostats, appliances, and sensors of all types are being connected to the Internet. In "Browsing the Internet of Things with Sentient Visors," the authors explore what the browser will look like in the coming transition from the Internet of Information to the Internet of Things.

When smart devices meet smart spaces, there is an opportunity to merge the personalization afforded by one with the rich human-machine interfaces of the other.

As the authors describe in "Morphing Smartphones into Automotive Application Platforms," Nokia Research is encouraging the adoption of such a fusion between phone and automobile with Terminal Mode, in which the smartphone and car infotainment system work together to present a personalized, networked, high-fidelity application platform.

Innovations in mobile and embedded computing are transforming the way people access information and use network services. The articles included in this special issue offer a look at emerging trends in technology drivers and directions for the smart devices that have become such an integral part of our daily lives.

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