FUTURE WIRELESS APPLICATIONS

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As a new century begins, market forces are accelerating the pace of wireless technology innovation. Faster, cheaper, and more power-efficient alternatives are rapidly evolving for wide-area, indoor, and short-range wireless communication. "Anywhere and anytime access to the Internet" is often quoted as the killer application, fueling much of recent growth in wireless standards and industry.

The objective in putting together this special issue was to ask if the role of wireless is limited to extending the reach of the Internet, or whether there are fundamentally new applications that are enabled by wireless access. Contributions were invited across a range of areas, including novel applications of wireless in sensor networks, location-aware systems, personal area networks, wearable computers, and cellular telephony systems. The pace of developments in startup companies as well as research institutions has been dramatic, and in recognition of that the call for papers solicited short papers describing entrepreneurial uses of wireless technology, in addition to regular full papers.

The result is a set of articles that together provide a fascinating glimpse into the future opportunities enabled by wireless technology. The first four articles in the magazine are full-length articles that address several of the key relevant research issues: public access wireless networks, in-home networks for wireless devices, discovery of resources by nomadic users, and employing wireless technology to change the face of tourism. Following these are two articles reporting on innovative entrepreneurial developments.

The article "Future Wireless Applications for a Networked City" by Davies *et al.* explores the opportunities for context-sensitive applications of outdoor wireless technology in providing novel services for city residents and visitors. This work is a follow-on to the original GUIDE system that provided tourist services for visitors to Lancaster in England. In this article the new system is described, along with a range of new applications it makes possible.

The article by Weatherall and Jones, "Ubiquitous Networks and Their Applications," discusses the opportunities for novel applications of short-range low-power wireless networking in the home. An embedded network design along with a range of applications are presented, as well as a discussion of the technical challenges that arise. The article presents a prototype embedded network being developed at AT&T Labs.

The article "Physical Registration: Configuring Electronic Directories Using Handheld Devices" by Barton *et al.* describes a novel wireless application for constructing electronic directories of pervasive computing environments. Directories can be used by mobile users to discover networked devices and services, or learn information about objects in the computing environment. The article describes how an administrative user carrying a handheld device equipped with a barcode scanner can walk around a pervasive computing environment and construct an electronic directory of network-accessible devices and services, or resources such as books and wall pictures. The article presents two implementations of this application at HP Labs Palo Alto.

In the article "PAWNs: Satisfying the Need for Ubiquitous Secure Connectivity and Location Services" Bahl *et al.* argue that wireless connectivity presents new opportunities for extending network services and deploying location and context-aware applications in public places such as airports, hotels, and shopping malls. A public area wireless network called CHOICE was built and deployed by the authors at a mall in Bellevue, Washington. The article describes the CHOICE system, the lessons learned from its deployment, as well as some insights on making it a viable business.

The article "Mobile Computing at Vindigo" by Caceres *et al.* describes Vindigo, a very popular palmtop application that offers dining, shopping, and entertainment guides to 20 major cities, including New York, San Francisco, and London. Building user-friendly applications on CPU-limited memory-constrained bandwidth-limited mobile devices is a challenging task. Vindigo is one of the few palmtop applications that have been successful at overcoming these limitations and earning mass market acceptance. The article describes how those challenges have been addressed in Vindigo design.

The article "Notes from the Construction of a Relevant Information Network" by Mankins describes an entrepreneurial application of location-aware technology to provide targeted advertising. Vert Inc. has devised an information display that can be controlled to selectively display advertisements based on the display's current geographical location. The article describes the current implementation, with displays mounted on the rooftops of taxicabs in Boston.

These articles demonstrate exciting location-aware services that have been implemented using technology available today. Thanks are due to the reviewers who provided invaluable assistance to the guest editors in making tough decisions on which of the submitted papers to select for publication.

BIOGRAPHIES

PRAVIN BHAGWAT (pravin@reefedge.com) is the principal architect at Reefedge, Inc., a networking infrastructure and software company that builds secure and seamless roaming solutions for indoor wireless LANs. Prior to joining ReefEdge, he worked as technology consultant in the networking research group at AT&T Shannon Labs, and as a member of research staff at IBM Thomas J. Watson Research Center. He is the chief architect of BlueSky, an indoor wireless networking system for palmtop computers, and co-inventor of TCP splicing, a technique for building fast application layer proxies. He actively serves on program committees of mobile computing and networking conferences and has published numerous technical papers and patents in the area of mobile computing and networking. He received his Ph.D. in computer science from the University of Maryland, College Park. He is spending the spring 2002 semester as a visiting professor at the Department of Computer Science and Engineering at the Indian Institute of Technology, Kanpur. He also holds an adjunct faculty appointment at WINLAB, Rutgers University. http://www.winlab.rutgers.edu/~pravin

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