



## Ubiquitous Japan

Japan is well-known as a leader in mobile technology and high-tech gadgets. The image of the Japanese *kogals* (hip schoolgirls) and salarymen (office workers) with their Internet-enabled *keitai* (mobile phones) roaming the neon-lit entertainment districts of Shinjuku and Shibuya has become shorthand for a mobile computing future to which money-hemorrhaging “third-generation” phone operators in the West can only aspire. Japanese universities and corporations are now putting major research funding toward new applications that go beyond the mobile phone, where computation is embedded in the world, and everything is connected. The idea of ubiquitous computing and networking is so popular that the national strategy for information technology is called ubiquitous-Japan, or u-Japan for short. In fact, it seems “u” is replacing “e” and “i” as the prefix of choice to indicate hot new technology.

In that spirit, I recently had the pleasure of joining the Swedish u-Delegation to Japan, organized by the Swedish Science & Technology Office and the Institute for Growth Policy Studies. The intense weeklong visit took us to many sites in Tokyo and Kyoto, and of course this column can offer only a glimpse of what we saw.

Electronic tagging technology is hotter than ever, and almost every lab we visited had a couple of demonstrations showing how tagging can enable new interactive applications. Hitachi showed the latest version of the world’s smallest RF-ID chip, the  $\mu$ -chip, which is smaller than a grain of sand. Due to its low cost and diminutive size, it will allow many new applications that work with tags embedded in everyday objects. For instance, every ticket for the 2005 World Exposition in Aichi (over 22 million total) contained a  $\mu$ -chip, giving all visitors an electronic identity. This

made it possible to make reservations for pavilion visits and events, as well as facilitating more-advanced services such as downloading personalized photos taken at the event. Hitachi is in negotiations with several countries to integrate the  $\mu$ -chip in paper currency, making it harder to forge but easier to count and trace—a truly ubiquitous application area!

About two hours by train from Tokyo Centre is Keio University’s Shonan-Fujisawa Campus, currently one of the most exciting places in the world when it comes to interaction design and ubiquitous computing research. In Professor Naohito Okude’s laboratory, new concepts are explored through a process called “total design.” Among their projects were several new display devices that show that tomorrow’s portable gadgets do not have to look like phones or PDAs. The Z-Agon is an interactive cube with displays on all sides, which allows you to view innovative forms on content. Navigation is as simple as turning the cube. The *BiblioRoll* is another innovative device, an electronic book reminiscent of an ancient book scroll. The lab also demonstrated a new ubiquitous computing sport, *Shootball*—I guess that’s a *u-sport*? It is played on a field with three large screens surrounding the players. The ball is augmented with a sensor so that bouncing it causes the images on the screens to change, and shooting the ball at the pictures scores points for the different teams.



**Figure 1. The Z-Agon concept is an innovative display device in the form of a cube.**



**Figure 2. The uTexture system lets users create their own interactive furniture.**

Keio University, Media Design, Okude Lab

Another laboratory at Keio SFC is run by Professor Hide Tokuda. This lab concentrates on the enabling technology for ubiquitous computing, such as operating systems and networks. One fascinating system is the *u-Texture*, a set of interlocking computational tiles that can be combined to create different applications. The tiles are roughly the size of a Tablet

PC, have integrated network connections and of course RF-ID readers. They can be assembled in many different shapes and will automatically configure themselves to acknowledge the new connections. Fancy a new digital shelf, a smart table, or an electronic wall? Just put together a few u-texture blocks and you've got your new interactive furniture! I wonder if IKEA will catch on?

But if you are looking for high-tech central in Japan, there is only one place to go: Akihabara, the "electric town" in Tokyo that has been the *otaku's* (fanatic's) source for electronic components and new gadgets since World War II, and more recently comic books and animated movies. At the Akihabara site of the National Institute of Advanced Industrial Science and Technology, we find Toshiyuki Masui, who could not be more at home in this environment. He is the inventor of an amazing array of gadgets, hacks, and techniques in everything from information retrieval to tangible interfaces. His biggest success story is the POBox system for predictive text input, which is used in tens of millions of phones in Japan.

One of Masui's inventions is the Mousefield, which combines an RF-ID reader with the sensors of an optical mouse. This simple combination turns any

tagged object into a controller. For instance, by placing the cover of a CD on the reader, you can start the music playing, but by sliding and waving the case you can also skip tracks, adjust the volume, and perform all of the functions normally controlled by buttons. According to Masui, a great advantage of the system is that it is waterproof and thus can be used in bathrooms! This sounds strange until you realize the important role of the bath in Japanese culture. Bathing is not just a means of cleaning yourself, but is an important activity that provides relaxation and contemplation and plays a central role in family and community.

And there we leave u-Japan—where the juxtaposition of tradition and high-tech never ceases to amaze the visitor. Considering Japan's increasing influence through technology and popular culture, don't be surprised if you find yourself grasping for your *keitai* and  $\mu$ -chip next time you take a bath! ◆

#### URLS

Hitachi  $\mu$ -chip: [www.hitachi.co.jp/Prod/mu-chip](http://www.hitachi.co.jp/Prod/mu-chip)  
Naohito Okude Lab, Keio University: [www.ok.sfc.keio.ac.jp](http://www.ok.sfc.keio.ac.jp)  
Hide Tokuda Lab, Keio University: [www.ht.sfc.keio.ac.jp](http://www.ht.sfc.keio.ac.jp)  
Toshiyuko Masui, NAIST: [http://pitecan.com/index\\_e.html](http://pitecan.com/index_e.html)

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