Pervasive Deployment Makes a Difference

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When I travel, I enjoy seeing how technology is used in other cities, states, and countries. I recently traveled to Beijing, China, and observed two new technologies in practice that greatly improved convenience for travelers. The technologies were neither ground-breaking nor unique to Beijing—both have been deployed in other cities around the world—but I hadn't before experienced their widespread deployment.

PERVASIVE APPS AND SENSORS

Unlike my visit to Beijing a few years ago, this time around, I initially found it surprisingly difficult to hail a cab. It turns out that this was because hailing a cab has gone mobile, in a ubiquitous way! In August 2013, Beijing officially sanctioned four smartphone apps to support hailing a taxi.[1] This was a significant turn-around from its ban on commercial taxi apps just two months before.

The apps are pretty simple. Your phone uses GPS to pinpoint your location, and then you enter your desired destination and submit your request. A taxi driver responds, and you can watch the taxi's approach and get an estimated time of arrival.

Since being introduced, the apps have taken over the taxi business. If you don't have a smartphone (with cellular service as well as one of these apps), you're at a significant disadvantage. Although I had my smartphone, it had no cellular service, so when I left my hotel in the morning, it took quite some time for the doorman to hail a cab. (Perhaps in the future, the hotel will provide smartphones with this app to the doormen.) Luckily, for my return trip to the hotel, my colleagues were able to use their smartphones to hail a cab for me.

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Another observation I made while traveling in Beijing was the sensors in a parking garage at the mall. Each parking space had a sensor over it that was green or red, indicating whether the spot was available. Although the sensors seemed easily fooled by bad parking jobs, they made it easy to tell whether there were any available spots in each row of the garage.

What a difference in time and convenience the deployment of these technologies makes! Such simple ideas, when widely deployed, can make a big difference. Given this issue's focus on wearable computing, it will be interesting to see how widespread deployment of wearable computing devices advances the field of pervasive computing. This is particularly relevant in light of the many smart watches, glasses, bracelets, and the like available to today's users.

ALSO IN THIS ISSUE

In addition to our focus articles on wearable computing, this issue presents several exciting feature articles.

In "Biosignals for Everyone," Hugo Plácido da Silva, Ana Fred, and Raúl Martins present a toolkit to make it easier for students, researchers, and hobbyists to get access to physiological data. The authors describe the BITalino hardware platform, which captures a variety of physiological data. They also present the software libraries that make it easier to interface with the hardware to access those captured signals and present some related use cases. One that caught my eye uses conductive fabric on the handlebars of a bicycle to allow software to monitor the rider's heart rate without requiring the rider to wear a chest strap or similar device.

Yossi Gilad, Amir Herzberg, and Ari Trachtenberg bring us "Security Smartphones: A μTCB Approach." In this article, we learn how a small trusted computing base can be used to secure smartphones. In essence, the authors

propose having a small trusted computing base in your smartphone that allows the phone to enter a "secure" mode. To enter this mode, the user must physically push a special button to prove that the user is in physical possession of the device. Once in the secure mode, all I/O is managed by the trusted computing base. As smartphones become increasingly enticing targets for malware, such an approach will become necessary to let us continue to use our phones for payments and secure messaging.

In our next article, "Toward a Group-Aware Smartphone Sensing System," Bin Guo, Zhiwen Yu, Daqing Zhang, Huilei He, and Jilei Tian describe a smartphone sensing system that helps identify and manage groups and activities. The system leverages social networks, graphs, and context-aware computing to support real-world interactions.

In addition to these articles, this issue includes an array of interesting departments, including Mary Baker's interview of Terry O'Shea, a Fellow at Hewlett-Packard. O'Shea is leading a team focused on wearable devices, and he provides insights from his vast experience in the field. In their discussion, they cover a wide range of topics, from what makes something a wearable to the technological challenges of wearable computing. One topic focuses on the importance and challenges presented by fashion trends and how technology must be aware of fashion issues if it's to have widespread success in the wearable market.

In our Wearable Computing department, Thad Starner considers the question of why wearable computing might succeed now when it hasn't in years' past. He highlights the many technologies he has worn daily since 1993, when he first started using a computer with a head-up display. He looks at the many technological changes that have happened over the years related to wearable computing. This perspective will help you understand why wearable computing seems to be taking off now when it

hasn't gotten off the ground so many times before.

Our Conferences department focuses on MobiSys 2014, which took place in Breton Woods, New Hampshire this past June. Travis Peters and Puneet Jain provide an informative overview of the conference. The conference opened with a keynote by James Landay, who reminded attendees to focus on balance between different (and competing) aspects and also challenged attendees to set audacious goals. The many technical sessions focused on many different topics, ranging from wearable computing to gesture recognition, security, and performance. If you couldn't attend the conference, this overview should help you find papers of particular interest to you.

In our Notes from the Community Department, Mary Baker and her new department co-editor, Justin Manweiller, discuss a wide variety of material from around our community. They begin with 3D printing that extends the theme of our July–September 2014 issue. They continue with extreme sports, including an interactive basketball court and a tool that provides a multi-angle view of Yankees baseball. Next up are tools that support spying—for spying on thieves or teenage drivers. They then move on to this issue's theme of wearables, including interviews about wearables and also wearable gadgets. Finally, they present a wearable for cats that lets owners gather information about unprotected or underprotected Wi-Fi hotspots around the neighborhood.

Our Spotlight department, contributed by Ival Elhart, Tommi Heikkinen, and Aaron Quigley, focuses on the Third International Symposium on Pervasive Displays (PerDis 14), which was held in Copenhagen in early June. They highlight some of the presentations and demonstration that took place over the course of this year's symposium, including the ways in which the walking speed of passersby can be used to evaluate a public display, the exploration of a mobile "display copter," the impact of bezel size in large tiled displays, as well

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as a demonstration of software to support open public display networks with content from many stakeholders.

In this issue's Smartphones department, Nayeem Islam and Roy Want provide a fascinating look back at the evolution of the mobile phone, bringing to mind cell phones long since forgotten. They also offer a glimpse into what capabilities might come to smartphones in the future. My personal favorite was "cell phone meets wearable," with the concept of a phone whose wearable components are distributed across your body where they make the most sense.

Wearable computing seems to have momentum—between the glasses, watches, and bracelets, we just might see wearables become pervasively deployed in the next few years. What fundamental changes in our daily lives might we see if this future becomes reality? As I said before, pervasive deployment can make a big difference—so it should be interesting to watch wearables go mainstream in cities all over the world in the years to come. P

REFERENCE

1. J. Chan, "Taxi Apps are Back (and Legal) in Beijing," blog, 24 Aug. 2013; www.thebeijinger.com/blog/2013/08/24/taxi-apps-are-back-and-legal-beijing.

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