Chapter XXVIII
Citizen Science:
Enabling Participatory Urbanism

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ABSTRACT

In this chapter, we present an important new shift in mobile phone usage—from communication tool to “networked mobile personal measurement instrument.” We explore how these new “personal instruments” enable an entirely novel and empowering genre of mobile computing usage called citizen science. We investigate how such citizen science can be used collectively across neighborhoods and communities to enable individuals to become active participants and stakeholders as they publicly collect, share, and remix measurements of their city that matter most to them. We further demonstrate the impact of this new participatory urbanism by detailing its usage within the scope of environmental awareness. Inspired by a series of field studies, user driven environmental measurements, and interviews, we present the design of a working hardware system that integrates air quality sensing into an existing mobile phone and exposes the citizen authored measurements to the community—empowering people to become true change agents.
MOTIVATION

Mobile phones are powerful tools indeed—collapsing space and time by enabling us to reach out to contact others at a distance, to coordinate micro-planning events, and to reschedule activities at a moment’s notice. But with all of their abilities they lack the superpower we perhaps need most—the ability to measure and understand the real world around us.

We carry mobile phones with us nearly everywhere we go; yet they sense and tell us little of the world we live in. Look around you right now. How hot is it? Which direction am I facing? Which direction is the wind blowing and how fast? How healthy is the air I’m breathing? What is the pollen count right now? How long can I stay outside without getting sunburned? Is the noise level safe here? Were pesticides used on these fruits? Is this water safe to drink? Are my children’s toys free of lead and other toxins? Is my new indoor carpeting emitting volatile organic compounds (VOCs)? Now look to your phone for answers about the environment around you. What is it telling you? For all of its computational power and sophistication it provides us with very little insight into the actual conditions of the atmospheres we traverse with it. In fact the only real-time environmental data it measures onboard and reports to you is a signal to noise value for a narrow slice of the electromagnetic spectrum (Figure 1).

Certainly one could imagine accessing the web or other online resource to find an answer to some of these questions. But much of that online data is calculated and published for general usage, not for you specifically. For example, the civic government may say that the temperature is currently 23°C by taking one measurement at the center of the city or averaging several values from multiple sites across town. But what if you’re in the shade by the wind swept waterfront where it is actually 17°C or waiting underground for the subway where it is a muggy 33°C. The measurement that means the most to you is likely to be the one that captures the actual conditions you are currently experiencing, not citywide averages.

Imagine you are deciding between walking to one of two subway stations and could gather live data from the passengers waiting on the platform at each stop about the temperature and humidity

Tell me, I forget.
Show me, I remember.
Involve me, I understand.

—Chinese proverb
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