Place Based Ringtones

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Any new technology, any extension or amplification of human faculties when given material embodiment, tends to create a new environment.

- Marshall McLuhan [7]

ABSTRACT
No longer confined to our offices, schools, and homes, technology is expanding at an astonishing rate across our everyday public urban landscapes. From the visible (mobile phones, laptops, and blackberries) to the invisible (GPS, WiFi, GSM, and EVDO), we find the full spectrum of digital technologies transforming nearly every facet of our urban experience. Many current urban computing systems focus on improving our efficiency and productivity in the city by providing "location services" and/or interactive navigation and mapping tools. While agreeing with the need for such systems, we are reminded that urban life spans a much wider range of emotions and experiences. Our claim is that our successful future urban technological tools will be those that incorporate the full range of urban experiences – from improving productivity and efficiency to promoting wonderment and daydreaming. This paper describes the development of Hullabaloo, an Object of Wonderment based on urban sounds, ringtones, and Bluetooth sensing. We also present concepts around the design of a toolkit for enabling the production of future Objects of Wonderment.

INTRODUCTION
Contrary to location based services and corporate generated productivity tools; our goal is to create a simplified open source toolkit that the public can use to easily create new public urban objects that promote wonderment. By allowing anyone to design and deploy these new city objects, we are directly empowering people to participate in the authorship of their emerging digital era metapolis with emotionally meaningful technological objects that matter.

Deconstructing the Mobile Phone
Our mobile phones are more than just personal communication tools, they are "mobile-super-computer-radio-stations-with-sensors". They are globally networked, speak the lingua franca of the city (SMS, Bluetooth, MMS), and are becoming the dominant urban processor. We need to shatter our understanding of them as phones and celebrate them in their new role as measurement instruments. Our desire is to provide our mobile phones with new senses and abilities by enabling a wide range of physical sensors and actuators to be easily attached and visually programmed by anyone (Figure 1). These resulting, Objects of Wonderment are a series of new public artifacts designed to radically expand our expectations of mobile phones as they shift beyond merely connections to people and begin to interface directly with new sensors, actuators, and physical places. The Objects of Wonderment Toolkit is an open source project designed to promote hacking, re-making, and to tap into the personal DIY (Do-It-Yourself) passions in each of us.

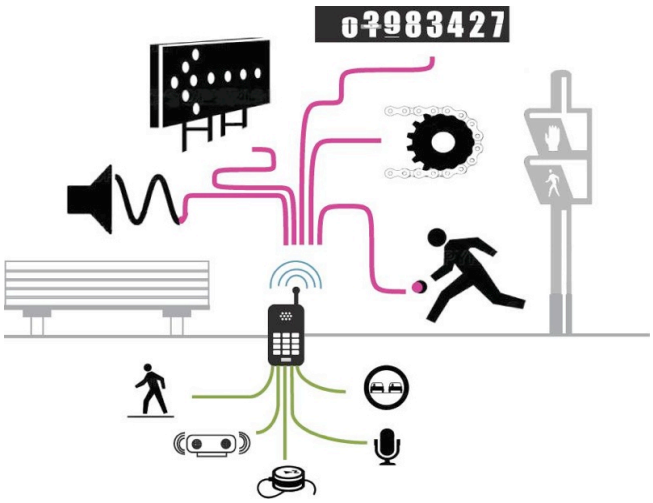

Figure 1: The Objects of Wonderment Toolkit is an open source mobile phone toolkit designed to radically expand our expectations of mobile phones as they shift beyond merely connections to people and interface with new sensors (*at bottom in green*), actuators (*at top in red*), and physical places empowering each of us to become authors of our emerging technological public urban landscape.

Mobile Phone as Urban Processor
Central to the Objects of Wonderment Toolkit is the mobile phone. We have drawn much of our inspiration from the wide range of successful existing physical toolkits [3, 7, 9]. Our approach is to the use of the mobile phone as the central computing platform for the system, promoting a hacker style [1], DIY (Do It Yourself) approach to making by using a standard everyday consumer technology as the basic building block. Already a throw away item, discarded

mobile phones could be repurposed back to life serving as the cores for these Objects of Wonderment. It is important that other single board computers and embedded processors are avoided as much as possible. This keeps the cost low as well as the accessibility of the system to a wide range of non-experts. Using the phone has several main advantages:

1. **Familiar urban object** – mobile phones have already adapted themselves into our city lifestyles where we comfortably co-habitate with them
2. **Commodity consumer item** – tremendous production volumes drive the cost down for mobile phones leaving more raw technological power and functionality per cost than any single board computer or microcontroller
3. **Globally networked** – mobile phones come connected to the global network where data can easily be moved between devices, servers, and the web.
4. **Speak the lingua franca of the city** – by design they readily interact with existing urban technologies such as Bluetooth, SMS, and MMS
5. **Color Display** – mobile phones provide a functional color display for output and debugging

Physical Prototypes as Inspiration

Rather than design and implement the entire toolkit we wanted to go through the process of developing, building, and deploying a prototype Object of Wonderment. We expected this process to motivate a wide range of inspiration around the concepts and ideas we were planning with the Objects of Wonderment toolkit. As a design constraint we scoped our focus on the idea of a "public object" + "public sensing" + "public expression" = "personal reflection". While we realize that the range of objects that could be built with the toolkit could not be limited to such public objects, we chose to brainstorm our initial design scenario in this space. We wanted to think of the mobile phone not simply as an interface from person to person but as belonging to a place. This paper describes the high level details of the development of this initial inspirational prototype Object of Wonderment called Hullabaloo. A full discussion of the general-purpose toolkit that was motivated by this research is beyond the scope of this paper.

URBAN SOUND

Our brainstorming around *Objects of Wonderment* employed a proactive, hands-on approach using the Urban Probes methodology [8]. Our goal was to be inspired by everyday urban experiences to focus the design for a prototype Object of Wonderment. During these observations, we were drawn to the ubiquity and richness of ambient cityscape sounds. This city soundscape was a rich design space and clearly captured elements of wonderment – birds, horns, conversations, *etc*. While some sounds have long been part of the urban sonace such as laughter and crowds, if you listen carefully you will always hear the technology of the day dominate. The introduction of the combustion engine radically altered the sounds of cities at the turn of the twentieth century. In fact technology has always played a dominant role in shaping the murmur of our cities. Our modern cities resonate with the sounds of a new technology. During our initial bodystorming activities that were done *in situ* at several outdoor urban locations, it was clear that a new sound had begun to dominate the landscape – ringtones.

Ringtones

Ringtones (also known as ringing tones) are the customizable sounds that can be set to announce incoming calls on most mobile phones. Often a specific ringtone is set for an individual person to announce their call uniquely. While many phones come with a small set of pre-installed tones to choose from, an entire industry has emerged to sell ringtones for mobile phones. Ringtone sales are a $4 billion market worldwide, generating $600 million in the US market alone in 2005 [3]. Some staggering statistics – 95% of US mobile phone users have changed their ring tones, 85% have changed it more than once, and 50% of all mobile phone users in US (age 15-30) have downloaded a ring tone. A key observation is that ringtones have a private meaning but present a public experience.

Sound Scapes

Numerous projects have explored the role of sounds, noise, and mobile ringtones within crowds and cities. While not a complete list, we have drawn inspiration from work that promotes new public sounds such as Tejp and Sonic City [4], as well those re-interpreting existing signals as audio such as Glitch [5], new music making metaphors with ringtones such as Dialtones [6], and new urban sensing strategies such as those developed within the eScience project and Noiseman [2].

Studies in Sound

We initiated a series of in situ urban sound studies to further understand the meaning and role of sounds in urban life. A full discussion of these studies is beyond the scope of this paper.

HULLABALOO

Based on our urban sound studies and interviews we designed a new public place based ringtone artifact. Hullabaloo presents the first in a series of new public artifacts called Objects of Wonderment that are designed to radically expand our expectations of mobile phones as they shift beyond merely connections to people and begin to interface directly with new sensors, actuators, and physical places. Combining simple bluetooth sensing technology with a newly fabricated public object, Hullabaloo dynamically generates new urban sonic experiences that reflect the verve of the people that transit it. Each person contributes a unique, personal sound to this place based ringtone mix.

Design

Hullabaloo uses the nearby Bluetooth signals to mix a dynamic sound for a place. The metaphore is for each person to be giving off a sound. As they transit a location there sound is temporarily mixed into the sounds of the others in the place. A person's sound can linger for up to three minutes after they leave the area. The sound "of the moment" is unique to others that share the same place at that time. While we can envision others setting their sound "gift" [1] it would be too difficult for an early deployment. Therefore each person was assigned a deterministic sound. In the future user could send a sound to the system via Bluetooth, MMS, etc to set their sound. Each mobile phone has a unique address that can be read if the Bluetooth radio of the phone is turned on. There is no software that is needed to be installed on people's individual phones (Figure 2).

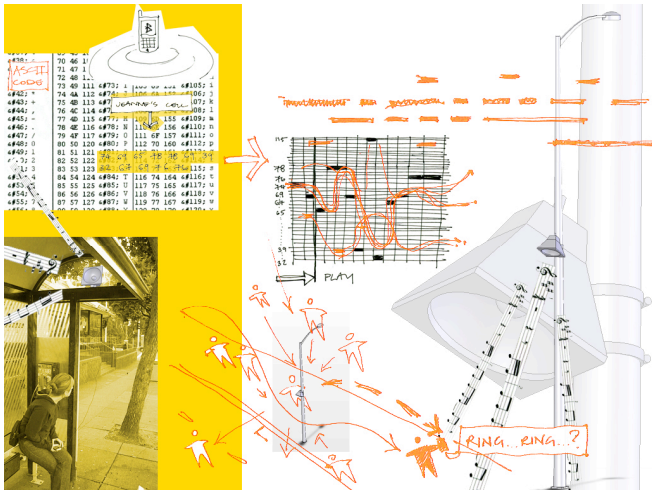

Figure 2: Architectural layout of reading Bluetooth ids to generating audio mixes out a public speaker.

Design with the Objects of Wonderment Toolkit in mind, a mobile phone was placed as the central computational unit. Using Bluetooth to sense individuals the software generates the mix of audio tracks. The software was written in J2ME and currently runs on a Nokia N80 mobile phone. Only a single power outlet is needed to operate Hullabaloo. As each Bluetooth ID is located and scanned, its address and familiar name (i.e. "Jill's Nokia 6600") is displayed on the screen of the mobile phone. Physically attached in a modular fashion is a custom speaker box (Figure 3).

Figure 3: Hullabaloo mobile phone enclosure box (left) and speaker box (right)

Hullabaloo was design so that it could actually be deployed outdoors with less worry about vandalism and theft. While nothing is unavoidable, it is certainly more industrially designed for harsh environments and through three deployments we have incurred no damage or tampering.

Deployment: Cambridge, Massachusetts

Hullabaloo was setup for three months in Cambridge, Massachusetts. During this deployment the set of mixed sounds were composed of pre-recorded urban sounds and human activities such as sneezing laughing, etc. During the deployment over 10,000 separate Bluetooth ids were logged and audio mixed.

Informal interviews were conducted with individuals over the course of the deployment. Many recognized their audio signature during regular visits by the fixed location. Even more encouraging, several people became curious and wondered who had generated the other sounds they often heard. For them, it was truly an Object to promote Wonderment about urban life.

Figure 4: Hullabaloo deployments of white and red units

A second deployment was made of a red colored Hullabaloo system in a downtown setting. In this version the audio samples consisted of bird sounds. Therefore each person was in a sense a separate bird. When they passed by, their bird sound would be mixed in with the sounds of the other birds chirping that represented nearby people (Figure 4).

We are experimenting with enabling deployment of these dynamic ringtones to phones. Similarly, we are experimenting with allowing the uploading of new audio content to the system. Further long term deployments are planned.

CONCLUSION

We set out to re-interpret the mobile phone as an integral building block for urban computing with sensors and actuators attached to it using a simplified toolkit. We used the study of one such designed object, Hullabaloo, as inspiration for motivating further research into a general purpose toolkit for mobile phones. We conducted several studies to design a functional new public Object of Wonderment around Bluetooth sensing and place based dynamically mixed ringtones. This system reinterprets the radiating wireless signals from nearby mobile phones and uses them to produce new compositions of public audio in a fixed location. With Bluetooth clearly at the center of more productivity and efficiency based deployments such as tracking and customer loyalty programs, we envision other uses for this technology that promote wonderment and reflection about urban life. Hullabaloo initiates that discussion.

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