UbiComp in the Urban Frontier

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ABSTRACT

UbiComp in the Urban Frontier captures a unique, synergistic moment – expanding urban populations, rapid adoption of Bluetooth mobile devices, tiny ad hoc sensor networks, and the widespread influence of wireless technologies across our growing urban landscapes. The United Nations recently reported that 48 percent of the world's population current lives in urban areas and that this number is expected to exceed the 50 percent mark world wide by 2007 [1]. In developed nations the number of urban dwellers is even more dramatic – expected to exceed 75%. Current studies project Bluetooth-enabled devices to reach 5.4 billion units by 2005 – five times the number of mobile phones or Internet connections [2]. Mobile phone penetration exceeds 80% of the population in places like the European Union (EU) and parts of Asia [3]. WiFi hardware is being deployed at the astonishing rate of one every 4 seconds globally [4]. We argue that now is the time to initiate inspirational research into the very essence of these newly emerging technological urban spaces. This paper and resulting workshop seek to understand how our future fabric of digital and wireless technologies will influence, disrupt, expand, and be integrated into the social patterns within our public urban landscapes.

Author Key existent words

Urban computing, wireless, public place, WiFi, community, Situationist, *dérive*, *détournement,* mobility, socio-techno infrastructure, urbanism

INTRODUCTION

There is little doubt that laptops, PDAs, and mobile phones have enabled computing to become a truly mobile experience. With these new computing devices, we emerge from our office, work, and school into the urban fabric of our cities and towns. We often view these urban areas as "in-between spaces" – obstacles to traverse from one place to another. However, not only do we spend a significant amount of time in such urban landscapes, but these spaces contribute to our own formulation of identity, community, and self. Much of the richness of life transpires within our own urban settings. The introduction of mobile computing tools upon our urban landscape affords new methods of viewing our city, community, and neighborhood. They can empower us to better understand our social relationship to community, place, and self. Similarly, there is a growing body of work within the field of social computing, particularly those involving social networking such as Tribe, Friendster, and Live Journal. At the intersection of mobile and social computing, we call for a discussion concerning research directed at understand this emerging space of computing within and across our public urban landscapes – technology at the urban frontier.

URBAN LIFE

While toting a laptop around a city may seem a like an example of such city computing, Urban Computing research is more deeply concerned with addressing deeply human issues and concerns embedded within urban living.

While Urban Computing is focused on understanding technological effects on the urban landscape, it's important to reflect on urban life itself. We explore the meaning of our living urban landscapes and then return to the discussion of Urban Computing.

The spectacular image of the modern urban city is that of a facilitator of commercial exchange, a place where people go to shop: the city as mall. The city is also a workplace – a center for government and business functions. While work, commerce, and business are the focus of cities, it is also a place for individuals and communities – a place where people can play. People come there to eat, drink, dance, meet friends, and just hang out. The potential for sociable exchange and the pursuit of happiness is vast. For its workers, the city also provides leisure zones – what Foucault calls "sites of temporary relaxation" [3].

However, the nature and locations of these social encounters are not always predictable. Whyte's "Street Life Project" [4] observed that usage of New York's downtown plazas varied wildly and bore little relation to extant

theories of constructed space. Similarly, Lynch and Milgram exposed the difference between peoples' mental maps of the city and the physical city plan [5, 6]. Jacobs discusses the creation of small neighborhoods in cities [7].

Public urban spaces also manifest a degree of anxiety and fear. The 1964 murder of Kitty Genovese exposed the tenuous and conditional links urban dwellers have to their neighbors and community of Familiar Strangers [8]. Genovese was murdered on the streets of New York City while her neighbors listened to her die. Not one called the police or came to her aid [9]. Afraid for their own safety unable to even telephone the police for help.

While massive physical changes are still rare in urban settings, a new social-technical landscape is emerging. Massive "invisible" changes are taking places through networks of technologies that enable behavior in urban spaces to transgress the lines and protocols between public and private space, altering understandings of time and space. Boundaries between home, office, automobile, and street are increasingly blurred [10]. Jain exposed how individuals used mobile phones within a city to influence the nature, negotiation, and navigation of urban space [11].

Guy Debord and the Situationists [12] sought to reinvent everyday life in urban spaces by constructing situations which disrupted the ordinary and normal in order to jolt people out of their customary ways of thinking and acting. Using *dérive* (the urban flow of acts and encounters) and *détournement* (rerouting of events and images), the Situationist developed a number of experimental techniques that stressed the relationship between events, the environment, and its participants – our urban community.

As computer and social scientists we have the responsibility to look critically at such underlying forces and trends. In this workshop we take the urbanist's perspective on the application of these new technologies within cities by their inhabitants. We think of the city not simply in spatial terms or temporal rhythms but also in terms of flows of people, information, signs, images, and artifacts. We are interested in the movement and activities of people as well as the familiar patterns [13] that comfort individuals within our seemingly chaotic, crowded urban landscape.

URBAN UBICOMP

Only very recently have we seen the playful re-appropriation and novel uses of wireless devices and personal technologies in urban spaces. Such spaces contain trace elements of themes often found in traditional ubiquitous computing literature such as those exploring the ubiquity of computing devices in the home, office, school, automobile, *etc*. However, urban landscapes are both crowded and lonely, comforting and frightening, public and private, and shared and exclusive. Urban places and our actions there are critical to forming our understanding of community and belonging – often without direct interactions with members of the community. Overall, while Urban Computing can draw from foundations in ubiquitous computing, we argue that it diverges significantly from traditional computing spaces, actions, objects, and communities. Furthermore, with mobile and wireless devices in their infancy of adoption in urban life, we argue for an open research forum aimed at promoting a broad inspiration of urban possibilities. This calls for new techniques and methods to engage and explore this field.

COMMUNITY

Who are the people we share our city with? How do they influence our urban landscape? Where do we belong in this social space? How do we understand "us" and "them" as we move through time and space? How are communities enabled to share space or fortress themselves with new urban technologies? How do new technologies enable and disrupt feelings of community and belonging? How will new technologies enable or collapse social and psychological geographies of urban areas? How are understandings of boundaries of public verses private changing? How do current designs and thinking in UbiComp blur the boundaries in good and bad ways? Social movements have played key roles in technology use, in adoption and rejection. How might the cultural movements of rights for women, gay people, the differently abeled, ethnic minorities, older people, younger people and spiritual minorities affect and be affected in an urban UbiComp environment?

INFRASTRUCTURE

How will buildings, subways, sidewalks, parking meters, and other conventional, physical artifacts on the urban landscape be used and re-appropriated by emerging technology tools? What do UbiComp designers need to know about environmental and urban design? What is the role for UbiComp in this space – solving timeless problems of urban design in new ways, improving existing solutions, or causing new problems!? How does UbiComp in the urban frontier exploit, augment, interfere, and supplement physical environments and the perception of the urban? What problems are faced in UbiComp design as it approaches an urban infrastructural landscape that is characterized by fragmentation?

FLOWS

What are the paths or routes through a city using these new urban tools? How will navigation and movement, either throughout an entire city or within a small urban space, be influenced by the introduction of urban technologies? How do we design for movement, rather than the stasis? How will flows in and between urban environments develop? Where will the social-technical networks merge and separate, and how can we design for this heterogeneity?

APPLICATIONS

Although clearly UbiComp has imagined many obvious location based applications, we hope to push the conversation toward more challenging research and design

issues in the urban landscape like "limited attention budget" that urban dwellers have or "designing for difference."

URBAN INTERFACES

What sort of things will be made and why? Where shall we begin the imaginative exploration of potential interfaces and hardware? Should inputs and outputs be more heterogeneous? What about interfaces beyond the visual such as sound, touch and smell? In the urban environment, is there a need to design around ruggedness? If so, what does "rugged" mean in an urban interface? How will we handle scale and group usage "ruggedness"?

CITY AS OPEN SOURCE

The urban is an environment that can be considered an infrastructure environment. It is through these systems that UbiComp can and will happen. This raises questions of what is the right balance between user-provided and environment-provided capability. For example, do I need to buy a WAN cellular wireless connection or should I assume good places have open WiFi? What is the role of authentication in an urban environment? What can the grass roots WiFi initiatives tell us about UbiComp? What ownership issues arise from the expected provision of services and devices? What concerns for design emerge from the urban digital divides?

URBAN PROBES

We have a unique opportunity, right now, to invigorate the very role that technology will play in our cities. We argue for an approach that encourages a divergent brainstorming style, perhaps even away from practical applications, to promote rapid discovery of radical potential ideas, devices, applications, and interactions. Primarily, this research investigation should begin before urban inhabitants acquire strong mental models and expectations of a suite of standardized urban applications.

We argue that now is the time to initiate inspirational research into the very essence of our newly emerging urban spaces. We encourage urban inhabitants to become proactive in the evolving and future design of our urban landscapes. In the spirit of cultural [14, 15] and technology probes [16] we propose a lightweight, provocative, inspirational research methodology for exploring computing in urban environments – Urban Probes

GOALS OF THE WORKSHOP

Taking the above perspectives as a springboard for discussion, this workshop has the following aims:

- To bring together a multi-disciplinary group of practitioners to discus how our future fabric of digital and wireless computing will influence, disrupt, expand, and be integrated into the social patterns existent within our public urban landscapes.
- To elaborate new methods and models in design practice that can accommodate designing technology for urban environments and lifestyles.
- To develop an agenda for future collaborations, research and design in the area of urban computing and identify critical opportunities in this space.

CONCLUSION

The very essence of place and community are being redefined by personal wireless digital tools and mobile devices that transcend traditional physical constrains of time and space. New metaphors for visualizing, interacting, and interpreting the real-time ebb and flow of urban spaces are certain to emerge. Without a concerted effort to develop a deeper understanding of the implications of emerging technologies on our urban landscape, computer and social scientists, city planners, and others run the risk of losing touch with the reality of our urban streets and their inhabitants. The UbiComp in the Urban Frontier workshop aims to provide a starting point for exploring, deconstructing, and understanding our urban landscapes as well as empowering city dwellers to participate in the construction of their newly emerging digital city landscape.

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