Adventures in Urban Computing

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Abstract
Urban computing is an emerging multi-disciplinary research field that focuses on computing and digital networks in urban landscapes, and on the cultural and social impact this has on the city. This diploma is an exploration into this field.

Keywords
Urban Computing, Urban Probe, Mobile Technology, Everyday life, Psychogeography, Urban details, Physical Computing

Introduction
Urban Computing is an emerging multi-disciplinary research field that combines computer-science, technology and research on human-computer interactions (HCI) with art, design and urban, social and cultural studies.

The background for this project is both current practises in Urban Computing and theories of the city and the everyday. The project seeks to explore certain aspects of this field through practical exercises within a theoretical framework. The projects ambition is to do research on Urban Computing by combining skills and knowledge from both interaction design and urbanism.

Background

Ubiquitous computing
Urban Computing originates from *Ubiquitous computing* (Ubicomp). Ubicomp is a post-desktop model of human computer interaction, and describes a scenario / vision where information processing has been integrated into everyday objects and activities. The term "ubiquitous

computing" was coined by computer scientist and Xerox PARC-researcher Mark Weiser in his 1991 article "The computer for the 21´st century" and has become a dominating paradigm in HCI- and computing-research. According to Weiser Ubiquitous computing `takes into account the natural human environment and allows the computers themselves to vanish into the background' [1]. Originally Ubicomp was described as as vision of a *third wave* in computing:

"Ubiquitous computing names the third wave in computing, just now beginning. First were mainframes, each shared by lots of people. Now we are in the personal computing era, person and machine staring uneasily at each other across the desktop. Next comes ubiquitous computing, or the age of calm technology, when technology recedes into the background of our lives." Mark Weiser, 1996 [2]

Since then numerous of interpretations have been made of the vision of ubiquitous computing, and a variety of terms have been coined to describe different perspectives on ubicomp: "calm computing", "pervasive computing," "ambient intelligence", "everyware," [3], "physical computing" [4], the "Internet of things", "things that think" [5], "spime" [6] and others. These different terms are associated with specific future visions that range from humble near-future scenarios to both utopian and dystopian views on the human-computer future.

Ubicomp encompasses a wide range of research topics and the field is developed at institutes and research labs all over the world. In its broadest sense, ubicomp currently includes any number of mobile, wearable, distributed and context-aware computing applications [7].

Urban computing
On of the more recent perspectives on ubicomp is that of *Urban computing*. Urban computing focuses specifically on computing and digital networks in urban landscapes, and on the cultural and social impact this has on the city.

When applied to the city, ubiquitous computing has a very large scope and potentially includes topics about everything like:

- public and commercial infrastructures
- mobile and other wireless networks
- collective transportation
- payment
- security and surveillance
- pervasive advertisement
- smart architecture
- spectacular urban events,
- mobile technology devices
- personal communication
- way-finding
- social network services
- urban art and locative media
- explorative design and urban games.

All these are topics that might be relevant for urban computing research, but it is just as important for urban computing to study the combined impact of rapidly emerging technologies on life in the city, both from a socially, culturally and technical perspective. Urban computing seeks to explore the opportunities and challenges that an ubiquitous computing of the city represent, and focuses on the "user experience" of the city and on the everyday life of the common citizens.

Urban computing does not necessary share the same visions as those of Ubicomp, but relates strongly to current critiques on practice in ubiquitous computing from within the field. One of the critiques relevant to urban computing are presented by Genevieve Bell and Paul Dourish in their 2006 article "Yesterday´s tomorrows: notes on ubiquitous computing´s dominant vision" [8]. Bell and Dourish question ubiquitous computing´s focus on *the proximate future* and the relationship between ubiquitous computing´s envisioned future and our everyday present:

"(...) The centrality of ubiquitous computing´s "proximate future" continually places its achievements out of reach, while simultaneously blinding us to

current practice. By focusing on the future just around the corner, ubiquitous computing renders contemporary practice (outside of research sites and "living labs"), by definition, irrelevant or at the very least outmoded. Arguably, though, ubiquitous computing is already here; it simply has not taken the form that we originally envisaged and conjure in our visions of tomorrow" Bell & Dourish 2005 [9]

Bell and Dourish argues that ubiquitous computing is already here ´in the form of densely available computational and communication resources´ [10], but than instead of being the clean and orderly world it was meant to be; it turns out to be a messy one. Ubicomp devices are ´not invisible and unobtrusive, but highly present, visible, and branded´[11]. Bell and Dourish draws on case-studies from cities in Korea and Singapore, and argues for ´developing a "ubiquitous computing of the present" which takes the messiness of everyday life as a central theme´ [12]:

"Ubicomp has turned out to be characterised by improvisation and appropriation of technology for purposes never imagined by their inventors and often radically opposed to them; by widely different social, cultural and legislative interpretations of the goals of technology; by flex, slop and play." Bell & Dourish 2005 [13]

This "ubiquitous computing of the present" is crucial to the understanding of Urban Computing. Bell & Dourish claims that the fact that we already live in a world of ubiquitous computing is a wonderful thing, but that the main challenge, now, is to understand it [14]. This would also apply to urban computing; the focus should not be on envisioning scenarios for the proximate future, but on deconstructing, challenging and exploring the emerging technological opportunities and challenges of the urban landscapes.

Another perspective on ubicomp that is relevant to urban computing is that of Anna Galloway´s 2004 essay "Intimations of everyday life - Ubiquitous computing and the city". Galloway seeks to "draw out ways in which social and cultural theories of everyday life may begin to contribute to discussions of the design of ubiquitous computing, and how critiques of everyday life will increasingly need to account for emerging ubiquitous technologies." [15] To explore urban computing´s impact on life and society in the city it is necessary to use cultural, social and urban theories as well as HCI and computing research. Urban computing is only another layer in the already dense context of the city, and must be understood as interwoven part of this context. It might therefore also be possible to use urban computing to gather new knowledge about other aspects of the city as well. Both the inputs and outputs of urban computing research must be multi-disciplinary and based on an understanding of the city as a whole.

Urban Atmospheres

Urban Atmospheres at Intel Berkley is currently one of the most relevant research project in urban computing, and is responsible for developing the *Urban probes* methodologies. Their approach to urban computing is crucial for this projects understanding of the term:

"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. (....) At the intersection of mobile and social computing, we seek to provoke discussion aimed at understanding this emerging space of computing within and across our public urban landscapes - Urban Atmospheres." Paulos & Jenkins 2005 [16]

Urban Atmospheres main research challenge is "to understand how the fabric of digital and wireless computing will influence, disrupt, expand and be integrated into the social patterns existent within our public urban landscape " [17] and their work consists of several project investigating different aspects of urban computing. They focus on "exposing, deconstructing, and understand the challenges of this newly emerging moment in urban history and its dramatic influence on technology usage and adoption [18].

One of their ambitions is to develop methodologies for inspirational research into "the very essence" of the newly emerging technological urban spaces [19]. This is described and discussed in Eric Paulos´ and Tom Jenkins´2005 paper "Urban Probes: Encountering our emerging urban atmospheres":

" An Urban Probe is a fail-fast approach for asking early questions about urban computing in order to focus and influence future urban research and application choices. It is also a useful methodology for conducting rapid urban application discovery and evaluation metrics.

Urban Probes employ a series of lightweight provocative urban proto-tasks to inspire direct discussion from people about their
current and emerging public urban landscape. These tasks involve physical construction of simple, functional artifacts and accouterments that are introduced into the urban landscape. These are not paper prototypes, but working models of potential systems.

Urban Probes must capture provocative elements of urban computing questions while incorporating opportunities for play, Happenings, and various Situationists themes such as détournement (rerouting of events and images), and dérive (the urban flow of acts and encounters). Similarly, Urban Probes exploit methods of deep observation coupled with experimentation and concrete interventions in urbanism. In practice, Urban Probes develop and deploy novel physical artifacts into everyday urban settings." Paulos & Jenkins 2005 [20]

Urban probes build on research in developing technology and cultural probes and applies this to the context of urban computing [21]. They argue that probes are ideal for an emerging multi-disciplinary field in that probes combine the social science goal of collecting information about the use and the users of the technology in a real world setting, the engineering goal of field-testing the technology, and the design goal of inspiring users and designers to imagine new kinds of technology to support their needs and desires [22]. By developing an urban probes methodology Urban Atmospheres wants to allow researchers to collect inspirational data about urban places and people, but also to provoke city inhabitants to think about "the roles they play and pleasures they experiences in their everyday life" [23].

Urban Atmospheres continue to develop projects along the directions and values that they present in Urban Probes and their approach to Urban computing is a significant one. Their latest projects include "Ergo - On-the-Go Air Quality Readings delivered to your mobile device" [24] and "Participatory Urbanism - Empowering citizens to collectively author, share, and remix measurements from their environment" [25]. The Participatory Urbanism-projects share the same attitude to urban computing and everyday life as Urban probes, but deal specifically with citizens as agents of change.

"Participatory Urbanism promotes new styles and methods for individual citizens to become proactive in their involvement with their city, neighborhood, and urban self reflexivity. Examples of Participatory Urbanism include but are not limited to: providing mobile device centered hardware toolkits for non-experts to become authors of new everyday urban objects, generating individual and collective needs based dialogue tools around the desired usage of urban green spaces, or empowering citizens to collect and share air quality data measured with sensor enabled mobile devices." [26]

Participatory Urbanism argues for, and explores a shift in mobile device usage - from communication tool to "networked mobile personal measurement instrument". The project explores how these new "instruments" enable entirely new participatory urban lifestyles and create novel mobile device usage models [27]. Participatory Urbanism promotes a perspective on Urban Computing that includes involving citizens in the development and exploration of technology in urban landscapes. The project has a democratic agenda and

has a cultural and social concern for the everyday life, and argues that technology and computing can provoke change.

Motivation

In the broadest context the motivation for the diploma is to theoretically and practically explore the field of Urban Computing. The spirit of Urban Computing, as promoted by Urban Atmospheres, is one on of "open authoring, sharing, and remixing of new or existing urban technologies marked by, requiring, or involving participation, especially affording the opportunity for individual citizen participation, sharing, and voice" [28]. This diploma-project positions itself within this understanding of urban computing and strongly relates to the Urban Atmosphere projects and the development of the urban probes methodology. The diploma shares the concern with people´s experiences in cities, towns and other landscapes that are layered with new technological opportunities and challenges. The diploma has an interest in how the technology of the city influences everyday life, and how everyday life can have an impact on the development and usage of technology. The diploma also promotes an interest in the non-spectacular and mundane side of life in cities and towns, and supports a ground level view on the exploration of human encounters with the urban environment.

Project

Context

The working-title of this diploma project is "Adventures in Urban Computing", but it could just as well have been "Adventures *into* Urban Computing". The diploma`s ambition is to make explorations into the specific branch of Urban Computing that is described above. This contextual background can be summarised as:

- Urban Computing is about 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 [29].
- Urban Computing is a multi-disciplinary field that draws on HCI-research, architecture, design, art, urbanism and cultural and social theories of life in the city.
- Urban Computing is a ubiquitous computing of the present, and it takes the messiness of everyday life as a central theme [30]. It is not about developing scenarios for a future digital metropolis, but working for the here and now. Urban Computing is not as not about "the city of the future" but about the future of the city.

Theme

The goal of the diploma-project is to develop a concept within this context, preferably concerning the theme of city life, user experience and citizen-involvement. The diploma`s ambition is for the concepts to be both developed, tested and evaluated. One of the initial concepts is to design a "toolkit" for collaborative city exploration along the lines of Urban Probes, but other more intricate concepts might be developed as the project evolves. The concepts should focus on artifacts and devices as part of workshops for gathering subjective city-readings and opinions, and generating informed discussion about city life and urban details. The diploma will therefore have a focus on practical and conceptual interaction design, as well as the facilitation of probing sessions (user-tests) and workshops. Probing sessions will be understood as conceptual user-tests; testing concepts and exploring interactions in context.

Goals / Ambitions

This diploma-project is meant to be an practical exercise within the theoretical framework of urban computing. As the phrase "exercise" suggests, the scope and practical scale of the project will be modest. As the project-period is only four months, the diploma will not attempt to develop concepts for large-scale services or proper products, or dwell with visions of the

digital metropolis of the future [31]. It will focus on fieldwork and designing small-scale interventions into everyday life. These interventions will not be locative installations or spatial structures, but will deal with the possibilities of mobile technology and wireless networks. A possible direction would be to design mobile technology devices with the purpose of gathering and provoking opinions of the city. These devices would be designed as probes and would also be exercises in interaction design. The devices would be used as input for workshops or seminars on reading the city. It might be necessary to introduce an element of storytelling into this process, and the workshops would preferably be structured as classical scientific explorations [32] to promote an adventurous atmosphere.

It is the projects ambition to be relevant within the field of urban computing. The project should have the field as its broader context, but not necessarily seek to draw generalizable conclusions. It should rather provide reflections on the theme and an informed discussion of possibilities. The project`s goals can be summarised as:

- Research in urban computing and related fields; might including art, locative media, urban games, mobile technology, psychogeography (and other theories of subjective city reading), locative services, explorative design research, storytelling, design methodology and other relevant topics.
- Creating a "Project review" that summarises the research and presents projects that are relevant to the diploma.
- Developing ideas and concepts based on the research and the theme of the diploma. Developing one (or more) of these concepts through iterations of prototyping, workshops and probing sessions (user-tests).
- A body of reflective knowledge and conclusions obtained through testing, evaluation, design and iteration.

Process

The project is of an explorative nature and will include practical exercises, prototyping, user-tests and theoretical writing. The priority of these topics might shift as the project evolves. The key concepts in the process will be rapid prototyping, design iteration and evaluation in context. The project will have a practical attitude to interaction design, focusing on the creation of simple prototypes to test concepts and ideas. The writings of this diploma might be presented as an essay or a paper, and including a summary of the projects theoretical framework as well as an evaluation of the outcomes.

Bibliography

- "Placing Worlds – Symbols, Space, and the City", William J. Mitchell, The MIT Press 2005, Cambridge Massachusetts 2005.
- "The Situationist City", Simon Sadler, The MIT Press 1998, Cambridge Massachusetts 1998.
- "Theory of the Dérive and other situationist writings on the city", Libero Andreotti & Xavier Costa (red.), ACTAR Barcelona 1996.
- "Situationists – art, politics, urbanism", Libero Andreotti & Xavier Costa (red.), ACTAR Barcelona 1996.
- "Estetiske teknologier 1700-2000", Gunnar Iversen og Yngve Sandhei Jackobsen (Red.), SAP 2003.
- "Teknikk og modernitet", Andrew Feenberg, Universitetsforlaget i Oslo, 1999.
- "Psychogeography", Merlin Coverley, 2006
- "Walkscapes", Francesco Careri, 2002
- "Creative City – A toolkit for Urban Innovators", Charles Landry, 2000
- "The Practice of Everyday Life", Michel de Certeau, 1984
- "På sporet av Byen", Aspen/Pløger (red) , 1997
- "Teknovitenskaplige kulturer", Kristin Asdal, Brita Brenna og Ingunn Moser (Red.), 2001
- "Where the action is", Paul Dourish
- "Everyware", Adam Greenfield, 2006
- "Shaping Things", Bruce Sterling, 2005
- "In the Bubble", John Thackara

- "Digital Ground: Architecture, Pervasive Computing, and Environmental Knowing", Malcolm McCullough, 2005

The bibliography will grow as the project evolves.

References

[1] Weiser, M. (1991) "The computer for the 21st century", Available at http://www.ubiq.com/hypertext/ weiser/SciAmDraft3.html
[2] Weiser, M. (1996) on "Ubiquitous Computing" on http://www.ubiq.com/hypertext/weiser/UbiHome.html
[3] Greenfield, A (2006) "Everyware: The Dawning Age of Ubiquitous Computing" New Riders Publishing; 1st edition (March 10, 2006)
[4] Igoe, T & O´Sullivan, D. (2004) "Physical Computing: Sensing and Controlling the Physical World with Computers" Course Technology PTR; 1 edition (May 28, 2004)
[5] MIT Media Lab "Things that think" http://ttt.media.mit.edu/
[6] Sterling, B. (2005) "Shaping things" The MIT Press (September 1, 2005)
[7] Galloway, Anne (2004) "INTIMATIONS OF EVERYDAY LIFE - Ubiquitous computing and the city " p.5 Cultural Studies Vol. 18, No. 2/3 March/May 2004, pp. 384–408 available at purselipsquarejaw.com
[8] Dourish, P. & Bell, G. (2006) "Yesterday´s tomorrows: notes on ubiquitous computing´s dominant vision" Pers Ubiquit Comput (2006)
[9] Ibid p.2
[10] Ibid p. 8
[11] Ibid p. 10
[12] Ibid p.1
[13] Ibid p.10
[14] Ibid p. 10
[15] Galloway, Anne (2004) "INTIMATIONS OF EVERYDAY LIFE - Ubiquitous computing and the city " p.2
[16] Paulos, E. & Jenkins T. (2005) "Urban Probes: Encountering Our Emerging Urban Atmospheres" CHI 2005 p.1
[17] Urban Atmospheres http://www.urban-atmospheres.net/
[18] Ibid
[19] Paulos, E. & Jenkins T. (2005) "Urban Probes: Encountering Our Emerging Urban Atmospheres" CHI 2005 p.1
[20] Ibid p.3
[21] Ibid
[22] Ibid
[23] Ibid
[24] "Ergo -On-the-Go Air Quality Readings delivered to your mobile device" http://www.urban-atmospheres.net/Experiments/Ergo/index.html
[25] "Participatory Urbanism" http://www.urban-atmospheres.net/ParticipatoryUrbanism/index.html
[26] Ibid
[27] Ibid
[28] Ibid
[29] Paulos, E. & Jenkins T. (2005) "Urban Probes: Encountering Our Emerging Urban Atmospheres" CHI 2005 p.10
[30] Dourish, P. & Bell, G. (2006) "Yesterday´s tomorrows: notes on ubiquitous computing´s dominant vision" Pers Ubiquit Comput (2006) p.1
[31] "Designing the century's first digital city", http://news.com.com/2008-1082-958461.html
[32] Darwin, C. "The Voyage of the Beagle: Charles Darwin's Journal of Researches"