

Towards Urban HCI

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ABSTRACT

In this position statement we raise a number of questions about how HCI systems can incorporate design values which are already embedded in architectural space. Thinking about these might help to explain why Ubiquitous Computing often does not provide fitting HCI solution for the public urban environment. We aim to show that technology system developers need to approach their developments from a situated perspective to create public social values in a space already infused by segregation.

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H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

In the 50ies and 60ies, the car and its promise of freedom and mobility was the main technological force that influenced the design, the use of the built environment and its architecture greatly. Whole cities were built based on the dogma of car-friendly environments (e.g. Radburn, New Jersey). This idea not only had an impact on large-scale urban planning, but also influenced the micro-level of the built environment. Architects were heavily influenced by the upcoming ubiquity of the car. Drive-in banks, drive-in fast food and even drive-in churches are some of the results. This development in the 60ies and 70ies also led to the alternative concept of car-free living as a reaction.

Will computer technology influence architects in the same way? Sure, it already has. Since the 80ies Computer Scientists investigate ways to embed digital technology into the city. E.g. we now cluster in cafés or public libraries with free Wifi spots, we obey every day access restrictions systems in the subway and at parking spaces, trust the ATM, or a building, smart elevator, or traffic system that regulates our mobility, which otherwise (as we think) would be chaotic. However most of these technologies have regulating and restricting effect. In “Code and other laws of Cyberspace” [10] Lawrence Lessig points out that architecture (cf. Latour’s Berlin key), besides the entities of norms, laws and market, is a regulating force in our lives. The interesting bit here is that he shows that code is the equivalent of architecture in the cyberspace. Nowadays embedded technology with its ‘code’ sprawls into the cities. With sensors and actuators the code becomes just as physical as architecture has been since centuries and thus turns into a fifth re-

gulating force alongside the market, laws, norms and architecture.

We have seen that architectural urban designs changed to accommodate cars and we know that the same happened with the advent of computer technology in the city. However, let us turn around the question and ask: “How can architecture be utilized in the design of HCI Systems?” or “Should architecture influence HCI?” If we do so, we clearly have to think a bit longer. In general Ubiquitous Computing tends to strip the relevance of space away from the systems’ design. Most of these systems work universally, regardless of time and space. We believe that if we carry on neglecting architecture as a discipline when designing new HCI applications for the city, few systems with values beyond efficiency, surveillance and consumer oriented applications will emerge. Valuable opportunities for software systems that enliven public space and involve and activate city dwellers will be lost. ‘Embedded code’ with a playful character and interactive concepts may cultivate social values, spark political discourse, create shared or mediated encounters, and promote cultural activism, participation and involvement. Computer systems in urban scenarios do not necessarily have to be of a passive nature or to serve automation and regulation. We believe that these systems could also create new types of human computer interaction.

USING THE CITY

Until now, Media Façades are one of the rare original fusions between information technology and architecture. Most of them are commercially used and one could argue that they are rather poor representatives of technology in public space. Politically controversial and aesthetically questionable, Mark Shepard describes in [12] how neon and the intangible image became more important than detailing in façades in the 50ies and 60ies. Again we can draw the comparison to the car. Like some cities ban cars from the inner city, Sao Paulo prohibited advertising screens and billboards. And here the lack of HCI research becomes obvious. IT System deployment had to be left to the advertising industry and property developer. Research could not deploy media technology because deploying things in public space is highly political. City council regulations in general are an unknown problem area that makes the research area of Urban HCI so difficult. While Ubicomp is largely free from such regulatory problems, situated technology often has to go through a daunting approval process.

However, the arts and activism established ways how we nevertheless can explore the relation between architecture

and HCI. Art and Technology festivals like FILE, Today's Art, Urbanize, Incubate, Future Everything, Media Façade Festival, etc. provide good vehicles to get around these issues, because curators act as brokers between artist and city council. Also, there are plenty of independent collectives which are digital reincarnations of the Situationist International (e.g. The Ludic Society [1]) reviving and reinterpreting their methods and ideology with new location based technology. Urban probes like "Wallbots" [9], Laser Tag [6] or SMSlingshot [5] take approaches of activism, intervention and street art to gain bigger insights in the digital activated use of public space. Of course this can result in a conflict with authority and ethical concerns and questions of safety hit the agenda.

When we step into public space, regulating forces become a constraint. But politics is not the only challenge to deal with. Our experience with interventions done in the past taught us that we need to think differently. Interaction in urban spaces has to integrate spatial thinking beyond longitude and latitude and hence will create a new breed of interfaces different from the ones known from mobile and desktop computing.

TOWARDS AN ARCHITECTURAL UNDERSTANDING OF RELATIONAL SPACES

We believe, that when we are developing interactive technology for large spaces, we need to attain an architectural understanding of space. Looking at common attempts for pervasive technologies in architectural spaces, we find that these often focus on screens (e.g. [14], [15]), and have a tendency to design, discuss and analyze these in relative isolation from their surroundings. For technologists, screens are the predominant choice of creating interactivity, and the environment is often only analyzed in terms of where to attach the screens and the surroundings influence on usability requirements or location-based information needs.

It is Difficult to Think Different

Indeed, it is not easy to think outside the box of well-known technology and gadgets. We experienced this when teaching a 6 week module on Interaction Design for our 1st year CS students, using the OzCHI 2010 24-hour student design challenge for a group project. This asked to pick an unused urban space and to sketch how it could be revitalized using novel or existing digital technologies. Over six weeks, we ran students through an inquiry, brainstorming and sketching process. It was striking that in terms of proposed functionality (and the values this carries), information, efficiency and access to services were prevalent – email, discussion forums, class timetables, transport timetables and bus tickets, event calendar, time of day, historical information on buildings, and internet access in general, plus advertising. A majority of groups decided to install screens of some kind (some big outdoor touch-screen panels, and the more inventive ones were embedded in benches or lamp-posts), while one group sketched a smart-phone guide (deviating from the brief to embed technology into the environment). We also noted the tendency to want to 'box' specific activities

into an enclosed area, e.g. setting up a glass-paneled kiosk for computer gaming in the pedestrian zone. The more innovative solutions attempted to integrate screens into objects that create comfort spaces (seating, rain-cover), had them movable and pointing at buildings (for an AR view). Only two groups went for more playful ideas, such as an interactive staircase with LED lights or a musical walkway. While this was disappointing to see, we really should not expect different – if we look around our cities, the majority of identifiable technology takes the form of screens, providing information or advertising.

Scaling up – Taking Inspiration from Other Disciplines

While it is standard for HCI to stress that we need to design for context, we are not yet used to thinking about this on an architectural scale and in terms of urban design. This also includes thinking about how technological interventions might create new places [2], meanings, new communities, and social interactions, or how they generate (or interact with) mobility patterns.

While not explicitly architectural, some of the concepts suggested in the authors' previous publications suggest taking an architectural perspective towards embedded technologies. One of the core themes of the **Tangible Interaction Framework** (which includes embedded and embodied interaction) [7] is *Spatial Interaction*, and relates to the spatial nature of a system's setup and the ability to engage in full-body interaction. The themes are broken up into a set of questions each. Questions such as 'How can the human body relate with the space?' and 'Can you create a meaningful place with an atmosphere?' are inspired by a phenomenological investigation of how spaces are experienced (space is inhabited, lived in, by humans who have bodies that relate to the space around them), and will sound familiar to architects (Le Corbusier considered the size and proportions of the human bodies in his architecture, for example at La Tourette). Other questions within this theme address the visibility of action for others and its performative value, experienced 'ownership' of space, and support of bodily skills. Another core theme is *Embodied Facilitation*. It highlights how physical, spatial, and programmed configuration of the system affect group interaction patterns. This was inspired by rather pragmatic knowledge and 'tricks of the trade' from group facilitation methods and adult education, and addresses questions such as whether there is a shared physical focus (which creates a similar arrangement as Kendon's F-formation [8] and thereby might implicitly invite social interaction), the utility of subtle physical constraints that guide people to collaborate and share, and low entry thresholds for interaction. Basically, practitioners that aim to intentionally create social settings and to encourage specific kinds of interactions, have accumulated a wealth of experience-based knowledge on how arrangements of the physical environment (in combination with the process conducted) influence behavior. While educators and group facilitators (or interior designers) do this

on a room scale, urban designers and architects do the same on a larger scale.

Urban HCI can benefit from work done in related areas such as environmental psychology. These might provide us with a common language and concepts that we can use to better understand this new area. While Kendon [8] analyzed the relation between spatial formations and social situations, the urbanist Whyte analyzed the direct impact of architectural space on the behavior of people [16]. His observations are highly relevant, if we wish to utilize existing architectural influences on humans in interactive installations or interventions. E.g. in one of his examples he describes that people are much more likely to have a chat with another person in the middle of the walkway rather than on the side. He also found that street corners are favored for having a lunchtime chat. Also capacities of ledges used for seating were analyzed.

Our model of spaces in Media Façade environments (see Fig. 1) follows a similar phenomenological research approach and will be presented at CHI 2012 [4]. While not yet having full insights on the dynamics in public media interventions, we developed a model that considers different types of spaces and displays in respect of scale and relation, which might help to make better design decisions for interactive pieces in the public.

Different then works done before, we don't focus on experience design or usability issues that treat Media Façades in isolation. Instead, we focus on the overall space it is in and how the numerous subspaces interact and contribute towards (or interfere with) the installation or intervention. We identified relevant subspaces (see figure) that help to discuss designs of situations in the production phase as well as in the phase of deployment. In the case of our own installation, the interaction device is a handheld device, the SMSlingshot. One can type a message on the body of the device, and then shoot the message onto the façade by pulling the physical sling while pointing at the façade.

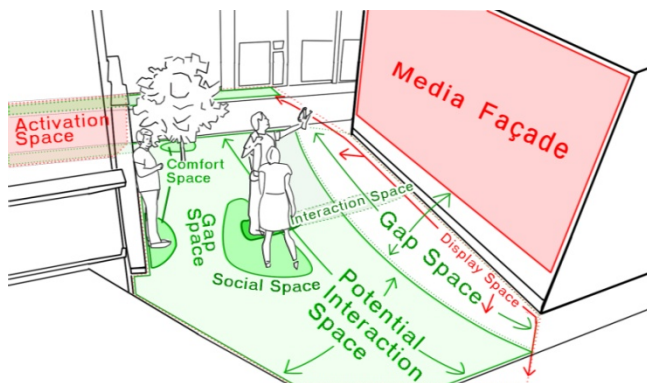


Figure 1 Model of spaces in a Media Façade intervention

The interface allows the user (or as we prefer to say, *performer*) to move around in a *Potential Interaction Space* in front of the façade, and thus the *Interaction Space* between performer and façade itself moves.

Around the performer, often a *Social Space* forms, while the performer is typing in a message in order to 'shoot' it to the Media Façade. Architectural configuration and context affects size, position, duration and fragmentation of the social space. For SMSlingshot it was the case that the device leaves the performer enough flexibility to be able to act in Social Space and the Interaction Space at the same time, not isolating the performer in the virtual realm. Isolation and exposure also plays a role for the observers. They tend to gravitate to so called *Comfort Spaces* that provide a sense of physical and psychological ease. Protective features like walls, pillars, trees seem to draw people subconsciously towards them. Sometimes our projector setup tended to create such *Comfort Spaces*, which we in general wanted to avoid, because the technology was thought to recede in the background. Whenever that happened, drawing people away from the *Comfort Space* was hardly possible. A fifth type identified are *Gap Spaces* that create distance, either between human and system or among humans. These can have multiple causes. Sometimes they occur between different *Social Spaces* and others occur because of the interactive setup. We found in general that the common *Gap Space* right in front of the façade can be closed if the projection is on ground level. The last type of space is the *Activation Spaces*, which are spaces where some displays can be seen from, often triggering curiosity, but interaction is not possible. All these spaces should be considered in concert. Often you have the choice of how to setup your intervention and one tends to do it intuitively without further thought, but tightening *Gap Spaces* or choosing the right *Potential Interaction Space* can make the difference in the success of a shared encounter.



Figure 2 SMSlingshot in Madrid

In addition we found a role based view such as the one from Reeves [11], Sheridan [13] and Finke [3] useful for design. However we extended their models in respect to the fact that roles like performer, performer and participant do have display qualities. This means the scale of a physical activity supplements the digital display in space, as others can see the activity which is becoming part of the installation.

OPEN QUESTIONS

We are surely at the beginning of Urban HCI and still beginning to explore how to create public shared encounters and to relate aesthetically to the social patterns in the built environment. Ubiquitous computing might establish a new sort of global public space detached from the actual, but

what could mediation made use of for the local situation of the city?

Which design values?

We propose to focus on elementary design values in architecture which can be of aesthetical, social, environmental, traditional, gender-based, economic, novelty and scientific value. These base values can be split into subcategories. For social design values this could be, for example, social change, participation, involvement, activation, inclusive design, etc. Again, these design values can be even further specialized. Qualitative design values for plazas might be specified abstractly as: Open and inviting, connected and accessible, usable and comfortable, enjoyable, sociable and enlivening, safe and clean. As stated earlier, the commercial use of technology in buildings and urban space does not seem to see or anticipate the richness of such architectural design values that could be implemented in the urban environment. But maybe it is the task of urban planners to come up with a kind of digital master plan for the city?

Which content and activities?

The passive type of engagement in public space is an important element. There would be no such thing as relaxation if benches would constantly try to engage with their occupants. Allowing people on benches to watch people walk by is a quality that may not need any digital intervention. However, with the term Urban HCI we address values that are of an active nature and if we think of Media Façades we might ask what kind of content would the design values mentioned earlier reflect? Actual content ranges from generative art, abstract environmental data usage, reactive real-time mirroring, concrete video based content or rare interactive content. Playful content seems a favoured choice for interactive installation, but what is beyond that?

How to evaluate?

Lastly, we do not yet know how best to evaluate Urban HCI systems. If we produce activities matching our wanted values, according to what criteria could they be evaluated? Social, architectural, computational, psychological, etc.? What methodologies are suitable for evaluation?

CONCLUSION

It seems that technology will creep into the leftovers of public spaces in the city anyway, but we are in charge. If we want to keep the city a sociable and public place, we should change the way profit oriented systems sneak into the built environment, occupy it and dynamically start to regulate it and with it our lives. We propose that system designer should focus on values already identified by urbanists, social scientists, architects and philosophers. The code in our future architecture has to support basic democratic values, quality of live, our pleasures, politics, rituals and freedom. At the end the city belongs to the people and not

industrials who abuse the power of code to gain more power.

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