



## From cyberpunk to calm urban computing: Exploring the role of technology in the future cityscape



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### ABSTRACT

In this paper we will present studies aimed at uncovering the attitudes, needs, and expectations people have towards novel types of urban computing technologies deployed in a city. First, we conducted a storytelling competition to elicit future visions of how people imagined the role of technology. Second, we conducted a rapid ethnographic study using a mock-up prototype device in various public locations to gain a deeper understanding of how people would appropriate a specific technology, namely interactive public displays. Lastly, we collected ethnographic material through a diary study and interviews where people recorded their use of existing technology, and through these experiences, imagine how future technologies might affect their lives. We found that these methods proved useful in engaging a city's community to imagine the city's future. Consequently, we were able to explore the current use of technologies in the city and project their possible future use. Contrary to previous speculation in academic and cyberpunk literature, we conclude that digital technologies will not necessarily induce an abandonment of physical urban spaces. Rather, we project an increased sophistication in the sociable uses of urban spaces and technologies, where people blend their online and offline worlds into a single lived reality.

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## 1. Introduction

In much of science fiction literature, and especially in the cyberpunk genre, epitomized in the works of the authors featured in Sterling's "Mirrorshades: The Cyberpunk Anthology" [58], future cities are often depicted as dangerous, alienating, media-saturated mega-cities dominated by large corporations where our lives (and minds) are more integrated with technology than ever before. In addition to cybernetic limbs, characters in this genre are often augmented with cranial implants that enable direct brain-computer interaction and

offer access to virtual worlds, which are often depicted as semi-physical places where the protagonist, through an avatar, ventures to find information or to gain access to places that are inaccessible in the physical world. These virtual worlds are dangerous places, where computer firewalls and viruses are also represented by beings that can harm the character, and often the result of injury in these worlds also means death in the physical world – a prime example of such a world can be found in the Matrix films [42], where sentient machines have enslaved all of humanity and keep them under control by feeding a virtual representation of the world as it was before the revolution directly to their brain. Of course, a small group of resistance fighters have managed to escape from the illusion and can traverse between the real world and the virtual one. This dichotomy between the physical and the virtual worlds is very common in much of the cyberpunk literature – people are either in the physical world, or in the virtual, but these two are seen as

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separate, detached from each other. These science fiction narratives are also widely used by researchers as materials to study human-technology relations through its various themes, e.g. globalization, embodiment, feminism, and urbanism [64].

Whereas the image of a city in cyberpunk novels and movies is without exception very bleak, a growing body of literature in the domain of *ubiquitous* and especially *urban computing* paints a completely different picture. Starting with the writings of Mark Weiser [63], the father of ubiquitous computing, these visions of future always depict technology as benevolent, friendly, useable, and always there when needed, never failing, never disturbing. Ubiquitous computing (from the Latin word *ubique* meaning “everywhere”) is the name given to the third major era of computing, following the mainframe era and the personal computer era.

In a world of ubiquitous computing, technology is built into the physical environment. Computers are everywhere, invisible, watching our every move in order to know exactly when to step out and provide whichever service is required. Mark Weiser called this calm technology [63], to highlight the fact that computers blend into the background when not needed, and only ask for our attention when appropriate. In this sense ubiquitous computing is the exact opposite of the vision put forth in science fiction literature – instead of making humans live inside the computer in a virtual world, the vision of ubiquitous computing is to make the computer live in our world. As William Gibson, the author of well-known cyberpunk novels such as *Neuromancer* [18] and *Mona Lisa Overdrive* [19], explains in an interview with the *Rolling Stone* magazine:

*“Totally ubiquitous computing. One of the things our grandchildren will find quaintest about us is that we distinguish the digital from the real, the virtual from the real. In the future, that will become literally impossible. The distinction between cyberspace and that, which isn’t cyberspace is going to be unimaginable. When I wrote Neuromancer in 1984, cyberspace already existed for some people, but they didn’t spend all their time there. So cyberspace was there, and we were here. Now cyberspace is here for a lot of us, and there has become any state of relative non-connectivity. There is where they don’t have Wi-Fi...”*

*In a world of super-ubiquitous computing, you’re not gonna know when you’re on or when you’re off. You’re always going to be on, in some sort of blended reality state. You only think about it when something goes wrong, and it goes off. And then it’s a drag” [36]*

There is no doubt that technology is increasingly pervading our shared urban spaces, and the rate at which new digital services are made available is continuously increasing. Accelerated by the digitalization and miniaturization of electronics and the explosion of communication networks, new technologies have pervaded the society in many ways. There are already over 5 billion mobile subscribers in the world and over two billion people use the Internet [6,25,48]. Over 30 billion RFID tags have been embedded in our world and a billion transistors per human, each costing one ten-millionth of a cent [6,48]. Over one billion Bluetooth chips are shipped every year and a new WiFi access point is

deployed every four seconds [6,48]. The convergence of smaller, cheaper and faster computers and ubiquitous communication technologies have made it easier to control systems and to empower people, to make cities smarter.

In this paper we will discuss the concept of urban computing and its various facets from the point of view of creative prototyping. In our case, the prototype in question is a large-scale technology deployment built into the existing urban fabric of the city of Oulu, in northern Finland. This deployment of various technologies constitutes a large, geographically distributed and completely public civic laboratory for studying ubiquitous computing technologies “in the wild”, and is technologically the largest such research deployment in the world. Here, our main focus will be on discussing shared urban technologies, i.e. technological artifacts deployed as an integral part of the public urban fabric, and thus useable by the whole community. Specifically, we will look at the early stages of planning and design process of the technology deployment, and at the various studies conducted to understand the needs, attitudes, and even fears people have towards new urban technology.

The contribution of this paper is threefold: first, we will offer a theoretical look into cities as settings for new technology, and identify challenges and opportunities that arise from the introduction of a new digital layer into the existing physical urban environment. Next, we will introduce work done in designing the “Ubiquitous Oulu” (Fig. 1), a prototype of a future smart city augmented with new technology and services, and discuss the steps we took to harness the imagination of the community in the design process. Using storytelling and rapid ethnography we first identify ways in which citizens envisioned that such technology would change their lives once installed across a city center. By transitioning through a complete design process including elicitation using storytelling, interviews and focus groups, and drawing from a rich theoretical background from the fields of urban design, architecture, anthropology, and computer science, we will then attempt to forecast how such urban technologies might induce societal change in the following decades.

The rest of this article is structured as follows. In [Section 2](#) we will present an extensive theoretical literature review and attempt to place our own research in this context using concepts of *spatialization*, *temporalization*, and *embodiment*. In [Section 3](#) we will then move on to describe the studies we conducted to elicit feedback on the planned technology injection from people. These studies include storytelling, rapid ethnography using a mock-up prototype, and technology diaries and interviews meant to uncover so-called *stories of everyday life* on how people use existing technology, and how they see technology in the future. In [Section 4](#) we will then discuss the findings of our studies, and reflect on those using the concepts introduced in the theoretical framework. Through this reflection we will attempt to project on the role of public urban computing technologies in the upcoming decades. [Section 5](#) concludes the paper.

## 2. Urban computing artifacts: design challenges and opportunities

In order to take a look forward and speculate on how urban computing artifacts might affect society in the future, we first take a look back and reflect on activities in urban

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