Intimate (Ubiquitous) Computing

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ABSTRACT

Ubiquitous computing has long been associated with intimacy. Within the UbiComp literature we see intimacy portrayed as: knowledge our appliances and applications have about us and the minutiae of our day-to-day lives; physical closeness, incarnated *on* the body as wearable computing and *in* the body as 'nanobots'; and computer mediated connection with friends, lovers, confidantes and colleagues. As appliances and computation move away from the desktop, and as designers move toward designing for emotion and social connection rather than usability and utility, we are poised to design technologies that are explicitly intimate and/or intimacy promoting. This workshop will: critically reflect on notions of intimacy; consider cultural and ethical issues in designing intimate technologies; and explore potential socio-technical design methods for intimate computing.

Keywords

Intimacy, computing, emotion, identity, body, play, bioethics, design methods, socio-technical design

INTRODUCTION

Intimate. adj. Inmost, deep seated, pertaining to or connecting with the inmost nature or fundamental character of the thing; essential, intrinsic ... Pertaining to the inmost thoughts or feelings, proceeding from, concerning, or affecting one's inmost self, closely personal.

We inhabit a world in which the classic computing paradigm of a PC sitting on your desk is giving way to a more complicated and nuanced vision of computing technologies and power. This next era is predicated on a sense that the appliances and algorithms of the future will respond better to our needs, delivering 'smarter' more context-appropriate, computing power. Underlying such a vision is the notion that computers in their many forms will be pervasive and anticipatory. Arguably, to achieve this, computing appliances will have to become more intimate, more knowing of who we are and what we desire, more woven into the fabric of our daily lives, and possibly woven into the fabric of our (cyber)bodies.

In this workshop we address the notion of 'intimate computing'. We invite designers within the area of Ubiquitous Computing to: address and account for people's embodied, lived experiences; explore the ways in which computing technology could and should be *more* intimate; and join us in considering possible pitfalls along the design path to such intimacy.

Intimacy as a cultural category/construct

What might intimacy have to do with technology and computers, beyond the obvious titillation factor? In the United States in particular and the west more broadly, there is a persistent slippage between intimacy and sex, which is not to say that there isn't a place to talk about the relationship between sex, intimacy and technology [see 15]. However, in this workshop, we want to cast our net more broadly. We are interested in other constructions of intimacy; intimacy as something that relates to our innermost selves, something personal, closely felt. Such a construction could include love, closeness, or spirituality. Or perhaps it is in the way we understand, feel and talk about our lives, our bodies, our identities, our souls. In all these ways, intimacy transcends technology, and has a role to play in shaping it. As we move towards designing for communication, emotion, reflection, exploration and relationship, we need to critically reassess our reliance in design on outmoded conventions and old models of computation and connection. We need to employ new metaphors and create new models.

A BRIEF HISTORY OF (INTIMATE) UBIQUITOUS COMPUTING

Having said that, there has been an idea of intimate computing for as long as there has been a vision of ubiquitous computing. The two are inexorably linked in the pages of the September 1991 issue of *Scientific American*. In that month's issue of the magazine, Mark Weiser, articulated his vision of ubiquitous computing – "we are trying to conceive a new way of thinking about computers in the world, one that takes into account the natural human environment and allows computers themselves to vanish into the background" [25]. In the article that follows, Alan Kay used 'intimate' as a modifier to computing in an essay reflecting on the relationship between education, computers

and networks [10]. He wrote, "In the near future, all the representations that human beings have invented will be instantly accessible anywhere in the world on intimate, notebook-size computers." This conjoining of intimate computers and ubiquitous computing within an issue of *Scientific American* dedicated to Communications, Computers and Networks is perhaps not a coincidence – both represents complementary parts of a future vision.

How has this conjunction been expressed more recently? Broadly, there are 3 manifestations in the (predominantly) technology literature. 1. intimacy as cognitive and emotional closeness *with* technology, where the technology (typically unidirectionally) may be aware of, and responsive to, our intentions, actions and feelings. Here our technologies know *us* intimately; we may or may not know them intimately. 2. intimacy as *physical closeness* with technology, both on the body and/or within the body. 3. intimacy *through* technology: technology that can express of our intentions, actions and feelings toward others.

In the first category, Lamming and Flynn at Rank Xerox Research Center in the UK in the mid-1990s invoked 'intimate computing' as a broader paradigm within which to situate their 'forget-me-not' memory aid. They wrote, "The more the intimate computer knows about you, the greater its potential value to you. While personal computing provides you with access to its own working context – often a virtual desktop – intimate computing provides your computer with access to your *real* context." [12]. Here 'intimate computing' (or the 'intimate computer') refers to the depth of knowledge a technology has of its user.

'Intimate computing' has also occasionally been used to describe a different kind of intimacy – that of closeness to the physical body. In 2002, the term appears in the *International Journal of Medical Informatics* along with grid computing and micro-laboratory computing to produce "The fusion of above technologies with smart clothes, wearable sensors, and distributed computing components over the person will introduce the age of intimate computing" [20]. Here 'intimate computing' is conflated with wearable computing; elsewhere intimate computing is even subsumed under the label of wearable computing [2]. Crossing the boundary of skin, Kurzweil paints a vision of the future that centralizes a communication network of nanobots in the body and brain. He states "We are growing more intimate with our technology. Computers started out as large remote machines in air-conditioned rooms tended by white-coated technicians. Subsequently, they moved onto our desks, then under our arms, and now in our pockets. Soon, we'll routinely put them inside our bodies and brains. Ultimately we will become more nonbiological than biological."[11]

Finally, intimate computing has also referred to technologies that enhance or make possible forms of intimacy between remote people that would normally only be possible if they were proximate. Examples include explicit actions (e.g. erotically directed exoskeletons [19]), non-verbal expressions of affection or "missing" [22], and computationally enhanced objects, like beds, that offer "a shared virtual space for bridging the distance between two remotely located individuals through aural, visual, and tactile manifestations of subtle emotional qualities." [5]. These computationally enhanced objects are all the more effective because they themselves are rich (culturally specific) signifiers. Dodge states of the bed, it is "very "loaded" with meaning, as we have strong emotional associations towards such intimate and personal experiences"[5].

INTIMATE COMPUTING TODAY AND TOMORROW

So where are we to go with intimate computing in the age of ubiquitous and proactive computing and the tentative realities of pervasive computing [23]? Clearly, as we move to the possibility of computing beyond the desktop and home office, to wireless hubs and hotspots, and from fixed devices to a stunning array of mobile and miniature form factors, the need to account for the diversities of people's embodied, daily life starts to impose itself into the debate. We already worry about issues of privacy, surveillance, security, risk and trust – the first accountings of what it might mean for individual users to exist within a world of seamless computing. And then there are issues of scale – ubiquitous computing is a far easier vision to build toward. It promises a sense of scale and scalability, of being able to design a general tool and customize it where a local solution is needed. But intimate computing implies a sense of detail; it is about supporting a diversity of people, bodies, desires, ecologies and niches.

THE WORKSHOP:
Outlining A Research Agenda for Intimate Computing

In this workshop, we address the relationship of people to ubiquitous computing, using notions of 'intimacy' as a lens through which to envisage future computing landscapes, but also future design practices. We consider the ways ubiquitous computing might support the small scale realities of daily life, interpersonal relations, and sociality, bearing in mind the diversity of cultural practices and values that arise as we move beyond an American context.

We perceive four interrelated perspectives and strategies for achieving these goals: (1) deriving understandings of people's nuanced, day-to-day practices; (2) elaborating cultural sensitivities; (3) revisioning notions of mediated intimacy, through explorations of play and playfulness; and (4) exploring new concepts and methods for design. Below we elaborate on these perspectives:

1. Nuanced practices

A sense of intimacy made its way into Wesier's thinking about ubiquitous computing. In collaboration with PARC's anthropologists, he and his team became aware of ways in which people's daily social practices impacted their

consumption and understanding of computing. They looked at the routine, finely grained, and socially ordered ways in which people use their bodies in the world to see, hear, move, interact, express and manage emotion and pondered "how were computers embedded within the complex social framework of daily activity, and how did they interplay with the rest of our densely woven physical environment (also known as the "real world")?"[27] This consideration of social frameworks and physical environments led Weiser's team to propose "calm computing" as a way of managing the consequences of a ubiquitous computing environment. Calm computing is concerned with people in their day-to-day world, with affective response (beyond psycho-physiological measures of arousal), with the body, with a sense of the body in the world, and with the inner workings and state of that body. This notion of calmness and calm technology thus echoes the sense, if not sensibility, of intimate computing. [26]

2. Culture Matters

Weiser also credits anthropologists with helping him see the slippage between cultural ideals and cultural praxis as it related to the use of computing technology in the work place. One of the issues that is very clear when we engage in a close reading of ubiquitous computing is how very grounded it is in Western practices, which makes sense given its points of origin and the realities of resource and infrastructure development. However, there have been several significant, unanticipated changes in the last decade, in particular the leapfrogging of developing countries into wireless networks and whole-sale adoption of mobile phones. It is important then to explore some of the ways in which intimacy is culturally constructed, and as such might play out differently in different geographies and cultural blocks [3;9]. We also need to explore cultural differences in the emotional significance and resonance of different objects.

3. Can Ubiquitous Computing come out and Play?

"You can discover more about a person in an hour of play than in a year of conversation" (Plato 427-347 BC). Play provides a mechanism to experiment with, enter into, and share intimacy. The correlation of play and intimacy is so strong that elements of one rarely occur without the other. It is during play that we make use of learning devices, treat toys, people and objects in novel ways, experiment with new skills, and adopt different social roles [16, 17, 18]. We make two important observations about play: (1) humans seamlessly move in and out of the context of play and (2) when at play, humans are more exploratory and more willing to entertain ambiguity in their expectations about people, artifacts, interfaces, and tools. Such conditions may more easily give rise to intimacy. Such a scenario represents a different design scenario from designing for usability and utility [6].

As ubiquitous computing researchers, we must be aware of this human tendency to play, and use it to our advantage.

When does play occur? How does it begin and end? When is it appropriate or inappropriate? What elements give rise to play? The understanding of play may affect our views about the origin and experience of human intimacy.

4. New paradigms for design

It is hard to imagine that the computer, an icon of modernity, high technology and the cutting edge could in some ways be behind the times. However, its association with modernity marks it as old fashioned; as a product of modernity the computer is highly functional with a minimalist aesthetic. It approaches the modernist ideal of pure functionality with little necessity for physical presence. Computer chips become smaller and smaller black boxes offering more and more functionality, but not necessarily more intimacy.

Bergman states modernity has been admired for its "high seriousness, the moral purity and integrity, the strength of its will to change", but he also goes on to note "At the same time, it is impossible to miss some ominous undertows: a lack of empathy, an emotional aridity, a narrowness of imaginative range."[4]. Modernity in art, design, architecture and fashion are associated with aesthetics and design principles from the first half of the twentieth century [7]. Since then, movements in pop art, deconstructivism, and postmodernism have invited us beyond functionalism to new ways of thinking about how to make the impersonal computer more intimate. There are lessons in consumer product design; the founder of Swatch focused on the emotional impact of the watch to start his business, designing the watch as a fashion accessory and invoking the ideals of pop art "fun, change, variety, irreverence, wit and disposability" [21]. What might it mean to apply such lessons to the design of ubiquitous computing systems?

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 what it might mean to account for intimacy in ubiquitous computing and to consider issues like: How do notions of intimacy change over time and place? How do notions of intimacy differ as we engage in different social groups and social activities? When does intimacy lead to or become intrusion? Invasion? Stalking?

- To elaborate new methods and models in design practice that can accommodate designing for intimacy.

- To develop an agenda for future collaborations, research and design in the area of intimate computing and identify critical opportunities in this space.

Workshop Activities

We will balance presentations and discussion with collaborative, hands-on creative activities. These activities will include:

- Cluster analysis, including questions like what does intimacy cluster with semantically (ie: identity, uniqueness, personalization, friendship, connection)

- Designing intimacy within, upon and beyond the skin: build your own membrane/skin; designing supra-skin technological auras; designing for a reflective ethics

Workshop Organizers

The organizers of this workshop come from a wide range of backgrounds, including cultural anthropology, computer science, psychology and design. Together they have considerable experience in workshop organization across several disciplines.

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