Experiential Artifacts as a Design Method for Somaesthetic Service Development

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ABSTRACT

How can deep understandings of material properties, limitations and possibilities be used concretely as a resource in the design of embodied experiences? How can material explorations spur and potentially direct, inspire, open up for new technologies and innovations? How can we identify, develop, and polish desirable *core mechanics* for embodied experiences and what kind of mobile services can be built with these experiences?

In this position paper we describe our idea of *experiential artifacts*, and how we think these can help us open up the design space of the next generation of physically engaging mobile technologies.

Author Keywords

Design, The digital material, Design materials, Material properties, Core mechanics, Somaesthetics, Experiential Artifacts

ACM Classification Keywords

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

General Terms

Design

INTRODUCTION

Today, there are more and more products such as the Wii and Kinect, systems that aim to allow for engaging physical experiences with technology. One basic aspect of these systems is that they integrate the design of social and playful activities with the design of technology. Such systems also push the boundaries for how we build technology in several ways: for example in what data these systems need to capture or more exactly what data they do not need to capture, how these systems in a way do not need to be as complete in their knowledge about the user. How the computation is something that takes place in interaction and not in the technology alone. With the emergence of novel mobile technology with close ties to sensor- and wearable technology, it becomes possible to design also for people in motion, abandoning the TV screen as the feedback device. But designing for free body movement is hard, both in terms of designing feedback mechanisms without screens, and developing useful as well as pleasant ways of tracing body movement and user emotions.

In a current project at the Mobile Life Centre, we develop design models for working with the design of embodied experiences, services and technology together, based on the idea of *experiential artifacts*.

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EXPERIENTIAL ARTIFACTS

Experiential artifacts are carefully implemented systems that allow for a very precise experience, each shaped by the affordances of an identified digital material. Even though such artifacts do offer experiences, these serve no purpose or goal and are not meant to be final systems. What matters, is that they work, they are implemented and provide an experience that is there for a design team to explore.

From previous experiences, we know the design of an experience-oriented service must start from building its core experience – in game terminology, its *core mechanics*. Everything else, such as scoring, organization, and logistics etcetera can then be put together to support and further enhance this core experience. By designing experiential artifacts, we are able to polish the core experience to make sure that there are no break-ups or flaws in the implementation, which may ruin desirable experiential qualities such as flow or suppleness [4].

Experiential artifacts also work as conversation pieces within a multidisciplinary project. It facilitates an explorative design process where all members of a team, designers, developers and others, can work together from start, shaping both the core experience but also working out what the overall structure of the service could be. For this reason we find it to be important that the experiential artifacts we build are open enough to allow for many different kinds of systems, of course then holding a fine-tuned and adjusted version of the implemented experience.

In previous work we have presented the idea of *inspirational bits*, as a way for a multidisciplinary design team to become more familiar with the material in HCI, the digital material [11]. We describe inspirational bits as quick and dirty but fully working systems in both hardware and software built with the aim of exposing one or several of the dynamic properties of a digital material. The difference between these and what we now talk of as experiential artifacts is in a way small but significant. While the main aim of inspirational bits is to inform a design team about the properties of some of the digital material, experiential artifacts aim to present a new and interesting experience that some of the digital materials together or on their own allow for.

The inspiration to experiential artifacts can come from various sources. They could be the implemented essence of a desired experience described by some user such as in the case of *the walking artifact*, described below. They could also be inspired by material properties of some of the digital materials, then more similar to inspirational bits, as was the situation behind our second experiential artifact, *Unizone*, also described in this position paper.

The walking artifact

The walking artifact is an experiential artifact that detects the rhythm of walking. By using RSSI (received signal strength indication) the artifact is capable of detecting very subtle steps or movements of two things, such as the legs while walking, moving in relation and in rhythm with each other. The user is provided feedback in the form of sounds that simulate walking under different conditions, such as walking in water or on top of snow. The effect is that the artifact does not only provide feedback, but also encourage the user to walk or move in harmony with the feedback sound.

The inspiration to this experiential artifact came from a story presented to us by a potential elderly user, Rose. Sometime we as interactive systems designers tend to believe all elderly users need to get moving and that the technology we build should support this, but Rose's story shows us another picture of elderly users: Rose loves walking. When her late husband passed away, she went on a walking trip in Provence with her sister in law who was in the same situation. Every week, she takes long walking trips all over Stockholm where she lives. Often Rose is out for several hours, which is much more than many young people are. But Rose is slow paced, she does not stress herself and she finds that many young people stress themselves. Rose tells us how much she appreciates the little moments she shares with strangers when out walking. The little moments when she meets the eyes of another person walking pass her. A person that, just like Rose, does not stress herself.

Rose's story got us thinking about sharing walks with each other and sharing the rhythm of another person walking, preferably a person walking slowly like Rose. In a brainstorming session we discussed various ways and digital materials that we potentially could use to capture the rhythm of someone walking. We discussed pedometers and noted how those count the number of steps, which is far from capturing the fine details of rhythm. Having previous experience of working with sensor nodes and radio [12, 5] we decided to see what would happen if we combined Rose's story with the radio material.

Figure 1. The walking artifact consisting of two sensor nodes attached closed to the feet tracking the rhythm of walking by measuring the radio signal strength between the two nodes communicating over radio.

Sensor nodes are most commonly used setting up a wireless sensor network where some data captured by each sensor node is communicated and shared within the network in various ways. Each sensor node is a small electronic system containing a transceiver, a microcontroller and different kinds of sensors. The specific sensor nodes we have been working with communicate over radio. More specifically, we have been working with electromagnetic radiation, radio waves that propagate in space and travel at the speed of light. One fundamental metric of radio waves is the received signal strength (RSS). This is a metric in decibel (dBm) for how strong a signal is at the receiver. RSS decreases with distance and is therefore sometimes used for indoor positioning as the Global Positioning System (GPS) signals cannot reach there.

The walking artifact consists of two sensors nodes attached close to the feet on the inside of a person's legs, see Figure 1. When walking the radio signal strength of the radio signal between the two nodes is measured resulting in a system where we in a very nuanced way can measure the pending movement between the two legs while walking. In later brainstorming sessions we have also played around with attaching the two sensor nodes to two users walking side by side and also to two users walking towards each other.

The walking artifact could potentially be the core mechanics of a system where Rose records the rhythm of her walking for others to follow. The walking artifact could also be used for something completely different but that holds the core mechanics of capturing the rhythm of two

Figure 2. Unizone tracking the similarities in position and acceleration between two devices.

things/body parts being moved in parallel in some way. There are also of course many variations a design team potentially can explore by working with the feedback given to the rhythm measured or produced.

Unizone

Another experiential artifact we have built is *Unizone*. Unizone is an artifact that tracks similarities in position and acceleration between two devices (in this case two mobile phones), see Figure 2. When the position and the acceleration is the same the system is silent, but when there is a difference in one of the three physical dimensions, the system produces a sound (each direction represented with one of the tones from a major triad chord) that makes the user/users aware of the difference. There is one tone for each direction that mix to one sound if there is a difference in more than one dimension. The two devices could potentially track differences between various body parts of the user herself or between two different users. This similar to the walking artifact but here allowing for a different experience due to the usage of another digital material and a slightly different set up. The two devices used in this artifact do not need as the two devices used in the walking artifact to be in direct vicinity of each other. In fact the two devices used in the walking artifact needs pretty much open air between them. Here the two devices communicates by Bluetooth and can measure similarities between them anywhere within the coverage range of Bluetooth, which is in the case of the mobile phones we have used approximately 7 to 10 meters.

Unizone very much came about from our previous explorations of accelerometers as a design material [11]. In HCI and interactive systems development, accelerometers are many times refereed to as capturing movements, which is in a way a misunderstanding. An accelerometer captures the acceleration of something and not necessarily the movements of that something. A steady paced movement will for example not be captured apart from starting up that movement. Also an accelerometer has no way of telling where in physical space it is which means that it is very hard to use an accelerometer to capture the specifics of movement, such as some gestures. The accelerometer is a sensor that measures change of velocity (acceleration) relative to freefall (or zero gravity) and transforms this measurement into a proportional electric signal. The device is usually attached to an object, of which one wants to measure the acceleration. It is very easy to capture the differences in movements (the variations in acceleration) between two devices. All this led us to the design of Unizone, which from that perspective very much is an inspirational bit that can be used to inform a design team about these material properties of accelerometers, but at the same time as Unizone is designed being all silent when moving in harmony it very much opens up for a very delicate somaesthetic experience that to us very well could be the core mechanics of something.

SOMAESTHETIC SERVICE DEVELOPMENT

So what is then somaesthetics, and what do we mean with somaesthetic experiences and somaesthetic service development? This concept, relatively new to HCI, looks at our bodies as the center of our experiential existence and looks at design, from the perspective of providing for better bodily experiences. Ones, which do not harm our bodies, but rather allow for fuller and more pleasurable experiences and interactions. [10, 2]

From our prior work, we have quite substantial knowledge on how to design for embodied, emotional, physical close communication between friends [13, 5] how to cultivate a deeper, empathic, relationship with your own body [3], and how to design for playful interactions involving our bodies [7].

All our applications are hardware-dependent, software-defined, and rely on subtle and rich interaction, challenging the limitations of current IoT-technology. They make use of sensors in the mobile as well as sensor-devices in the environment or placed on the body. They have social as well as personal uses, and mix public, performative activity with deeply personal experiences. They thrive on the massive data streams that sensors in our environment and on our bodies may generate.

Our bodily experiences are integral to how we come to interpret and thus make sense of the world. Still, current work on body within HCI reflects a perspective of the corporeal human body as something that needs to be trimmed and controlled. The body has been seen as an instrument or object for the mind, and passively receiving sign and signals, but not actively being part of producing them. Training and fitness applications reflect this perspective. By designing applications with an explicit focus on aesthetics, somaesthetics, and empathy with ourselves and others, we aim to move beyond impoverished interaction modalities, treating our bodies as mere machines. Instead we aim for rich, meaningful interactions based on our human ways of physically inhabiting the world.

Our goal is to create knowledge about how we can create technology and design applications that address intrinsically human ways of living in this IoT-world: addressing body, emotion, sociality and empathy. To achieve this we need:

- example designs (of applications, devices, and embodied activities) that encourage deeply meaningful, human-centered ways of communicating with ourselves and others, involving our bodies, movements, bio-data, emotions, sociality, empathy in a non-dualistic whole.
- explorations of novel interaction modalities that leverage on the possibilities offered by the shift towards IoT-technology, sensors, actuators and connected devices, and capitalize on the massive amount of data that IoT-applications may produce
- human-centered design methods and tools making it possible to articulate experiences and rapidly design, implement, and evaluate human-centric IoT-systems, without requiring the typical lengthy sketch-design-specify-implement cycle, respecting and cultivating deep knowledge of the emerging IoT-technology materials.

FUTURE WORK

With an experiential artifact the thought is that all members of a multidisciplinary design team can be there for start and discuss and develop ideas together, making better use of all competences and experiences of the various professionals involved in such process.

Through sketches, mock-ups and early prototyping, designers engage in a *conversation with their materials* [9]. In the formation of new ideas materials start to *talk back*, revealing design opportunities and challenges. Digital materials—including both hardware and software—are however sometimes complicated for designers to work with [8]. Therefore, by having the digital material or even better some part of a running system there from start as a kind of "working material" provides the possibilities for trying out and experience alterations and ideas almost on the fly.

We also aim for the experiential artifacts to be a tool during discussions with potential users where we will get to explain our more general research aims of somaesthetics and interaction in a way that allow for more open-ended discussions with those users, rather than a feedback on experiences they would have had with a more ready made system. Dourish [1] argumentation that the system itself is a medium for communication between designer and user is an important point but we aim to argue that a ready made system or a more complete prototype is more of a message carrier from the designer to the users than a medium for communication.

We also have the idea that a very specific group of users can help us develop transfer scenarios [6] for the more "normal" user. For example this could be people that use their bodies in very extreme or controlled ways, users who are very aware of their body and the movements they can do with it.

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