

Experiencing and interpreting bio-data sensors through a mobile phone

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Mobile Life

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We are currently designing an application called Affective Health that allow users to interpret and reflect on bio-sensor data related to everyday bodily behaviour and activities. In particular, stress related issues have been aimed at when designing the system. The application explores mobile services that empower people to monitor and understand their own stress levels vis-à-vis their everyday activities. The design aims to provide users with easy to grasp visualizations of data captured from body sensors and mobile devices. When bio-data and mobile events are mirrored back to the users, the relationship between activities in the world and how they respond to them can help users create meaningful mappings between their experiences and how that affects them.

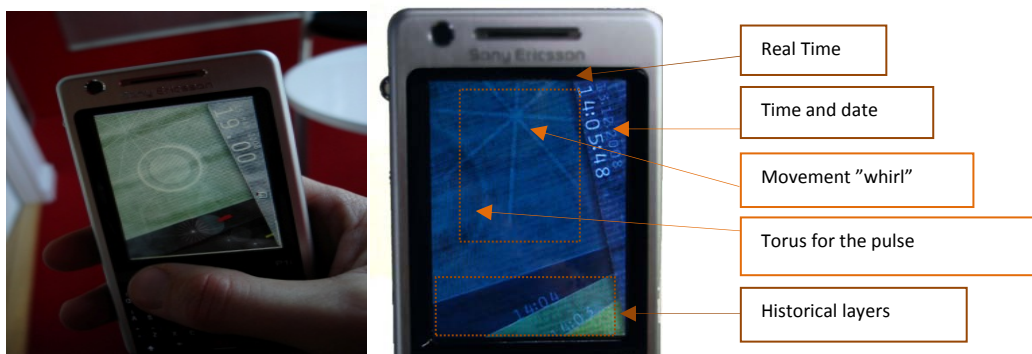


Figure 1: Sensor representations in the graphical user interface

In Affective Health we would like to provide for a biofeedback loop through using real-time feedback on your mobile phone. Through wirelessly transmitting data from sensors that pick up on pulse, galvanic skin response and pedometers, in real-time to the users' mobile, we can provide for a tight bio-feedback loop. Users can attempt to relax, get more aroused, do sports or other activities that changes pulse and skin conductivity and immediately get feedback on how they are doing. In addition, Affective Health allows users to look back into the past to be able to discover trends, patterns and hidden characteristics, e.g. sleeping habits and stressed reactions connected to persons or places etc. This in turn empowers them to take control of and cope with stressful situations, increase activities that promote their well-being, or simply change their attitude towards certain aspects of their lives, thereby reducing their negative impact. One important issue is that the users' experiences will be affected more or less by wearing the sensors. It is therefore important to make the bio sensors as smooth and seamlessly integrated with the carrier to interfere as little as possible with the user's day-to-day routines.

We are currently starting to empirically study people using the application in everyday activities. In a first study one in the project team has been using the application for four full days. One of the purposes of this has been to investigate different methodological approaches for understanding how the application affect users' perception and experiences of their bodies, in relation to the sensors and the graphical user interface on the mobile phone. The use of the application has been documented in two ways. Firstly, through a video-based ethnography where a researcher has followed and video-taped all the user's activities throughout a working day from arriving in the morning to taking the subway home in the evening. The second way has been through first-person documentation and reflection of the user of the application. This has focused on the experiential qualities of using the application with an attempt to include a rich variety of aspects ranging from the itching of the sensors after wearing them for a full day to interpretations of the sensor data in the graphical user interface.

Video-based ethnography

Video recording has been used extensively in ethnomethodologically inspired research of the social and collaborative aspects of technology use. It has proven a powerful approach to explore the publicly and socially available aspects of technology use and its shaping of social interaction. Due to the focus of such work on what is publically displayed and publically available to the participants of a situation, the shift towards sensor based technologies poses several challenges to such an approach. As in most cases, the sensors we are working with are small and worn on the user's body, thereby being hidden from other participants that the user may be interacting with. In addition, the data read by the sensor are presented on the small screen of a mobile phone. This supposedly makes it difficult to from a methodological point of view get access to the role played by these small computational and interactive elements that form the application. However, despite the difficulties revealed to us of using a video-based ethnographic approach to understand interaction with and through such a sensor-based technology, a number of aspects of the role of the technology have been brought to light. These aspects regard how the application with its sensors and mobile interface indirectly are given a role in the conversation and interaction that the user is engaged in such as a work meeting or a lunch conversation. Sometimes the user feels a need to comment upon the technology he/she is wearing, or someone might asks what it is that he/she is wearing. The conversations and interactions that occur in these situations have shown to provide insight into aspects how the user talks about his/her experiences and perceptions of the technology. For instance, the sensors for measuring galvanic skin response are worn in small velcro "rings" around the fingers. Conversations around these regarded how it actually feels to wear the sensors, as well as user's interpretation of the colour representation of the readings on the graphical interface, or even as a source of playful activities around the application related to people's perception of their bodies and how technologies influence these.

First-person documentation

However, the findings that can be conveyed through video-recordings of the use of the application in everyday activities are still a limited means for getting access to the personal experiences of the user. To further explore such aspects the researcher wearing the technology have taken notes and written a reflective diary on the experiences of using the application. This has given further insights and possibilities to explore aspects such as: 1) what it feels like to wear the technology and any practical implications this has for conducting everyday activities, 2) the processes involved in the user's attempts in understanding and ascribing meaning to the representations of the sensor readings, 3) or how the user starts treating the application as a device that you can try to inscribe bodily experiences into, such as explicitly trying to lower the pulse rate or jumping up and down to affect both arousal and movement. One issue that arouse was how the notion of time should be designed in the application and how changes in sensor readings over time should be presented in the interface. Currently, these are presented in one-minute slots but what was revealed in the documentation was that time in form seconds, minutes, and hours is not the primary way that we perceive our everyday activities. Rather when interacting with the sensor data our perceptions of these are related to events such as going to a seminar, running to the subway, or leaving children to kindergarten while being hurried for a meeting. The numeric sense of time works as an underlying factor that structures these events and activities, which suggests that the application needs to provide multiple ways of allowing users to perceive time and its relation to the sensor readings.

Conclusion

We have sketched out some of our initial explorations of how to study people's experiences and perceptions of using sensor based technologies. These suggest that these topics need to be explored from a multitude of methodological approaches. While the video-based approach may give insights into expected and unexpected ways that the technology play in social interaction, a first person approach reveals aspects of how the technology influences the felt-life of the user. A common theme revealed in these two approaches regards ways of understanding the role of bodily experiences in the developments of new sensor technologies. Clearly, as sensors get attached to our bodies and the ways for interacting with them are easily carried with us, our experiences and perceptions of our bodies gets if not altered, so at least influenced. Thereby, ways of including bodily movement, bodily awareness, posture, or even strength and endurance becomes aspects that need to be considered in more significant ways when investigating the relations between sensors, interfaces, and bodily experiences