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### Home Awareness

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# Home Awareness

## -Connecting People Sensuously to Places

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### ABSTRACT

People living a global lifestyle connect remotely to their families while away from home. In this paper we identify a need for connecting with a home as the physical place itself. For this purpose we introduce the concept of Home Awareness that connects people sensuously to remote places through sound, light and feeling of temperature. A working prototype has been successfully tested and we present some results from early user studies.

### ACM Classification Keywords

H.5.2 Information interfaces and presentation: Prototyping

### Keywords

Ambient displays, remote connectedness, interaction design, home feeling, mobility.

### INTRODUCTION

As globalization has gained ground mobility has become a condition for the late modern person. For more and more people, home is not just a house. An increasing number of people have flats and houses in several countries, people travel more and more as part of their job, urban families spend their weekends away from their primary homes in their cottage houses, and children of divorced parents spend their time between different homes. Many have designed for connecting these mobile people to their loved ones [4,7,8,9]. Through ethnographic studies and interviews we have identified a need for connecting people to places. We have seen how people currently exploit CCTV technology to relate to their secondary homes, and many commercial solutions exist for monitoring remote homes with respect to

burglars, fire and other aspects of security. Based on the empirical studies of people sharing their time between multiple homes, we suggest that there is an unexplored potential in supporting the emotional and sensual relationship to remote homes. In order to investigate this we have developed a prototype exploiting multiple sensory modalities in relating to a remote place. We have carefully considered the form of the prototype such that it can be present in the primary home in a form, which goes beyond a traditional display.

The demo prototype is a poetic answer to how people can relate to places, which are emotionally valuable to them. In the following, we describe the rationale behind the prototype, the actual prototype and results from early evaluations of it.

### CONNECTING PEOPLE WITH PLACES

Studies of extremely mobile people have illustrated how people seek to establish connections with both people and places [5]. Ibid mapped their study into tactics for ‘home making’, ‘connecting’ being one of the predominant tactics for shaping a sense of home. The participants in the studies [ibid] varied from the child of divorced parents living part time with each parent, to the commuter between the city on weekdays and a small Island during the weekends; and the steward staying on UK time while being in the US and others. We expanded the studies with 9 supplementary interviews of wealthy globalists owning multiple homes around the world, as these are also extreme examples of mobile life.

We found that most of the informants frequently were thinking of the other places, not in relation to people being there, but the place as a value of its own. One of the informants explained that his wife would check the residences over CCTV weekly, to be sure everything was ok, but also to decorate the house remotely: “(...) *she might change her mind, she wants to change the curtains, she wants to upgrade the boiler...*” Another informant stated that he didn’t like to travel for more than a week, because

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otherwise he missed the home too much, exemplified as the familiar bed, the bathroom and such. He had CCTV over the house that was displayed at his office. He liked to glance at the house numerous times daily.

Numerous studies have explored the landscape of designing awareness displays that support people in feeling connected with family or friends in different places [1,2,7,8]. While many studies have explored the form and expression of these types of displays, some have also empirically investigated the adoption of these types of displays and have documented how they actually result in peoples feeling of connectedness with remote loved ones [1,8]. Moreover there have been explorations of how to support connection or relationship with the home while away [2] or with experiencing the home in a new way through offering a view from the rooftop inside the home [3].

Thus from these studies we suggest that there is an unexplored potential in designing for more emotional relationship to remote homes.

### THE PROTOTYPE

The Home Awareness prototype consists of two parts. A 'sensor part' placed at the remote home sensing ambient data from the environment and a 'reproducing part' exposing the sensed ambience to the primary home.

The Home Awareness prototype mediates light intensity, ambient sound and temperature.

The central component in the 'sensor part' is a netbook computer monitoring and sampling two sensors and a microphone. The two sensors detect light intensity and temperature levels using Phidgets [[www.phidgets.com](http://www.phidgets.com)] mounted in a small weatherproof enclosure.

Using Skype, the sound recorded by the microphone is transmitted from the 'sensor part' to the 'reproducing part' as a regular Skype call over a 3G cellular network. Light and temperature readings are transmitted through the same connection as Skype-compliant UDP data packets.

The 'reproducing part' is a 65 cm tall cone shaped installation shaped by overlapping wooden leaves reflecting light through the gaps (see figure 1). The top is a vertical foam cap through which sound and ventilation can penetrate.

At the reproducing end, another netbook computer is connected (using Phidgets) to a dimmable light bulb to simulate the remotely recorded light intensity; a modified heating fan imitates the temperature levels from the remote home. Light and temperature sensors - similar to the ones in the 'sensor part' - is used for monitoring the reproduction of ambience. The orientation and shape of leaves on the outside of the 'reproducing part' provide a surface for the light to reflect on and illuminate as well as funneling the air from the fan upwards.

When "idle", the 'reproducing part' lights up and plays the streamed sounds to imitate the visual and auditive

ambience; and as the 'reproducing part' is approached it detects the presence of a person, and supplements with the reproduction of temperature using the heating fan as necessary.



**Figure 1. The Home Awareness prototype reproducing light, sound and temperature of a remote place**

### EARLY USER STUDY RESULTS

The Home Awareness prototype has been tested in the context of two families.

The first study was a family consisting of three people. They lived in their house on the 17<sup>th</sup> year and in addition owned two diverse summerhouses situated by the sea. We placed the 'sensor part' in the more primitive summerhouse by the water and the 'reproducing part' in their primary residence.

The findings supported the purpose of feeling connected to the remote location. They expressed that the awareness of the summerhouse had definitely grown while having the prototype running. It made them connect mentally to the specific place having "*a picture about the place inside your head.*" (Stated by the mother in the family). They felt that the rhythm of the day was very clear by following the installation in the background. They told us about different sounds they could identify by listening, e.g. children's voices, neighbor cutting down a tree and so fourth. It would sometimes make them want to go there to check it out. It also made them consider some more practical things as their thoughts wandered to the summerhouse like "*Perhaps it is time to mow the lawn again*". The family liked having

the connection and the awareness, however they would not like to have a cone for each place and they sometimes found it too intrusive, as the sound was playing constantly. Thus there was certainly a value in feeling connected to the remote home.

We had the prototype installed with another family who spend most of their weekends in their summerhouse, which they themselves have rebuilt from ground to top. The 'reproducing part' was installed in the primary home and the 'sensor part' being installed in the summerhouse. This family consists of a couple with two grown-up sons and their families. Immediately when the 'reproducing part' was installed in the primary house the couple recognized the sounds of swallows flying by, which they recognized as a specific characteristic of that place at that time of the day. This situation was an example of how they felt strongly connected to the specific summerhouse. In a later situation they heard some sounds that they did not immediately recognize, and for a little while they were concerned that someone were trying to break into the house. They listened for a while and concluded that this was not the case.

Thus the cases illustrate how the Home Awareness prototype indeed supported people in feeling connected to their secondary home, for both good and bad, i.e. pointing both to nice experiences there but also to an increased concern and memorizing some of the practical thing to be done. Interestingly, even though we in the development focused on supporting the emotional relationship and sensuous relationship with the remote place, in both situations we saw instances where the Home Awareness prototype functioned as a kind of a 'burglar alarm'.

## DISCUSSION

At this point we conclude that installations like the Home Awareness prototype hold great potential in supporting the emotional and sensuous relationship with a remote home. Further work needs to be done in order to integrate in particular the sounds in a way, which is not too intrusive in the primary home. One solution is to couple the sound to the proximity sensor, so that it is almost silent when people are away from the cone and sound turns up when closer to the cone. An alternative is to use directional speakers, which we have also tried. It did not give much different experience than the above mentioned, but to some extent it worked better than having the soundscape fill the room at all times.

Furthermore research needs to go into how to couple more than two homes or places in this way. Additionally there is a potential in adding some practical awareness aspects, like CCTV, the lawn, checking out plumbing, ventilation and such. In this way there may be a practical reason for having it, but the sense of the other place through supporting other

sensory modalities than traditional displays offer seems of great potential. Thus it is important to keep the poetics of the relationship so that it does not overwhelm with practicalities.

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## REFERENCES

1. Dey, A. K. and de Guzman, E. (2006). From awareness to connectedness: the design and deployment of presence displays. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Montréal, Québec, Canada, April 22 - 27, 2006).
2. Eggen, B., Rozendaal, M., & Schimmel, O. (2003). Home Radio: Extending the home experience beyond the physical boundaries of the house. HOIT 2003, University of California, Irvine, April 2003.
3. Gaver, W. (2006) The video window: My life with a ludic system. In *Personal and Ubiquitous Computing* (2006) 10: pp. 60–65
4. Go, K., *et al*, A. Familyware: Communicating with someone you love, In *Proc. Home Informatics and Telematics*, Kluwer Academic Publishers (2000), 125-140.
5. Hansen, A. B., Krogh, P. G., Petersen, M. G., and Winther, I. W. (2010) Tactics for Homing in Mobile Life - A Fieldwork Study of Extremely Mobile People. To be presented at MobileHCI, Portugal, September 2010. ACM Press.
6. Hindus, D., *et al*. Casablanca(2001): Designing social communication devices for the home. In *Proc. CHI 2001*, ACM Press, 325-332.
7. Kaye, J. ' (2006): I just clicked to say I love you: rich evaluations of minimal communication. In *CHI '06 Extended Abstracts on Human Factors in Computing Systems* (Montréal, Québec, Canada, April 22 - 27, 2006). CHI '06. ACM, New York, NY, 363-368
8. Rowan, J. and Mynatt, E.D. (2005): Digital Family Portrait field trial: Support for aging in place. In *Proc. CHI 2005*, ACM Press (2005), 521-530.
9. Werner, J., Wettach, R. & Hornecker, E. (2008): United-Pulse: Feeling Your Partner's Pulse. *MobileHCI '08 Proceedings of the 10th international conference on Human computer interaction*