Silka: A Domestic Technology to Mediate the Threshold between Connection and Solitude

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Abstract

Families living apart – with relatives and loved ones in different cities or countries – is not unusual. However, even though multiple communication technologies exist, communicating emotions can still be difficult. In this paper we present Silka: a device that supports long-distance communication by sending "smiles" and communicating presence in between traditional modes of communication, with the goal of enhancing bonds between two individuals or households. Silka's design is based on findings from an online survey, interviews and observations conducted to better understand how people communicate with loved ones and how they feel before and after communication. It aims to address worry and anxiety, which we found characterise the period between regular weekly, fortnightly or monthly calls.

Keywords

Remote presence, communication, domestic technology, tangible interfaces, anthropomorphic interfaces

ACM Classification Keywords

H.5.2 User Interfaces (D.2.2, H.1.2, I.3.6): User-centered design. H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

"When I'm offline for more than a day I get messages from my mum who's always worried. We don't talk that often, she just wants to know I'm there." – Male, 28, his parents live in a different country

"I always promise to call my uncle, but it never happens." – Female, 27, her family lives on a different continent

"My dad simply wants to check how we are and if everything is fine." – Male, 34, his family lives in a different city

Figure 1. Quotes from interviews

Introduction

Families living apart is not unusual. Grandparents in different homes, parents in different cities, children in different countries – this is a reality for many people. In 2010, foreigners (people not living in their country of citizenship) accounted for 6.5% of the population of 27 European Union countries [16]. This percentage translates into 32.5 million people [16] who live away from their friends and families, and who try to stay in touch with their loved ones using some kind of technology.

Computers and the Internet are increasingly connecting people who live in different homes, cities, or countries. In 2011, 77% of households in the UK had Internet access and 6 million people accessed the Internet using mobile phones for the first time in the previous 12 months. In addition, 21% of all Internet users made telephone or video chats online [11]. However, even though multiple communication technologies and devices exist, staying in touch can be difficult. Varying factors from different time zones to busy lifestyles have a huge impact on people's lives and the way they communicate with their families and friends, leading to more planning and the need for matching schedules.

Our research shows that communication between families living apart is often limited to a regular phone call, scheduled beforehand. This advance planning most affects multi-generational families: people tend to call their spouse daily, their parents weekly, but their grandparents monthly. In between those phone calls, family members can feel distanced; they miss each other, and feel guilty (see Figure 1).

Our goal was *not* to replace phone calls, text messages or emailed photos but to find a way of filling the communication gap between the weekly phone call through augmenting existing methods. In particular, we wanted to design a dedicated product to reduce people's feelings of solitude when they are living apart and increase their feelings of connection to their loved ones.

This paper describes our research, our review of previous work related to remote presence, our iterative design process, and our solution, including its capabilities and limitations.

Research

To better understand the way friends and families communicate with each other and to identify our target audience we conducted a series of research activities. We started with an online survey to learn how often people communicate and what kind of information they exchange. The survey was distributed on Twitter [15] and Facebook [4], and we used it as a basis for informal interviews with friends and family. Based on the findings of the survey, we chose families living apart as our target user group and considered that they would benefit most from a communications-based domestic technology.
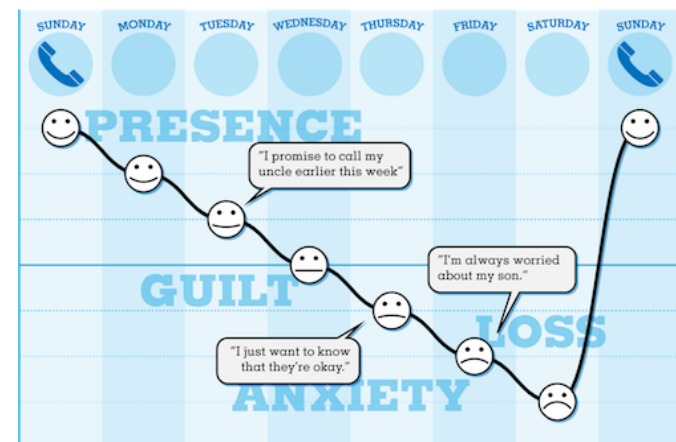
Figure 2. Communication cycle many families living apart go through. Quite often weekly, scheduled phone calls help to manage negative feelings.

Figure 3. Meaningful objects in one of the participants' homes

The analysis of 58 survey responses and notes from five interviews revealed a number of communication patterns. To stay in touch, families living apart took advantage of the latest technologies. The frequency of communication depended on the distance and the bond, but it remained regular at a set time (usually weekly) with occasional spontaneous communication, mainly in the form of text messages. However, even though the communication was regular, feelings of loss, anxiety, and guilt were often present (see Figure 2).

Our second study was concerned with how people remember each other when apart. We carried out interviews with five people living away from their families (three women and two men; 27-61 years old) and a series of observations in three households to understand how their inhabitants store meaningful objects and sentimental items. As people have a strong personal connection to gifts and clutter [12], we wanted to know what objects they kept, where, and how important those items were. The outcome of this observational study was a set of photos of people's personal objects that reminded them of their family members (see Figure 3), which later served as sources of inspiration.

Related work

The problem of remote communication and remote presence is not new. We reviewed existing research to better understand how others have investigated this topic and what specific needs they met. A number of artefacts have been developed to fill the communication gap and they can be classified as one of the following:

- **Devices representing online status**, e.g. Availabot [2], the dragonfly surrogate and the peek-a-boo doll [7], used to indicate whether a person is free or busy.

- **Ambient displays of remote presence**, e.g. 6th Sense and the tree lamp [14], Aura [9], and a ceiling-based remote awareness system [13], used to remind of other person's presence, but not allowing for any direct communication, which may lead to them being perceived as slightly intrusive monitoring devices.

- **Low-fidelity, long distance communication devices**, e.g. Blossom [3], Lumicard [14], and Huggy Pajama [6], which allow for limited, but direct interactions. They may also be perceived as somewhat invasive, in particular the Huggy Pajama as it allows long-distance touch interactions that could be unexpected or considered too intimate.

After gathering information about a number of devices, we realised that while most of them supported remote presence between people living apart, none matched the needs we identified: we wanted to design something that would be more personal, more intimate, yet non-invasive; something, where the interaction is designed not only to communicate remote presence, but also evoke an emotional connection. We wanted to fill the 'emotional gap' between traditional modes of communication and design for a domestic product that could be bought as a meaningful gift for loved ones.

Design process

We envisioned a tangible device that would be able to evoke emotions, personal connections, and non-intrusive communication. With this in mind, we started sketching initial ideas.

Figure 4. One of early conceptual designs: a heat sensitive wall sticker

Figure 5. Our solution: Silka

All designs were presented to nine potential users to gather feedback. Evaluating sketches instead of prototypes proved challenging; participants were more eager to point out things that would not work for them. Many participants found it difficult to abstract these new technologies from their current ways of using technology to communicate. Comments like *"why not just buy Grandma an iPad?"* were quite frequent.

Those early designs included:

- **An interactive photo frame** – *a digital photo frame with a built-in photo camera and a touch-screen, paired up with similar devices. It would allow sending pictures or short messages to other frames.*

  We later discarded the photo frame concept as it was considered too similar to existing devices, such as Apple's iPad [1] or Microsoft's Wayve [8].

- **Wall stickers** – *heat sensitive paired stickers that could be mounted on a wall or any surface, transmitting handprints or short messages (Figure 4).*

  The wall sticker received positive feedback from our participants. People considered attaching it on a fridge door and sharing messages (*"you'd never text each other"*).

- **A paired display & an object** – *a plinth with a glass at the front, which could serve as a display. Any personal object could be placed on the plinth to activate the device.*

  The plinth concept was also discarded as many people commented that it meant placing their intimate objects on a pedestal and that action alone, in their eyes, would remove the intimacy (*"this is more like 'You're precious to me so*

I'm gonna put you on a pedestal'…that's why I think you lose the intimacy").

- **Digital dolls** – *paired dolls with sensors, lights and triggers. The devices could react to touch, send pictures to one another, and take pictures of users' faces.*

  Participants liked the connection between paired dolls: "*there's a lot of back and forth – it's like the more you think of someone, the more the thing gives to you".* Especially inspiring were comments comparing the rough sketches of our 'robot doll' to a Russian Matryoshka doll and emphasizing its cultural significance and connection to gift giving (*"it's like an endless gift"*). Unlike other designs, the doll seemed to be something our interviewees would like to give to their loved ones.

The evaluation also showed that some of the more contrived features were not liked. For example, users were not keen on smiling at a camera to transmit their facial expression. As a result, we decided to discard unwanted features and incorporate the positive features of the wall sticker and the doll into our solution: Silka (see Figure 5).

Silka – the new communication link
Silka (from Russian 'ссылка' [*ssylka*] – 'the link') was envisioned as a device that would be sold in pairs to enable effortless, non-intrusive communication between two individuals or households.

The device would be constantly connected to a mobile data network and wouldn't require any set up. On sensing a touch and movement, it sends a "smile" and a "handprint" to its twin device. The colour of the print roughly represents a physical state of the sender and depends on the combination of input

from biometric sensors measuring galvanic skin response (GSR) and heart rate variance (HRV) [5, 10].

Figure 6 shows Silka's main features and Figure 7 presents a typical interaction. The interface is simple and represents four main states:

- **Asleep** – neither home nor twin Silka has been used for a while. The faces are asleep on both devices and the orbs on their chests are off.

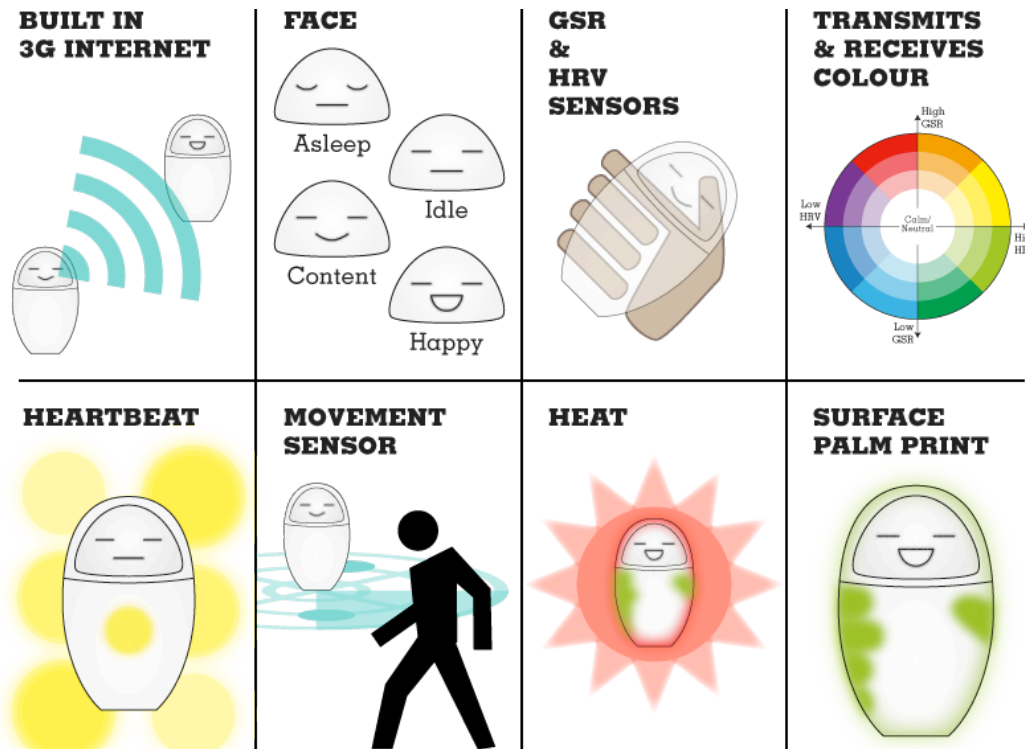- **Idle** – the home Silka has detected movement in its twin device, but neither has been touched. The face on the home Silka awakens (but doesn't smile) and the orb on its chest gently pulsates like a heartbeat
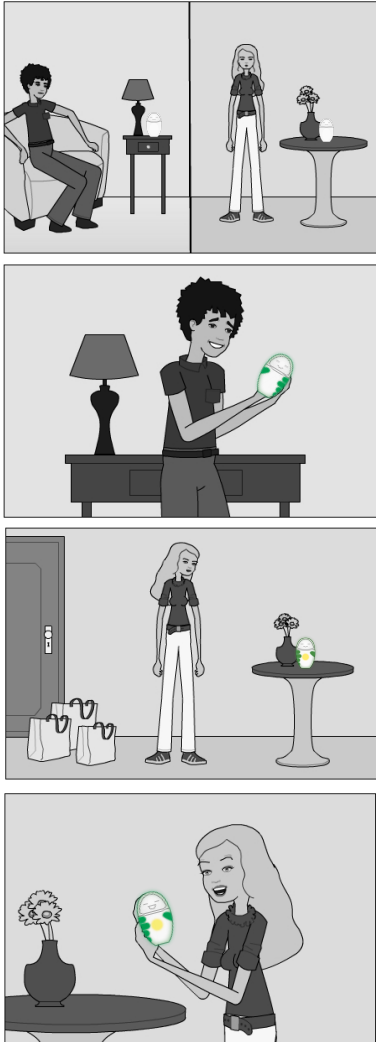
- **Content** – the twin device has been touched; in this state both Silkas smile. The home Silka's body pulsates with a lit colourful handprint (showing that its twin has been touched). An internal heater makes it warm to the touch.

- **Happy** – both Silkas have been touched, both have big beaming smiles on their faces, and both are lit up with colourful handprints.

We presented the sketches and described Silka's functionality to four potential users to get their feedback. The responses varied from very positive ("*I love it! Do you have a working model?*") to quite negative (*"Why the hell would I want that dust-gatherer?"*), which demonstrates the need for further longitudinal "in the wild" evaluations of prototypes. However, the positive responses were strong enough to confirm that there is a potential audience interested in the device: one participant even wanted to buy a Silka for each member of her family.

Conclusions and further work

Silka focuses on the shared awareness of the domestic experience and may help to exchange emotions with loved ones in a non-intrusive, effortless way. We see it as something that could act as a threshold between connection and solitude, enabling people to feel closer together; we understand that threshold to be both physical in being away from home and an emotional longing from this physical separation. Finally, Silka's association with the Russian Matryoshka doll that we discovered through participant feedback further strengthens association with family and homeliness. The Matryoshka doll metaphor also relates to the interaction model offered by Silka – little interactions and thoughts that make up the wider whole of two people's or households' relationship with each other: something smaller inside something larger.

BUILT IN 3G INTERNET

FACE
Asleep
Idle
Content
Happy

GSR & HRV SENSORS

TRANSMITS & RECEIVES COLOUR
High GSR
Low HRV
Calm/Neutral
High HRV
Low GSR

HEARTBEAT

MOVEMENT SENSOR

HEAT

SURFACE PALM PRINT

Figure 7. Storyboard presenting how Silka works. One Silka sends a message and a twin device responds when its owner is nearby, inviting reciprocation.

Silka's look and feel, especially the anthropomorphic interface and visual and tactile aspects, appeal to senses and provide curiosity factor in a form familiar to many. It addresses a specific need to communicate non-verbally by fitting between remote presence products and higher fidelity traditional communication devices.

The current design, while having several strengths, requires further research. It could be perceived as yet another gadget – and so, will users actually use it? Would it really reduce feelings of isolation? How could we ensure continued usage? Would it be seen as intrusive, mainly due to inclusion of proximity and biometric sensors? Would the motion sensor cause feelings of surveillance? These questions can be answered through conducting further field studies. Low-fidelity prototyping of the key functionality would be the first step. The next would be building prototypes of different sizes. We assumed that the device would fit into a hand of people of all ages, therefore, defining the actual size is important.

A series of observational studies would also be needed to learn how (if at all) the idea engages users, how they naturally interact with it, what are their expectations, and whether they continue to use it after initial novelty wears off. This would lead to further design and refinement of Silka's features and inter-actions, hopefully resulting in a product that families love and want to use.

Citations
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