Kissenger: A Kiss Messenger

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ABSTRACT
In this paper, we present an interactive device "Kissenger" that provides a physical interface for kiss communication between two remotely connected people with tactile stimulation of the mouth, combined with scents, voices and visual images. Kissenger was designed to augment already existing remote communication technologies where interactions are with computers through glass but cannot communicate and experience with all our five senses. Therefore, it is difficult to feel a sense of presence with our families through the internet. Hence the main goal of our work is to promote intimacy between humans in long distance relationships.

General Terms
Algorithms, Documentation, Performance, Design, Reliability, Experimentation, Human Factors.

Keywords
Wearable Computing, Human Computer Interaction, Empathic Media, Ubiquitous Computing, Kiss transmission, tangible user interface, haptic interpersonal communication, remote tactile communication.

1. INTRODUCTION

We live in a global era, and more and more couples and families are apart due to work and business. New technologies are often employed to help us feel connected with those who we care about, through an increasing interest in touch and feeling communication between humans in the human-computer interaction community. Research like "Hugvie" [1] and the "Hug over a Distance" project [2] tested the feasibilities of telepresence and intimacy technology. However, these are big, bulky, and impractical.

There is some commercial work like "Hug Shirt" [3] and "Huggy Pajama" [4], which explore hugging in remote with love ones using wearable fashion technology. But these still lack a proper interface for "abstracted presence". Thus, we propose a new system to feel the real presence using human communication over internet.

Kissing is one of the most important modes of human communication as it conveys intimacy and many deeply feel positive emotions such as respect, greeting, farewell, good luck, romantic affection, and/or sexual desire through the physical joining or touching of lips by one individual on another individual's cheek, forehead, etc.

We have developed the original Kissenger device in [5] further into a smartphone accessory that can support these features. Considering this missing dimension in today's communication technologies, we aim to design a new device to facilitate the exchange of emotional content to feel a closer sense of presence between people who are physically separated thus integrating their inter-personal relationships further.

2. DESIGN

During a kiss, along with its strong emotional and affectionate connections, a series of physical interactions takes place. The slightest touch of the lips exchanges the pressure, softness, and warmth of each lip in a convincing way. We approached this design problem carefully, given the intimate nature of the interaction and iteratively designed Kissenger which consists of two paired devices that can send and receive kisses simultaneously as in Figure 1.
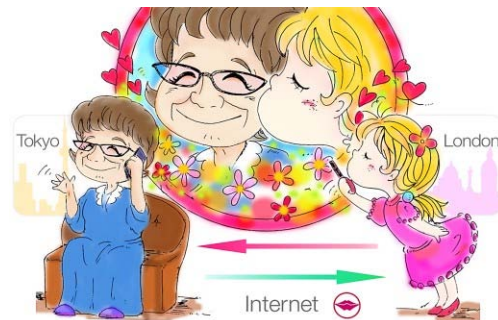

Figure 1: Overview of Kissenger

2.1 Hardware

After studying the biological and psychological parameters of a kiss, a series of exploratory form factors were drawn to help visualize the possible interfaces. Figure 2 shows some of our initial concept designs.
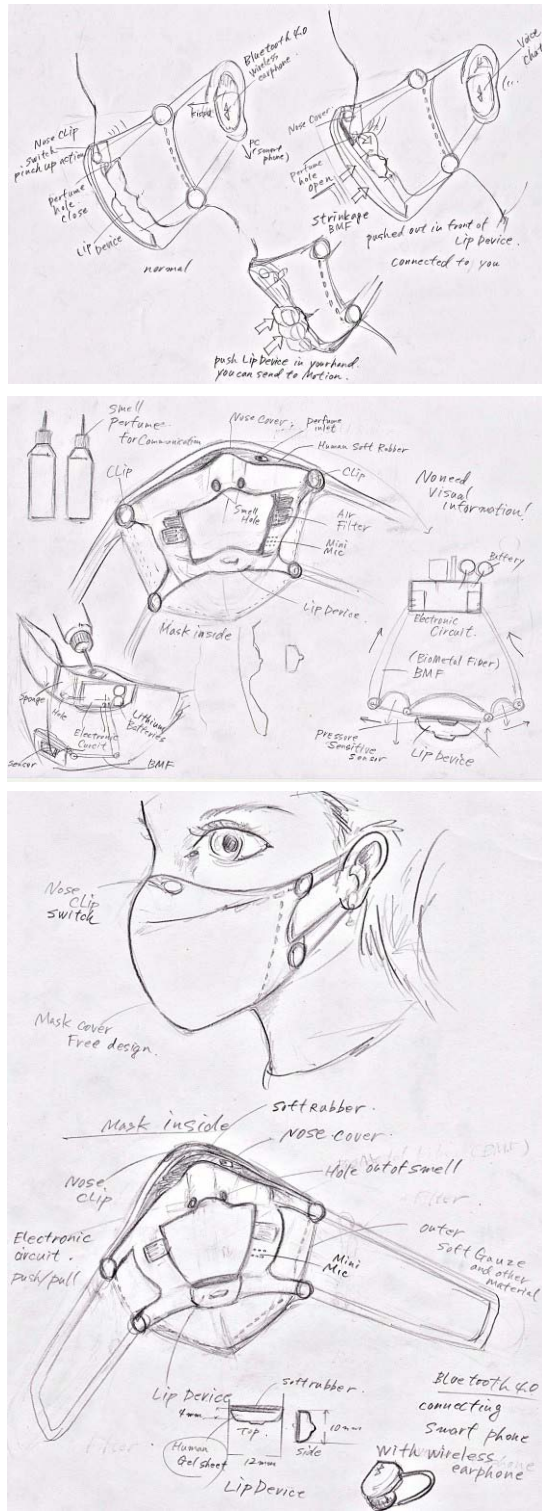

Figure 2: Preliminary concept designs of Kissenger

At this stage, we looked for designing a system that effectively transmits the same sensation of kiss to one another. The one key issue was that the use of the device should be comfortable and not distract or obstruct the natural interaction of the kiss. Hence, we decided to integrate the initial concept design for a lip-like portable device with a minimalistic shape. However, one of the main concerns was the lip needed to be equipped with sensors and actuators. Hence, we looked into the possible technologies and sizes which could be fit into the form factor of our device. Figure 3 shows the 3D depiction of the proposed device with the new shape.
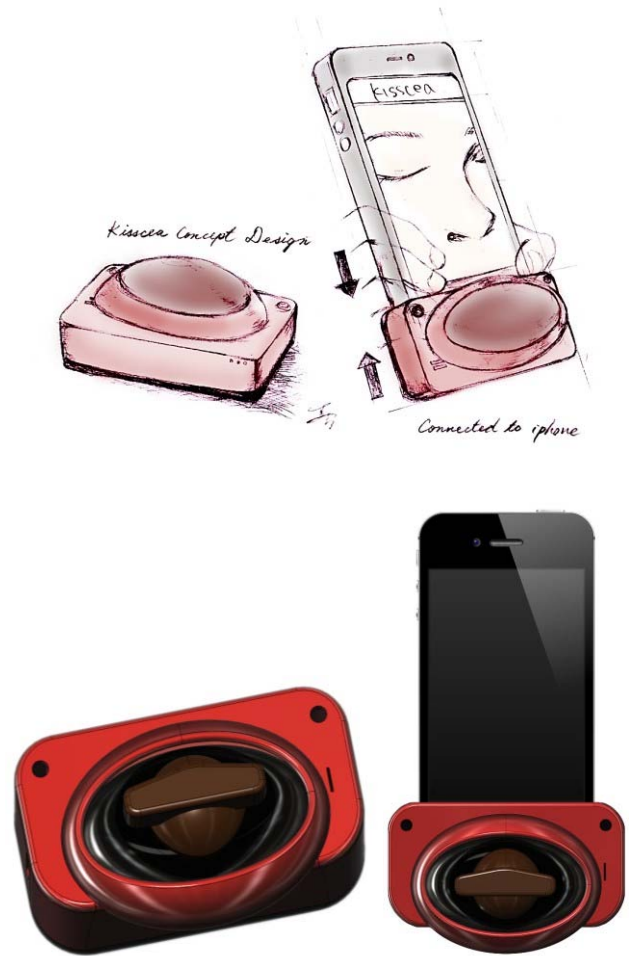

Figure 3: Proposed shape for first version of Kissenger

2.2 Design Features

The interaction mechanism for Kissenger was devised with a number of features that we believe will make kiss communication between two users more meaningful. The system consists of following key features:

- Lip sensor push and pull reverse feedback for kiss behavior.
- Lip rotation force feedback (with maximum tilt angle of 18 degrees).
- Sending scents.
- Feeling LED light color communication (red, orange,

green, and blue)

- Apps for kiss communication with video chat (Facetime, Google+ Hangout, Skype, Facebook, Zoom etc…)
- Changing the user characters and voices (face images)
- One-to-one pair and one-to-many user connections
- Recording the behavior of the partner's lips.
- Scent tank changes the scent to suit the partners.
- Soft silicon cover made with gel for kiss communication.

2.3 Design Flow

The hardware design of Kissenger with design features in 2.2 specifies the use of a light feeling sensor, an actuator, a vibration motor, a scent tank, and a smartphone connector in the Kissenger design flow. Their design role is as follows:

2.3.1 *Input Kiss Sensing:* The front of the lip has pressure sensors placed just below the outer surface to initiate the Kissenger for the transmitter (the kissing person), the receiver (the kissed person), and also to sense varying levels of soft touches. The features for the lip sensor push and pull reverse feedback for kiss behavior as shown in Figure 4.
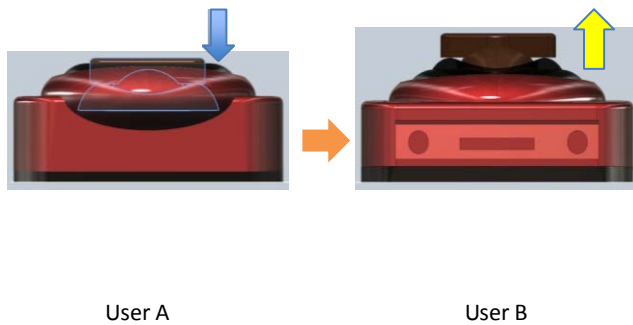

User A   User B

Figure 4: Lip sensor push and pull reverse feedback for kiss behavior

Upon initialization, the front end of Kissenger can be tilted to a maximum of 18 degrees to replicate different styles of kissing as in Figure 5. Thus, this design simplifies the interface and enables users to form a correct and semantically meaningful mental representation of the system with great feasibility for real kissing.
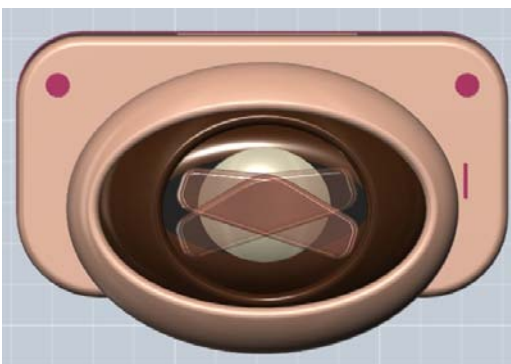

Figure 5: Lip rotation force feedback

2.3.2 *Control and Wireless:* Each Kissenger device is equipped with a lip sensor (pressure sensor + heat sensor), a scent tank, a smartphone connector and voice speaker (Figure 6) connected to an embedded circuit that controls the sensors and actuators and a Bluetooth module to communicate wirelessly with your phone and thereon with other Kissenger devices through the internet. Data from the pressure sensors is read continuously until a change is detected. If there was a substantial change, the resulting increase is transmitted wirelessly to a receiver circuit that then actuates a servo motor array to produce similar motion of the lips.

2.3.2 *Output Kiss Actuation:* The kiss sensation on receiver (the kissed person) is produced through movement of servomotors that distend the surface of the lip. Simultaneously, the scent, LED light feeling sensor, and voice speaker are actuated for pheromone scents, colors to depict different moods, and sounds respectively. Pheromones are the scents used in Kissenger that are capable of acting outside the body of the secreting individual to impact the behavior of the receiving individual giving the feel of real presence of the partner. The shape and size of the lip covers hide the inner electronics that go into the sensing, control, and actuation of the device. Thus all these features make the user more amicable to this device and helps evoke emotional responses and feelings for kiss communication.
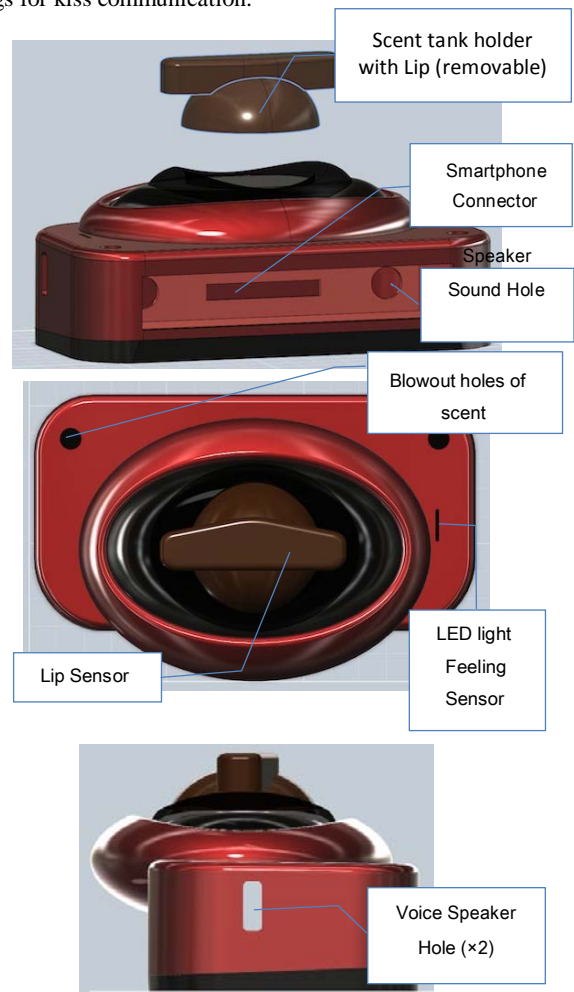

Scent tank holder with Lip (removable)

Smartphone Connector

Speaker

Sound Hole

Blowout holes of scent

LED light Feeling Sensor

Lip Sensor

Voice Speaker Hole (×2)

Figure 6: Key design features of Kissenger

3. COMMUNICATION

Two or more Kissenger devices are wirelessly connected to each other via the smartphone Kissenger app, which are internally connected to their respective Smartphones using Bluetooth as shown in Figure 7. One of the unique added features of the app is that it allows one-to-many user communication along with one-to-one user communication as shown in Figure 8. With the Kissenger app, the user can also actuate and transmit different colors to their partners to depict different moods (Figure 9) with different scents to depict different scents thus giving a real sense of kissing. The automatic power function initializes as Kissenger is inserted into the Smartphone, thus serving the purpose of instant charging.
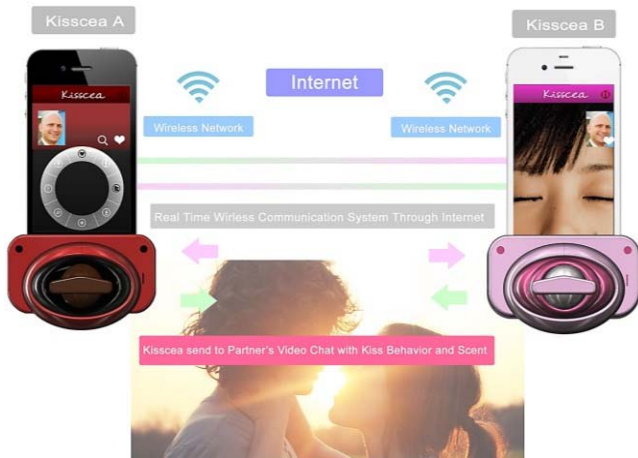

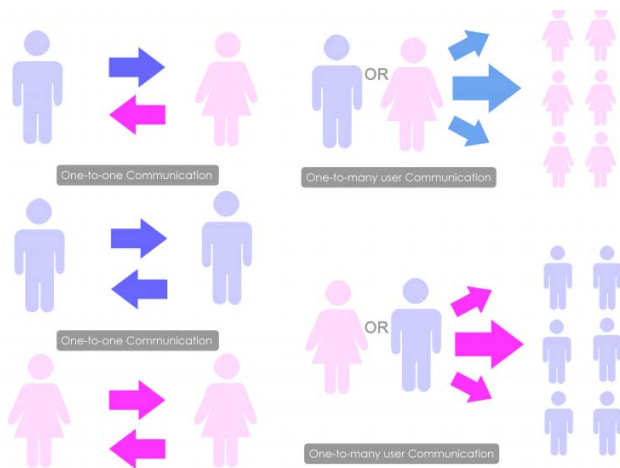**Figure 7: Kissenger system diagram**

Figure 8: User communication via Kissenger app.

4. FUTURE WORK

An assessment of the new proposed shape and its implementation was conducted with a wide variety of people including researchers not involved in our project, mall shoppers, and friends over a period of time with around fifty people from different cultural backgrounds, age, and sexes participated in the evaluation process and provided feedback for the proposed shape and features. The major feedback is to integrate the size to make it more portable

and user-friendly and provide the room for asynchronous kissing. This is the ability for the device to store a kiss that can be read at a later time on which we will be working in the future for the social impact of our project.

LED Color	User's Feeling Image
	Blue: (Chat start) Feeling: Normal Chat Time: 0s～120s Number of Kiss 0 Number of Sent 0
	Green: Feeling: Peace Chat Time: 120s～240s Number of Kiss 1～3 Number of scent 1
	Orange: Feeling: Empathy Chat Time: 240s～300s Number of Kiss 3～5 Number of scent 2
	Red: Feeling: Love (sincerely) Chat Time: 300s～ Number of Kiss 5～ Number of scent 3 more (1/s)

Figure 9: LED light feeling sensor color depiction

5. CONCLUSION

In this paper, we present the design and principle of Kissenger, an interactive device that provides a physical interface for transmitting a kiss between two remotely connected people. We describe our design process through three iterations where each stage has a separate focus. Our preliminary user study suggests that Kissenger has the potential to significantly improve current remote communication technologies using message and video interfaces. Further designs and studies will be needed to assess its potential in the field. We hope that this kind of research will enable a new dimension for remote couples and families to interact in addition to enhancing existing communications by adding the underused sense of touch.

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