

Commiticator: Enhancing Non-verbal Communication by Means of Magnetic Vision

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Abstract. Commitment is a key element in social behavior, especially when it comes to communication between two individuals in close relation to each other. Between people who have known each other for a longer period of time, communication often revolves around recent events and the act of sending a life sign takes precedence to the actual content of the information itself. Furthermore the constant accessibility through mobile media devices is increasingly creating the expectation of permanent communication between couples. The ongoing spread of wearable devices allows a permanent communication across physical distance but it sometimes also supports a leakage of situat awareness among their users.

The main concern of the Commiticator project lies within the development of a wearable device that can support the expression of commitment as an act of social interaction between two wearers. To study the acceptance of such a device, the already culturally established character of jewelry is used to create a jewelry set consisting of a ring and a locket.

To make an intuitive form of communication possible, the wearer's tactile sense is enhanced by the jewelry giving them a sense for a magnetic field that is enabled by the locket if it is activated by the partner. This creates a ping-pong like interaction between the wearers.

Keywords: Jewellery · Jewelry · Locket · Wearable · NUI · Smart object · Smart accessory · Magnetic vision · Communication · Commitment · Commiticator

1 Introduction

This research is part of a larger project which studies the area of conflict between ›jewelry culture‹ and ›digital culture‹. It is pursuing the idea of an exchange taking place in the transition between these medias.

The ongoing transformation to a digital culture does not spare the culture of wearing jewelry. Like other branches, the jewelry manufacturing finds itself in a merger with the digital market. Jewelry, in a tradition going back millennia, is changing in concern to its production (e.g. as a 3D-File), in its economical distribution structure (Industry 4.0, digitalization), as well as in its characteristics as a medium, especially as a medium of communication.

To enable a merge of the traditional and culturally settled inherent character of jewelry together with the decreasing size of intelligent acting digital hardware (like embedded systems), jewelry has the capability to transform into a kind of body worn computer. The idea of a suitable function enhancement of jewelry is a key element in this research paper. This includes the aim to answer the implied question how a jewelry point of view or ›form language‹ may be established in the area of body worn objects, that allows a traditional but in the same time modern view. If this merge is successful, jewelry itself can become a part of the debate about contemporary issues of digitalization.

1.1 Enhancement of Jewelry

Modern technology changes our daily life just by our use of it. Also the characteristics of jewelry are influenced if merged with recent technology.

Researchers such as Paul Watzlawick show how deep the presence of technology influences our lives and which importance it has in our daily communication and interaction [1]. The field of interaction and communication seems especially interesting if it comes to wearable technology as it breeds a close relation between the wearer and its technological device.

In actual forms of communication people benefit from the positive aspects of keeping in touch without the boundaries of physical distance. Nevertheless there are side effects of communication technology and their “excesses” in the form of noisy gadget toys that have become annoying interrupters in our everyday life.

In most cases these interruptions are done purposely and are widely appreciated. Yet there is a point where they start to culminate and they add up to a nuisance, which is not only overwhelming but also becomes a disturbance for the surrounding people.

There appears to be a permanent crave for attention that manifests itself in an attention economy [2]. Consumers have to choose what and when they want to consume. The brain has to become sensitized for filtering information, to decide whether they are relevant or not.

In phases of pressure it is easy to become distracted by disturbances of any kind. There is always the risk of losing the balance and forgetting important social interaction while drifting away into the lure of virtuality.

Digital consumers are flooded with information wherever they may go, which carries the risk of getting lost in a massive amount of data. This results in an establishment of rules to find what is looked out for and the building of systems, which help sort out information of interest. These systems are applied in web stores like *Amazon* or in selective searches on *Google*. Even when it comes to social interaction, systems being allowed to decide in the user’s presumable interest. In social networks like

Facebook, posts are preselected before relevant news is displayed. There are advantages and disadvantages in this preselection, especially if algorithms take over the user's natural task of reducing information in daily life [3]. This reduction draws the attention of a whole generation of media consumers [4] and is influencing how we, personally, filter the important from the less important. Becoming experts in selective communication although means accepting the loss of presumably less important information. Problems arise when the communication with people in the social environment becomes unbalanced.

The selection process in the media is assisted by the invention of technological structures. The spread of mobile technology especially in the form of wearable devices requires a transfer of those solutions into the sphere of physical products, especially if they fuse with the human body and make use of the human senses.

2 Observing Signs of Commitment Between Couples

To start the transfer of the previously described solution to a physical representation, the concentration has to be focused on one essential component in the first instance. This component was found by observing the behavior of a selected group of people for the Commiticator project.

The usage of mobile devices and the resulting constant accessibility lead to an observation when used by people in a close relationship: Their use of mobile text message systems in daily life shows the emergence of a specialized form of interaction. Between people who have known each other for a period of time, communication often splits into two main groups, one of which revolving around recent events. This happens for example on a practical level, when explicit information is shared with the other person like ›We don't have milk‹.

Another form is focused on commitment, for example ›Thinking of you‹ or ›How are you‹, although the sharing of media contents of any kind can be seen as a committing part of conversation.

Within the Commiticator project, a core group survey about the ›signs of commitment‹ was started and it revealed that about 50–80 % of the conversation was sent for reasons of commitment in one or the other form. When asked, the participants declared their actions as a subconscious act in the first hand. Nevertheless, nearly all agreed that they wanted to share a part of their own experiences to stay in contact with the other.

This behavior has been studied in several projects like the ones of Streyker [5] and Bennett [3]. They show that the information itself is not important in these kind of messages, which offer commitment in form of a “proof of life”.

Furthermore commitment can be identified as a key element in social behavior, especially when it comes to communication between two people in close relation to each other.

The constant availability through mobile media devices overcomes the limitations of physical distance and is increasingly creating the expectation of permanent communication that especially follows a growing emotional connection. Yet often this is not possible due to external circumstances, and less an expression of unwillingness.

The aspects of commitment in communication between related people seems reason enough to explore it more explicitly and to make it the object of our investigation in the field of jewelry.

2.1 Jewelry as a Tool for Communication in Form of Commitment

As the Commiticator project is all about the development of a device that acts in the described space of communication between people in a close relation to each other, the character of jewelry can take the role as a key to assure the acceptance of such a tool. Following the typical characteristics of jewelry, especially in its function as a body worn medium, it allows a particular perspective on behavior among couples.

The characteristics of jewelry can be described in recognition of its anthropological roots, its mythological connotations and its contemporary expressions.

Jewelry is one of the oldest representational object humans have used to communicate. Archaeologists have dated excavated strung shells back to around 75 thousand years ago [6]. Regardless of what exactly inspired early humans to put shells on a string and wear them on their body, it can be assumed that, from the moment where the human brain was able to understand metaphors, humans must have seen what others were wearing and must have started to read this information. It is not hard to conclude that seeing the teeth of a predator hanging around the neck of a hunter is a form of acknowledging him as a successful hunter [7]. The high-end technical goods for example in the form of smart watches, which are often produced of rare or high valued materials, are a similar sign for success in the present day [8].

To wear a ring intentionally as a symbol is not as old as wearing shells, but especially the wedding ring is known all over the world as a sign of partnership [9]. Even if one would not know the meaning of a wedding ring, the human could interpret the materiality of gold as an archaic representation of sun and its eternal power. If there are two people wearing a similar object, it is easily understandable that they, sharing the same symbol, must be linked to each other in some way. Communication with objects worn on the body is still present in its traditional form and these messages are still as significant as millennia ago.

Furthermore there are aspects of jewelry as a commemorative object. People are obviously turning their wedding ring or grabbing the locket as an object that is loaded with memories of a person. This is an expression of an intuitive and intimate relation to a person embodied by an object. This one-way-communication is often happening in a natural, non-disruptive and intuitive way. The person who is doing so is sending subconscious messages, being only able to imagine how a partner might be turning his or her ring at the same time. Commemorative objects fill the void that the impossibility of face-to-face interaction leaves in certain situation. This may be caused by death of the recipient, which also means the freeze of communication with that person, or it is just caused by distance that does not allow communication, for example if partners do not live in the same city or they are at work during the day. When studying a communication phenomenon facilitated by a piece of jewelry, it is helpful to be aware of the interaction happening within this void that occurs in communication.

As elaborated, the use of jewelry as a communication device cannot be viewed separately from its anthropological and historical context. It has been developed into an almost intuitive and universally understandable form of expression. Jewelry here is considered as an instrument that serves as a tool for researching the individual's reaction as a bearer of jewelry, along with ongoing events in the personal use of media and technology. Therefore, jewelry can although become a part of the debate about contemporary issues of digitalization.

2.2 Wearables

There have been several jewelry objects, that already made use of the characteristics of jewelry and are combining those with technology.

The term ›wearable‹ was affected by MIT professor Neil Gershenfeld who spoke about the wearable computer as a pervasive machine. In his idea about smart objects, wearables should serve as media prosthesis and enhance human abilities [10].

Smart jewelry objects are only one group of wearables. Best known are complex accessories like smart watches (*Apple Watch*, *Pebble*) and fitness bands (*Fitbit*, *Fuel Band*, *Jawbone Up*) but there also is smart jewelry in the form of pendants and lockets as well. The products on the market can be divided into five groups:

- gadgets (e.g. usb locked by *Swarovski*) and toys (e.g. digital diary, *iheartlocked*)
- medical helpers (e.g. pendant that manipulates electromagnetic fields, like *Q-Link*)
- sensors (e.g. weather sensor, like *CliMate*)
- input devices (e.g. gesture control, like *Logbar*)
- communication assistants (e.g. telephone assistant bracelet, like *MICA*)

Furthermore there are products that support the ideas of the Commiticator project. The *Shine* by *Misfit*, positions itself against current wearables as ›gadgets devices‹ by deploying aesthetics normally associated with jewelry. Another approach is the *Cuff* which can be integrated into existing wearable objects such as bracelets or pendants and functions as an enhancement of the mobile phone.

“*The Locket*”, a smart pendant allows users to receive messages and see images from selected loved ones in a traditional locket form, is related to the Commiticator in its approach to allow more intimate modes of communication, expressed in a minimalistic traditional form. Another similar emotional approach is the transfer of heart-beat through technical devices which can be seen in Projects like the *Heartier* by Alejandro Delgado Charra.

3 An Experimental Jewelry Device

As described before there is a potential for further research within the communication between two people if it comes to the exchange of signs of commitment. For that purpose, a wearable jewelry device has been developed. The device should meet the characteristics of jewelry, and also fulfill the criteria as a wearable (Fig. 1).

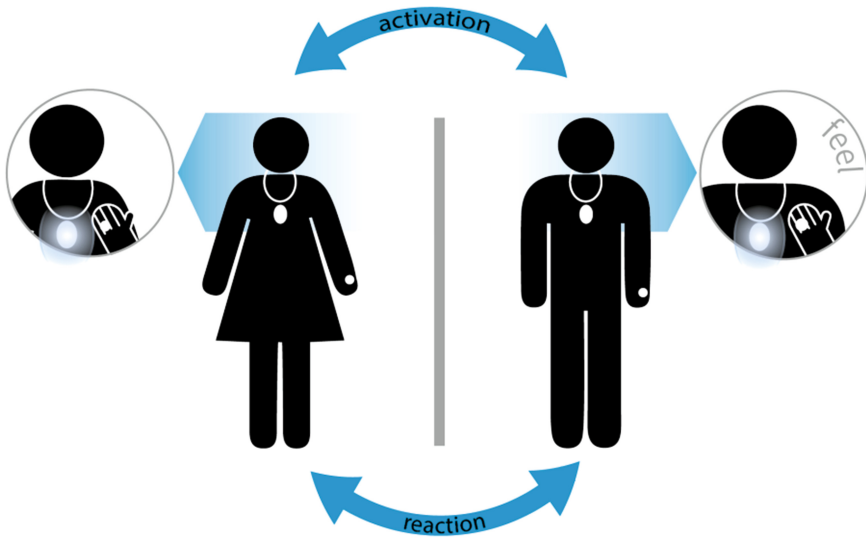


Fig. 1. Schematic view of the ping-pong like interaction with the help of the Commiticator locket

3.1 Components and Function

On the current market of wearables there are mostly watches and bracelets available such as the *Apple Watch* or the *Jawbone Up*, as well as flexible systems that can be worn on several positions on the body such as *Climate*, *Shine* and *Cuff*.

The Commiticator Project intends to underline the importance of relation between couples. To support this idea a ring and a locket for each one of the couple became the components of choice. As previously described, the ring is the eternal symbol for partnership and works as the initiator of the communication between the wearers.

To make use of the locket it requires a magnet on the finger ring. This can be done in an encapsulated fashion as displayed in the prototype ring but it is also possible to add a magnet to an already existing ring.

The locket is the second intimate jewelry object, as it holds traditionally commemorative objects. In the past it had a religious connotation and the lockets held personal relics or hair of a beloved person. Usually the locket held religious paintings and portraits inside the lockets. Nowadays they often hold photographs of beloved persons. As lockets are worn close to the heart, their position on the body correspond to emotional bindings and feelings of love and remembrance.

To make the Commiticator fit better in daily use, it is possible to wear the locket on a keychain or as a pocket watch but these are only further suggestions for its individualistic realization potentials.

3.2 Materiality

Due to its cheap price plastic is used in several wearable devices on the market (e.g. *iheartlocket*, *Pebble*, *Cuff*). For the first prototypes of the Project plastic is used as a rapid prototyping material. For the long-term study a metal version is intended, as it allows the daily use without major deteriorations. It supports the aesthetic and haptics of a jewelry piece. This aesthetic match allows a higher acceptance as a body worn product for daily use for the average consumer.

3.3 Design

Its appearance is reduced and modern but is not thought as a standalone statement. Instead it refers to the lockets cultural history. The surface still shows the lines of the production process, which is done by a low detailed 3D-printing process. The generated 3D-print pattern underlines the contemporary approach and refers to its technological genesis.

Due to the metal casting process and the smiths works afterwards, the printed lines appear as an almost natural pattern, referring to the growth of wood. It although has a similarity with the ancient goldsmith technique, where castings are made in engraved cuttlefish bones that leads to individual layered patterns.

At the same time this pattern is a reminder of decorative engravings in the surface of traditional lockets. The surface can be read as an individual fingerprint and stands equally for the uniqueness every intimate relation has. So it fits to the implications of the ring component in the device.

3.4 Requirements for a Wearable Device

As seen in the previous examples, wearable pendants and lockets communicate with the wearer in different ways. They make use of the senses to signal the recipient, for example by the use of light (*Qlink*), vibration (*MICA*) or by warming up (*Remember Ring*). The warming up of a device worn on the neck did not find a high acceptance in the preceding inquiry for the Commiticator project. The participants sometimes did not feel the temperature or they expected it could become too hot.

The shown solutions did not fully support the idea of intimate communication, thus the Commiticator project makes use of the haptic sense.

Referring to the idea of Neil Gershenfeld [10], who saw the main purpose of wearable devices as an enhancement of human abilities, the concept of a ›magnetic vision‹ came into focus as it could enable an invisible and therefore intimate form of sense.

The term ›magnetic vision‹ was established in the body mod scene and is used to describe the sensation of a magnetic field, which can be located with the help of an implanted magnet under the skin. Often these implants are located on the back or the side of the hand but mostly on the side of the fingertip of the ring finger. These kind of implants are popular in subcultural scenes like the cyborg-scene, where members try to enhance their bodies by mechanical and technological devices, often inspired by

science fiction models [11]. Furthermore, there is a rather established scientific approach to magnetic vision. Birds like doves orient themselves in the magnetic field to the earth and are able to navigate precisely due to their magnetic sense established by a field sensible part in their head [12]. The early state experiments revealed that it is not necessary to pass the border of the skin to enable the sensory experience of a magnetic field. It is also possible if a magnet is simply attached close to the hand.

Following that observation magnetic vision is established by enhancing the ring with a magnet. As the locket contains a magnet, close proximity between ring and pendant allows the wearer to sense the established magnetic field, whenever the partner sends the activating signal. The enhanced tactile sensation allows us to feel when the partner has recently been thinking of us and subsequently sends a signal back to the partner. This creates a ping-pong like interaction as the set of jewelry is worn.

3.5 Technological Solutions

The Commiticator is a set of jewelry, which consists of one ring and one pendant for each partner. The pendants of the two partners are wirelessly connected with each other. The prototype is built using an *Arduino* based microcontroller platform. The microcontroller is connected wirelessly to a cloud service (e.g. *Sparkcloud*) that enables the connection between the lockets. The locket includes a neodymium magnet that is pivot-mounted. A motor unlocks the magnet to turn in the right position when the input signal is received from the other locket and holds the position for a period of time. An included hall-sensor detects the magnetic field of the ring and sends out the activation signal, whenever the wearer is touching the locket with the ring. The device is powered by a polymer-lithium-ion battery.

3.6 Use Case Study

In the first stage of the project couples were asked about their usage of mobile communication devices especially as a tool to send signs of commitment to the partner.

Due to that experiment five groups could be identified as participants for the prototype study:

- normal couple (students, not living together)
- couple in a far distance relationship
- married couple (one partner working, one partner at home - live together)
- mother and child
- best friends.

The prototype was given to the selected core-group for two weeks to collect impressions and to be able to make further improvements on the device.

As the Commiticator investigates how private signs of commitment are facilitated by technology and its capability of changing behavior, the prototype-group had to answer several questions before and after the test period.

4 Result

Analyzing modern technological communication systems and how they function between couples and other peer to peer groups recover great potentials in the development of a device which is especially designed to express commitment discretely. First experiences with a prototype-group indicated, that such a device is in general welcomed by the participants. Especially the technical affine participants could imagine using such a device on a regular base. One criterion was to invent a convincing concept that works with the special characteristics of jewelry and benefits from its cultural implications. Because of its appearance as a locket, most of the participants would appreciate to see the device in a higher valued material. Nevertheless some sorted the device in the product category of gadgets as well as in jewelry. The participants also proposed several technical improvements such as a longer battery life and the integration of a battery low signal. They would prefer a smaller size of the locket as well as a more silent motor. Furthermore they wished a better connectivity through mobile services.

For the interval in which the magnet establishes a magnetic field, an average of 15 min could be determined as a useful middle, but this value is customizable in the code. The participants welcomed their enhanced ability to feel magnetic fields and discovered an aspect of playfulness in it.

A conclusion how far commitment is influenced by the use of the commicator in the long run, could not be evaluated in the undertaken short-studies. As some of the participants started to use the device intuitively, they agreed that the device is supporting intuitive gestures and unconscious communication. As assumed earlier, the Commiticator could enable commitment across physical distance, without losing situated awareness. In doing so, the device could work as counter draft to the sometimes disturbing communication which accompanies people in everyday life.

4.1 Discussion

Due to its state as an early-prototype, several technical issues need to be solved. In the prototype experiment the groups had to deal with connection interruptions caused by the lag of network connectivity. Further there are concerns that the mechanical parts may not be stable enough, even though there have been no cases of material weakness in the preceding study. As those mechanical difficulties are solved in mechanical watches, these concerns can be avoided in later versions. The integration of those suggestions from the first trial experiments in the Commiticator may influence the result of the experiment. As the experiment supports a change of behavior by sending signs of commitment with the help of a technical device, there remaining concerns, if a behavior change is socially helpful and desirable. In a larger scale study, these questions will be scrutinized.

4.2 Outlook

The ideas and changes drawn from the prototype stage will be included in the final prototype. With the final prototype, there will be an accompanying long-term study to clarify how private signs of commitment, facilitated by technology, may be capable of

changing human behavior. It will be interesting to see how the device is providing a private and intimate communication possibility for two people and if this is influencing couple structures. Further technical developments in the field of a ›true‹ magnetic vision could also mean a transgression onto the human body. Structurally the device could be enhanced and opened up for group-interactions. Technically it would be interesting to charge the locket wirelessly by induction. Further it would be interesting to follow the idea of an individual fingerprint on the locket with the help of 3D-printed structure variations, there has to be experiments with the plating of 3D-prints with gold or how 3D-printed forms could be used as stencils for the stamping process for gold sheets.

A larger scaled study would naturally be depending on the availability of a larger number of testing devices. The project is currently privately funded, so at the moment the capability of producing further prototypes is rather limited. It would be interesting to see how improved financial means and therefore enlarged production capabilities could provide the basic prerequisite for the realization of a larger scaled study. This could lay the foundation for an industrial sized production in the upcoming future.

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