

Blinklifier: The power of feedback loops for amplifying expressions through bodily worn objects

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ABSTRACT

The main motivation of this research is to gain a better understanding of the power of feedback loops by finding the zone somewhere between passively offering information and aggressively pumping out data that gets ignored along with all the other media noise. The answer we believe lies in creating compelling, aesthetic solutions that appeal to our senses and fuse seamlessly with our everyday lives. This poster discusses the power of feedback loops in environments where human and wearable computers are intertwined and explores their application as tools for self-modification and sustainable change. In order to explore feedback loops in these environments, we propose Blinklifier, a wearable computer that amplifies human blinking and minimizes the use of intrusive devices on the face such as heavy glasses and electromyography. Here we investigate the communication possibilities by exposing blinking through wearable computers.

Author Keywords

Feedback loops; wearable computers; humanistic intelligence; bodily affordances; haptic interface.

ACM Classification Keywords

H.5.2 [Information Interfaces and Presentation]: User Interfaces - Haptics I/O, Interaction styles.

J.5 [Arts and Humanities]: Fine Arts.

General Terms

Human Factors; Design.

INTRODUCTION

As technologies become cheaper and more readily available, the potential to embed sensors into the fabric of everyday objects and materials is enabling a form of aesthetic thinking to emerge. By harnessing the power of techno-sensual feedback loops, everyday objects can become reflective tools that stimulate us to modify our behaviours in ways that feel natural and unobtrusive. They may encourage us to play and explore the extended environments that become tangible spaces created in the interface between real-time information and haptic materiality.

We already know that feedback loops work: they can

change human behaviour [2], they have been explored in the fields of psychology, engineering, economics, social science, systems theory, education, biology, environmental science, control theory, and so forth. The basic principle remains the same: action, information, and reaction [4]. But never before in our history have sensors been so readily available. With the cost, size and weight of sensors so low, we can now afford to play and discover the full potential of feedback loops in ways that were previously unthinkable.

Humanistic Intelligence (HI) proposed by Mann [7] describes a framework wherein the natural capabilities of our human body and mind interact in synergy with one another and wearable computers become an integral part of the feedback loop. Blinklifier is our HI proposal, a wearable computer that amplifies voluntary and involuntary eyelid movement. Besides developing wearables that visualise psychological and physiological states, we developed a communication interface to amplify the natural muscle contraction and relaxation and to create expressions commanded by the user.

RELATED WORKS

The use of wearable computers makes possible a new personal computing genre but also adds some new capabilities and affordances arising from direct physical proximity to the human body, thus allowing the development of HI feedback [7]. *EyeTap* [6] is an HI example of a device that allows the user continuously to capture and record information. This enables the user to review the previous ten minutes of their life, allowing them to manually save the most memorable moments throughout the day. Another example of the power of feedback loops in wearable computers is the *CO2 Corset* [8]. It monitors carbon dioxide levels in the environment and provides physical feedback by tightening the bodice in relation to air quality. *Mind Cupula* is an affective environment that explores the interaction as a cognitive feedback loop [9]. This interaction attempts to comprehend the psychophysical action of the user and explores the user's endo-capacities (the user as observer of his own observation).

A social relationship is based on shared thoughts and feelings but effective communication is based on emotional signals, which are more efficiently communicated by facial expression. Several techniques are commonly used for

capturing signals; these include galvanic skin response; blood volume pulse; electrocardiogram; electromyogram; respiration and accelerometer signals [9]. *SmartShirt* [5], described as the ‘shirt that thinks’, allows monitoring of an individual’s biometric data such as heart rate, respiration rate, body temperature, calorific burn, and provides readouts via a wristwatch, PDA (personal digital assistant) or voice. This information is wirelessly transmitted to a personal computer and ultimately through the Internet.

BLINKLIFIER

Historically the notion of Wearables has grown out of two distinct fields: computer engineering and fashion design. These two areas are so entrenched in their professional silos that they struggle to communicate in meaningful ways which, at worst, result in ‘geeky’ apparatus that have little aesthetic value or, alternately, decorated dresses embellished with LED lights. At this point, with the availability and affordability of sensors and in the safety of the interdisciplinary workspace of the artist’s studio, we have an opportunity to throw out these old maps and create new ones to navigate the contemporary environment.

Figure 1 presents Blinklifier as a HI wearable device that intends to enrich our emotional dialogues and manage our social relations through blinking. It follows the natural eye muscles contraction and extends the motion into a visible light array. It responds to the specific eye movement patterns of the wearer and amplifies emotions that the wearer wants to communicate by presenting noticeable, exaggerated visual compositions.



Figure 1. Blinklifier, a wearable computer that amplifies human blinking

In order to avoid using any electronic device on the wearer’s face, skin conductive ink [3] is applied to fake eyelashes to capture the blinking motion and painted as eyeliner to connect the eyelashes with the wearable device. Blinklifier uses LEDs to create the blinking patterns in the headpiece and is prototyped using an Arduino microcontroller [1].

CONCLUSION

This paper presents key findings from our research into the power of feedback loops as tactics for self-sustainable change, in the fabric of everyday life, through enchanted bodily worn objects. It explores the feasibility of humanistic intelligence with feedback loops in wearable computers for social communication.

It proposes Blinklifier, a wearable computer that displays intimate data and creates a feedback loop between the wearer and the wearable. It was designed using a trans-disciplinary approach, drawing on aesthetics, arts and technology. Unlike other facial expression wearables, Blinklifier does not make use of video cameras, electromyogram, electrooculography or galvanic skin response, but uses conductive ink for eye motion recognition.

Future work will include Blinklifier evaluation, the exploration of other facial motion recognition techniques and the use of different actuators such as gesture display.

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