CoNNeCTioNS: A Tangible Interface to Represent Social Interaction

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ABSTRACT

CoNNeCTioNS attempts to represent the organic qualities of social interaction through the use of tangible beads. Necklaces of beads contain entire portraits of their owner, and when a bead is traded, it takes a "fuzzy" subset of that portrait with it. When connected to another person's necklace, a bead will slowly influence that person's portrait, mediated by the amount of time spent connected to those beads and frequency of such encounters.

Keywords

Tangible interfaces, beads, social interaction, portraits, personal artifacts

INTRODUCTION

Through one's life, one interacts with and influences many other people. One may interact a great deal with close friends and family, and therefore have great influence on their personalities. Even those who are briefly befriended can be affected, if only minutely.

Personality may be defined as the outward expression of the set of memories and experiences that one has accumulated from birth until the present day, Such memories and life experiences have been attached to stone, glass and bone beads since ancient times. From locust beads around 1000 BC [3], to the beads kept as jewelry by American slaves (who, upon the owner's death, divided the precious keepsakes among his survivors) [4], beads have comprised a visual, tactile connection to the intangible, unimaginable, or magical.

Beads are precious, fragile, and easy to lose. Through compact form and long-lived materials, beads survive time spans across which larger forms crumble. Their size and beauty invite their incorporation into jewelry, enhancing their significance as personal totems. Their availability in quantity, at low cost, allows them to be shared in friendship, as people trade keepsakes, memories and stories.

Intensely personal artifacts, such as photographs and recordings, with which people associate memories and experiences, become less real when digitized. An old photograph passed around a room accumulates fingerprints and gentle deformations from those who touch it. The names of those in the image may be written on the back by many different hands. Digital images, which may embody this same importance, never wear out, never admit their history, never age, and cannot be shared in the non-virtual world. Yet it is exactly the sharing of memories and physical artifacts that contain those memories with which people influence one another.

CoNNeCTioNS

CoNNeCTioNS provides a link from the physical world of personal artifacts to the virtual world of personal memories stored as digitized images and sounds [1]. Each bead on a necklace contains some incomplete fragment of a personal history. Only the necklace as a whole comprises a complete portrait: its storage and communication system is organic and imprecise. The assembled necklace serves as jewelry, a personal relic of the collected memories, and as a storage device for its contents. The necklace must be handled before it will reveal its contents. It must be assembled into a circle before its beads will share their content with others.

Much as the influences one person has on another are continuous and non-specific, the interactions between beads of different owners occur in a continuous, non-linear way. As a person receives objects from and gives objects to others, influencing and being influenced, so does a necklace evolve over time by the direct and indirect influences of other necklaces. As the psychological and physical instantiation of a person at any given time is a representation of that person's life, so is a necklace representative of its past experiences and interactions. A necklace is a portrait of a person that changes and evolves as that person lives. In the end, it is a summary of memories of events and interactions.

DESIGN

There are six principles of the CoNNeCTioNS project:

- Information on a necklace is distributed across its beads. A single bead doesn't contain a object or set of objects,

Figure 1. A bead showing the amount of information it contains.

but a fuzzy version of the whole set of events that exist on the necklace. We want to explore the representation of non-discrete, organic data.

- Beads can be traded and given to other people, and connected to other necklaces. In doing this, the owner of the bead is sharing a representation of their portrait with another person. When connected to another person's necklace, the bead slowly, over time influences the portrait contained within the necklace and the necklace influences the representation of the owner's portrait contained upon the bead.

- Upon returning to the owner, a bead shares its interactions with the necklace. These interactions are integrated into the portrait as a whole.

- The human interaction mechanism for a necklace is organic: manipulating a necklace with the hands, as one might handle worry beards or a rosary, allows browsing, recording and annotating the portrait stored within.

- The beads themselves embody the flow of information to and from themselves and their direct neighbors on a necklace. This embodiment should take the form of an organic attenuation of a light that is contained inside the bead (to allow a "glowing" effect) at the point of interaction.

- Beads do not know the topology of an assembled necklace: they are at most aware of their nearest neighbors. Using basic principles of sharing, beads develop "familiarities" with the other beads on a necklace, exchange their content, and determine when and how much content to share.

The intent of CoNNeCTioNS is to evolve an organic model of personal interaction that represents the type of social interaction that would take place with traditional beads. Unlike Meme Tags [2], the beads within CoNNeCTioNS provide a tangible instantiation to the trading of their contents. The beads trade information in an analog way, versus the digital trading of ideas by the Meme Tags. They more closely model social interaction since a bead's influence on a necklace is mediated by the frequency and duration of its interaction with that necklace.

IMPLEMENTATION
The initial version of CoNNeCTioNS was created using the Crickets hardware developed at the MIT Media Lab. Each necklace has eight LEDs attached each to one of eight beads. The intensity of an LED represents the amount of information contained on that bead. When two necklaces come into contact with each other, they trade pieces of information over an infrared link. During each turn, a necklace probabilistically chooses to trade the bits on a bead, which can increase the LED level of the respective bead on the other necklace.

Content—currently only bits on a bead—is probabilistically distributed among the beads on a necklace. Further, only a percentage of each individual element of content exists on a bead. For example, bead 1 may have 20% of content A and

Figure 2. Two necklaces trading information

70% of content B, while bead 2 might have 30% of content A and 40% of C. In this way, each bead carries some fuzzy subset of the whole.

After interacting with another necklace for a short time, each necklace has absorbed a small amount of information from the other in the form of increased bead LED levels. The stochastic nature of the communication ensures each interaction between necklaces has a unique effect on the final state of both.

CONCLUSIONS
The implemented version of CoNNeCTioNS currently does not adhere completely to the design framework outlined above. While the current system does work toward an organic model of information sharing, individual beads are not separable from necklaces. The use of LEDs to represent the information content of each bead is less than ideal.

Future development of this project will work toward developing autonomous beads that embody the type of organic information contained and transferred within and between them, respectively. Also, a concrete application, such as a historical photo album, must be created to place the CoNNeCTioNS framework into a real world context.

More information on this project can be found at: http://www.media.mit.edu/~spiegel/CoNNeCTioNS/

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