

exhale: (breath between bodies)

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Abstract

exhale is a whisper[s] research group project based on designing and fabricating "a-wearable" body networks for public spaces. The rhythm of networked group breath is used as an interface for interaction, and a mechanism for sharing our bodies' affective non-verbal data. We use the networked breath of the participants within the system to actuate the responses of small fans, vibrators and speakers that are embedded in the lining of sensually evocative skirts worn close to the body. The research integrates gestural interaction with fashion, developing new communication metaphors for wearable technologies network design.

1 Art and Science

This work embodies the confluence of artistic design and expression with software and hardware technology. The whisper[s] research group has collective backgrounds in fabric and garment design, choreography, and complex software systems, including both hardware and software architectures. The resulting work was influenced by their practices with modeling experience studies, networked micro-controllers, and real-time systems. It applies tools from choreography, such as Laban Effort/Shape Analysis along with linguistic and statistical analysis, to investigate the physiological data that the work utilizes. The garments employ conductive fabric, shaped equally by the needs of the electronic elements and the design aesthetics. Placement and organization of the sensors and transducers is guided by body ergonomics, bio-energy systems and interface design. Movement analysis is used to frame gestural interaction creating playful, intimate connections between participants.

2 Vision

In this work, garments are a step in a progression to systems that transparently exchange and express internal body state and intention via participant-mediated communication, mixing physiology-derived information with gestures and other non-verbal mechanisms. Concepts of device 'listening' and biofeedback enable what we term subtle machine learning. The garments provide an environment in which we can augment verbal and visual modes of communication, where the quality of a gesture can replace many words, and can be exchanged with their affects as well as their effects through out-of-band pathways.

3 Experience

Participants walk towards the darkened space, becoming aware of eight textured and sensual garments: skirts made of silks, and organza, natural fibers in earthy and vibrant tones, hanging from

cables stretched from ceiling to floor. The visual image is a small forest of "skirt trees": skirts suspended at various heights in space, connected to vertical cables dropping in plumb lines to the earth. A light positioned at the base of each skirt illuminates it upward from below, highlighting and bringing light to its materiality. Guides assist the participant in putting on the skirt and wrapping the breath sensor around the rib cage. As a participant moves through the space, consciously shifting their own breathing cycle, they create the interactions of self to self, self to other, and self to group: wirelessly communicating and creating a shared breath state. And as the lining of each skirt 'breathes' with the participants, the small fans and vibrators respond to the breath beneath the lining unseen to others; the small speaker within the skirt marks the sounds of the breath data creating a body network that tickles and caresses and whispers from within.



4 Innovation

The core technical innovation of exhale: (breath between bodies) is integration of non-verbal models of network communication in a playful multi-modal environment, using layers of directionally conductive fabric to provide both electronic pathways within the garment systems and a sensual tactile experience for participants. Connections between participants are realized through specialized electronics and embodied through acts of physical contact, designed using gestural models for interaction.

The fabric that forms the conductive layers within the garment has electrical behavior due to its construction as a combination of very fine silver or gold wire with traditional materials such as silk. This conductive fabric is used as a replacement for conventional wiring, which is much heavier and less flexible. It is also used to form simple touch or pressure sensors, via contact between layers, and identification patches, using isolated fabric regions that include devices that have unique electronic signatures. Touch zones on the garment (or another garment) can make contact with these isolated regions, and the signature can be "read" to establish self-to-self, self-to-other, and self-to-group connections.

5 Acknowledgements

the whisper[s] research group: Susan Kozel, Sang Mah, Gretchen Elsner, Robb Lovell, Diana Burgoyne, Norm Jaffe, Jan Erkku, Calvin Chow, Camille Baker, Lars Wilke, Adam Marston; Industry Contributors: Thought Technology, Tactex Inc, Credo-Interactive; Sponsors: Heritage Canada, Canada Council for the Arts, B.C. Arts Council, Savage Media, CFI, I-Lab at SFU