
Representation & Interpretation of Biosensing



Figure 1: Color-changing fabric. Woven and crochet material explorations for leveraging thermochromic textiles to display information, from prior work [2].

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Abstract

My work explores interactions with physiological signals in daily life. I develop alternative representations of these signals and study experiences and interpretations around these artifacts, leveraging material properties to create new associations and interpretations. Through broadening the design space around biosensing, I probe what relationships with physiological data might mean for our social relationships and sense of self.

Author Keywords

Biosensing; materiality; clothing.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous; See <http://acm.org/about/class/1998> for the full list of ACM classifiers. This section is required.

Introduction

Biosensing is on the rise in daily life. The Feel wristband monitors skin conductance, pulse, and temperature to track mood and give wellness advice [17], and Affectiva uses facial analysis to detect emotions [18]. Prevailing trends in biosensing promote individualistic, algorithmically defined emotions, wellness, and self-improvement. My stance is that this alone is far too limiting. Designs should embrace and explore a

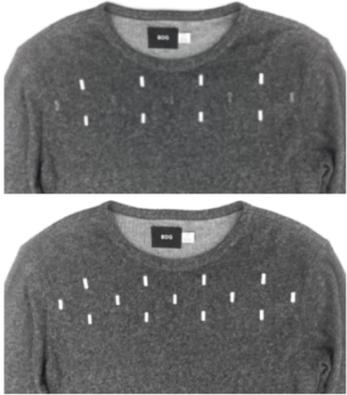


Figure 2: Shirt that senses and displays skin conductance. Small white rectangles gradually appear when the wearer's skin conductance spikes, an indication of excitement such as stress or happiness, from prior work [10].

multiplicity of values, experiences, and interpretations. Interpretation, moreover, is inextricable from representation [8], and materiality shapes information representation [3]. So, drawing from an alternative lens that foregrounds contextually situated interpretation [1,11], I design biosensing representations with properties unlike those of typical data visualizations or screens by leveraging the physical properties of dynamic materials, such as the slow, non-light-emitting color changes of thermochromic fabrics [4,12–15]. Embedding these displays in clothing brings in associations around personal style [9], self-presentation [6], and the body, which may further shift interpretations.

So far I have worked with thermochromic fabrics and display of skin conductance, and am exploring other materials and sensors. Over the course of my PhD, I hope to call out assumptions or unstated trends in biosensing and propose alternatives, with methods such as speculative prototyping and qualitative interviews. As an example, instead of promoting algorithmically defined wellness and self-improvement, designs could leverage comfortable clothing displays to prompt open-ended reflection or promote self-acceptance of one's current mental, emotional, and physical state.

Thermochromic Textiles as Information Representation

Ebb [2] is a collaboration I took part in with Project Jacquard [15] that explores associations around color-changing fabrics and information display in the context of fashion and personal style. Through material explorations [5,16], we developed thermochromic color-changing fabrics (Fig. 1). We engaged fashion designers and everyday wearers in envisioning what

role these fabrics might play in their design practice and sense of style. Participants expressed appreciation for the slowness and low resolution of this material, likening it more to a canvas than a screen, and envisioned slow, gentle, subtle displays. How might these displays shift our interactions with information?

Social Interpretation around a Shirt-Based Representation of Skin Conductance

This work [10] begins to explore the social meaning of clothing-based biosignal representations. I developed Hint, a t-shirt whose thermochromic screenprint pattern responds to the wearer's skin conductance (Fig. 2), and studied how pairs of friends, each wearing Hint shirts, conversed and interpreted the display. I found that in this context biosignals display became part of social performance [6]. What if wearers crafted their display to support their intended performance? What role might the sharing of biosignals play in social interaction?

Biosensing Clothing in Daily Life

Currently I am exploring thermochromic embroidery, shape memory alloy, and subtle actuators; different types of garments such as scarves, jackets, and socks; different biosignals such as heart rate, fidgeting, or touch; and ways that clothing already "senses" and "displays" aspects of our bodies and lives with material traces such as sweat marks, a lingering scent of perfume, or wrinkles. Inspired by slow technology [7], I plan to develop a biosensing and displaying garment, and study wearers' interpretations and experiences with the garment over a few weeks or more.

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