
Co-located Social Engineering Through Novel Technology Design

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Abstract

The focus of my Ph.D. research is on exploring ubiquitous and embodied technology interventions to enhance co-located social interactions. I engage in a Research-through-Design approach and leverage state-of-the-art technologies to envision and create novel designs. I then deploy and evaluate these designs to generate insights and identify key concepts and questions to consider when designing technology to engineer co-located social experience.

Author Keywords

Research through Design; Value Sensitive Design; Co-located social interaction; Social Wearables; prototyping; embodied interaction.

CCS Concepts

•**Human-centered computing** → **Interaction devices**; **HCI theory, concepts and models**; Interaction devices; User studies;

Introduction, Context, and Motivation

I am a Ph.D. student in the Social Emotional Technology Lab (SET Lab) at the University of California Santa Cruz. I am in the middle of my third year in the Computational Media Department, working under the supervision of Prof. Katherine Isbister. I started my doctoral studies in July 2017, and expect to complete them in July 2022. From

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Figure 1: A demonstration of 'Lågom' used in the context of a group discussion.



Figure 2: 'True Colors' wearable was deployed in a 4-day Larp event. Image copyright: ©Event Horizon.



Figure 3: 'The Cloakroom': An art installation exploring notions of intimate relationships and means of sharing memories through tangible artifacts infused with digital content [2].

2017 to now, I have been a collaborator and first author of a number of research projects, some of which have led to the publication of academic papers at top-tier conferences [5, 6, 16, 19].

My doctoral research examines the potential of ubiquitous and embodied technology experiences to enhance in-person social interaction, to offer new opportunities for people to connect to one another, and encourage meaningful human relations. I started my research by focusing on the design space of Social Wearables [16], and continue by exploring the design space of synergistic social 'robots' [4]. My major research goal is innovating ways to help people develop interdependent, more connected ways of relating. To that effect, I engage in a Research-through-Design process [20, 21, 9] to speculate, create, and study novel technology design focused on facilitating and encouraging these kinds of experiences.

My work is guided by the *Value Sensitive Design* approach to technology design. This approach accounts for human values "in a principled and comprehensive manner throughout the design process" [8]. I share similar values to those reflected in the Positive Computing framework [1], as well as in the design agenda of Slow Technology [12], which take into account studies that emphasize improvements to human psychological wellbeing. Olsson et al. recently articulated the need for better technologies that work to enhance co-located social interaction [18]. They emphasize that by enhancing they mean "not only enabling social interaction but taking an active role in deliberately attempting to improve its quality, value or extent" [18]. Every technology could impact psychological wellbeing [1], and I strongly believe that further research is needed to support the development of ubiquitous technology that truly enhances in-person

social interactions and that tends to our psychological well-being.

In terms of my own research practice, my background is multidisciplinary – I see myself as a person who bridges hardware prototyping, interactive experience, and fashion design. I am deeply interested in people: I wonder how interpersonal relationships emerge, develop, and grow, and what technology can do to encourage meaningful connections between us and those around us. Before starting my doctoral research, I earned a Masters degree from the Interactive Telecommunications Program (ITP) at the Tisch School of The Arts at New York University. ITP is known as a top program for interactive design and research training. The topic of my thesis there was an interactive, fully functioning installation exploring notions of intimate relationships and means of sharing memories with others through tangible artifacts infused with digital content (Fig. 3). I wrote an extended abstract paper about this work, which was presented at the TEI 2018 conference [2]. Previously, I worked for several years as a fashion designer in various market categories, and as a costume designer for art performances. My familiarity with and experience in fashion design inspired my interest in wearable technology as a social mediator. I also earned dual Bachelors degrees in Psychology and Film Television from Tel Aviv University, and a diploma in Fashion Design from Istituto Marangoni.

Problem Statement

Olsson et. al identified the lack of clear design guidelines which leads to low conceptual and methodological understanding of how to design technology that truly improves social interactions between people when they are in the same space [18]. This thesis focuses on exploring the potential of ubiquitous and embodied technology interventions to enhance co-located social interactions. My plan



Figure 4: Multiples of prototypes, top to bottom: 'Lågom'; 'True Colors'; The 'intimate-space' social robot; 'Flippo' creatures.

is to identify key concepts, synthesize theory, and create guidelines for best practices for those who wish to design, research and evaluate ubiquitous devices and other tangible computational artifacts to enhance co-located social interaction.

Research Approach, Methods

My research approach draws on my multidisciplinary background: I combine design practice with technical development and user studies. I follow a Research-Through-Design (RtD) approach [20, 21, 9] by mapping current design trends and drawing insights (work I have started in [6]); ideating, designing (or co-designing) and prototyping; then deploying and evaluating new designs in the field, in order to form new insights. I am particularly interested in designing and making tangible prototypes that augment social interactions and then conducting mixed-methods studies in real-world or semi-naturalistic settings to better understand their impact. I use theory such as Social Affordances [14, 16], theoretic constructs such as strong concepts [13, 10], and design methods and tools (e.g. Embodied Sketching [17] and Plex cards [15]) to guide my design process. I prototype and iterate until the design is ready to be deployed. Then I make multiple copies of the final design prototype (e.g. Fig. 4, 5, and 6) and deploy it with people for extended periods of time, when possible. To evaluate my designs I engage participants through both questionnaires and interviews. I also observe the interaction when possible (sometimes also using video capture). I then perform thematic analysis [11] on the data collected and draw insights for future social wearable design work.

Phase I: The Social Wearables Design Space

During the first and second years of my Ph.D. research I focused on unpacking the design space of social wearables

[16]. During this phase I explored co-located social engineering primarily through the use of wearable designs. I began as a co-author of a full paper published at CHI 2018 [16], titled *Designing Future Social Wearables with Live Action Role Play (Larp) Designers* which describes the design process and deployment of a series of social wearables that were designed in a co-creation process with Larp designers. The wearables were intended to support co-present social experience. Deploying and studying these designs in use allowed us to articulate a series of social affordances. A follow-up project I've led was reported in a full paper published at CHI 2019 [5] titled *Designing 'True Colors': A Social Wearable that Affords Vulnerability*. This paper describes the co-design and deployment of multiple copies of a social wearable for another Larp, that was meant to augment the players' social experience. In particular, we focus on how the wearables helped to create a space for vulnerability among wearers, that enhanced their sense of connection and improved their shared experience. This study resulted in a novel understanding about the potential of strategic vulnerability as a catalyst for meaningful social interaction. The design at the center of this project was selected as a demo at UbiComp/ISWC 2019 [3] (Fig. 2 and 4).

Another social wearables project is the Lågom. We intended to enable people to be more aware of and better regulate their verbal participation in group discussions. The Lågoms keep track of how much each person is speaking, and give participants gentle haptic feedback if they speak quite a lot or not at all, toward balancing the amount that everyone speaks in the group. We ran a pilot study with nine participants using multiples of the prototype. [7] (Fig. 1 and 4). This project was published as a Late Breaking Work and presented at CHI 2018 [7].

Research Objectives

Goals: To better understand how people's co-located social experience can be positively mediated by technology through exploring novel technology design creations in use.

Research Questions:

1. What design consideration are at the core of making computational artifacts that encourage and create meaningful, embodied, novel in-person social interaction?
2. How can ubiquitous technology designs support and encourage co-located social interaction?
3. What are under-explored design opportunities for technology design to enhance social experience?

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Concurrent to this work, I studied the state-of-the-art of social wearable technology, and outlined recurring themes that address co-located social interactions. This research was published as a full paper at DIS 2019 titled *a Design Framework For Social Wearables* [6]. This paper reviews design exemplars and concludes by identifying potential social wearable scenarios and social needs as opportunity gaps for future designs, and extended a series of guiding questions to consider when designing social wearables. These were grounded in prior work, as well as our own design research, based on the previous two design projects (Lågom and True Colors).

Phase II: Synergistic Co-located Creatures

This phase started with the design of the Lågom [7]. These social wearables had their own 'needs' for thriving, in their backstory they needed those who wear them to balance their conversation. I also worked on a research prototype with external research collaborators of an 'intimate-space' social robot design with a backstory of being a 'worried pet' that was used as a technology probe to explore supporting self-regulation in children. This research was published at CSCW 2018 [19]. The design we created (Fig. 4) is currently being adapted into a commercial product by Committee for Children and Sproutel.

These previous projects became the foundations for my recent work. I led research of the 'Flippo' design: a social wearable creature prototype designed to encourage wearers to take breaks from work in which they move around, and engage in co-located social interaction. The Flippos (Fig. 4) have synergistic needs for connection that require their companions to engage in these activities. This work was just accepted to CHI 2020 as a Late Breaking Work [4]. We tested the Flippo devices in a field setting, in which participants had to manage their creatures' needs during the

course of a work day, working together as a community. We reported the results in a full paper submitted to DIS 2020.

Phase III: Co-located and Beyond – Drone Creatures

Currently I am planning a new project: I will redesign drones as creatures who will have synergistic social 'needs' with their companions (the people who 'care' for them). I am fascinated with the idea of having a physical social agent that is like a pet, but can also live and act physically further away from their companion. Inspired by carrier pigeons, and the use of drones for delivery services, this project will explore drones as social companions that intervene in new ways in co-located social interaction.

Dissertation Status and Next Steps

In the Spring of 2020 I am due to finish the first chapter of my dissertation, in which I plan to focus on the Social Wearables design space (Phase I), by building upon the design framework for social wearables my colleagues and I have been developing [6]. In participating in DIS 2020's doctoral consortium I see an opportunity to engage with other researchers outside of my own institution who would have a fresh perspective on my current research. While I would be happy to contribute from my own experience in RtD methods, building prototypes and thinking about social contexts, I would like to receive rigorous feedback and guidance regarding my current progress and future research plans from others who have deep expertise in these areas, as well as from people with different approaches and perspectives. My hope is that this feedback will help me sharpen my contribution and help shape the next stages of my dissertation, and my research direction in the future. I see this as an opportunity to connect and develop a sense of community with other scholars who are currently in similar stages of their academic careers.

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