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Hooze: A Kinetic Fashion Accessory for Touch and Play



Figure 1: Hooze in the Wild.

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Abstract

Recent innovations in fashion and smart textiles have contributed new visions of wearable computing, addressing the body through the cultural and social self. In this work, we draw on speculative design, maker technologies, and zoomorphism to explore how wearables might support sociability, and present Hooze, a fashion accessory that entices touch through its zoomorphic qualities and visual appearance. We describe our design and prototyping process, and reflect on how Hooze inspires transformative designs of wearables.

Author Keywords

Wearable Design; Zoomorphic Design; E-textiles; Interactive Fashion; Maker Technologies.

CSS Concepts

• Human-centered computing \rightarrow Interaction design process and methods

Introduction

Wearable electronics and smart textiles are generating both academic and commercial interest [16]. Recently, projects have begun to engage with the aesthetic and expressive possibilities of wearable design [1,2,7,8,9,12], while also exploring their cultural uptake [17,18]. These projects not only suggest novel experience paradigms, but also work towards



Figure 2: View of Hooze from the front and back.

addressing intimate and social aspects of people's lives, important dimensions for cultural relevance.

While critical engagement from a diverse set of stakeholders is needed for realizing culturally significant wearable designs, researchers and artists at the intersection of e-textiles, fashion, and tech have proposed visions of wearables that push aesthetic and technological boundaries, and address social needs, desires, and aspirations. An inspiring example is that of the spider dress [12], which cleverly incorporates zoomorphic qualities of spiders to add a "defensive" mechanism to an otherwise beautiful cocktail dress. The spider dress and designs like it [1,7] inspire form, and functionalities that transgress our everyday understanding of what clothing ought to be and do, and rather than *transferring* technology onto textiles, they demonstrate how tech can combine with textiles to transform the meaning of wearables [1].

Today's broadening access to prototyping tools [4] further contributes to a wide explorative space. As such, researchers have explored wearable design for playful applications around bodily interactions, human sociability, and connection. For example, using simple components, the Massage me Shirt [14] transforms a tshirt into a video game controller supporting physical interaction between individuals. Social Textiles [11] a social messaging enabled shirt aggregates people for event planning. Notably, the Mediated Body project [10] converts bodies into musical instruments, facilitating social play and interpersonal touch. However, apart from these examples, the practice of generating novel concepts for wearable technologies remains difficult in practice. Drawing on speculative design practice [5] and maker technologies we carried out an exercise in "wearable imagination", or a way of imagining playful functions of wearables beyond today's pragmatic and functional commercial products. We contribute our design exploration of Hooze (Figure 2), a furry kinetic fashion accessory for the shoulder that encourages social play and touch, and offer a reflection on design qualities that could be taken up in future designs of wearables.

Hooze was designed in a week-long workshop about "making wearables that matter". Our design intention was to explore ways of engaging the body in playful social interactions, while also pushing wearable design outside of capturing sensor-tracked data, or electronically augmented clothing. Our interrogations of diverse forms of bodily engagements led us to question the taboo nature of touch between strangers and consider designs which embrace touch as a desirable interaction, and emphasize curiosity-driven exploration of the body. The design is also inspired by the behavioral and visual characteristics of cuddly mammals and exemplifies a zoomorphic design [3].

Design and Prototyping

The fashion accessory resembles a pauldron, or flexible armor for the shoulder (See Figure 1, 2). The structure itself consists of a rigid plate that also houses the electronics, and a flexible wing extension that hangs over the arm. Both the rigid plate and flexible wing are constructed out of four pieces of cardboard that are folded into a three-dimensional shape and mounted on top of a plastic frame. The cardboard structure is covered with synthetic fur augmented with conductive thread (27 *ohm*), creating a capacitive touch sensor capable of registering stroking movement as described

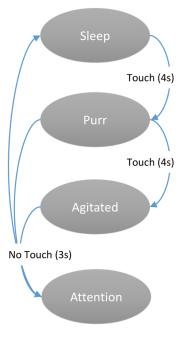


Figure 3: The programmed states of agitation of Hooze.

in [6,13]. The accessory's flapping movement is controlled by a continuous servo motor built into the rigid base. The servo motor translates its rotary motion to the flexible wing through a wire. Finally, haptic feedback propagates outwards into the periphery of the artifact via a vibrator motor embedded in the middle of the base structure.

A single Microsoft Micro: Bit board and two AA batteries power and control the accessory. It is programmed using Python and contains native functions for touch sensing and general purpose input / output pins. We developed a filtering algorithm to minimize input noise, which also controls the agitation state. We implemented four states: *sleep* (no vibration and movement), attention (no vibration and full movement), *purr* (medium vibration, no movement) and *agitated* (intense vibration, no movement). As shown in the state diagram in Figure 3, the default state is *sleep*, and moves to *agitated* state upon being touched for more than four seconds. When left untouched for three seconds, it shifts to attention state to attract people to pet it. After another three seconds it returns to its *sleep* state.

Arriving at Zoomorphic Qualities

The design of Hooze emerged through reflective [15] and opportunistic engagement with materials. We began prototyping with a rough idea of combining the pleasurable tactile qualities of fur with interactive qualities of movement, and experimented along these two dimensions, arriving at several technical proof-ofconcepts and two full iterations of our final design. We engaged in extensive testing and iteration, frequently trying on the design on our own bodies to adjust fit, as well as the kinetic and aesthetic qualities until we achieved a desired result.



Figure 4: Early prototype of Hooze with a different fur.

In our early prototypes, we explored the capacitive touch potential of various fabrics, but eventually settled on synthetic fur after a successful attempt at creating a fur stroke sensor [6,13]. We programmed the stroke sensor to trigger cat sounds, which became louder i.e. agitated with prolonged stroking. The result was endearing, drawing attention and interest from other workshop attendees, who began to associate our design with cats. We wanted to leverage the animal-like characteristics of the fur, but didn't want the accessory to be too closely associated with a particular animal, so rather than programming the sensor to trigger cat

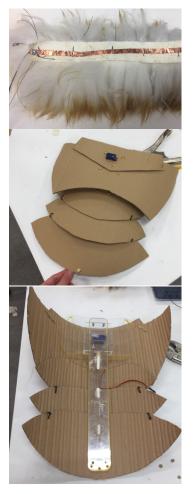


Figure 5: Images of components that make up Hooze: fur stroke sensor, cardboard base, and flexible plastic brace.

sounds, we incorporated haptic feedback programmed at different states of agitation in the final design.

Working with furs also created possibilities for integrating kinetic gualities into the design. The fur had an inherent bounce and drape to it, and we experimented with ways to emphasize this existing subtle movement. We explored materials that could support the weight of the fur, provide rigid structure, but also remain flexible enough so that when placed on the arm or shoulder, they would move up and down in a manner suggestive of a "flap" or "wiggle". Feasibility of creating this effect pushed us to create natural movement using mechanical servo motors, but without rigid mechanical forms. We designed a simple string pulling mechanism using a servo motor that leveraged the fur's weight inertia to gently release the fur. Unexpectedly, rather than giving the artifact a robotic quality, the servo motors added a purring sound that strengthened the references to animals we were already attempting to reinforce.

In our final steps of adding the fur onto the cardboard, we improvised with small fragments of a different fur to cover the leftover spots, which conveniently created the appeal of "eyes", strengthening the association of Hooze as a furry and animate creature posing as a fashion accessory.

Reflection

Our engagement with materials produced Hooze, an interactive accessory for the shoulder that enticed touch with a flapping movement, and responded to touch through haptic feedback. We view Hooze as an artifact to think with and reflect upon, rather than as a fully interactive prototype that demands rigorous evaluation and user-testing. As such, we solicited informal feedback by wearing the accessory around the facilities of the workshop, frequently modelling it to others. To help us further reflect on the design, we also took the accessory on a brief trip to the city center to observe reactions and interactions with strangers. We now turn to describing what we believe Hooze helped us accomplish in light of our design goals.

Enticing Social and Physical Engagement Hooze's visual aesthetics drove curiosity and bemusement from others, who often asked to touch, or play with it. Interactions with Hooze became a means of expressing a gentle and caring nature, where the soft furs, and endearing appearance encouraged delicate petting, and handling as if Hooze were indeed a small precious creature. Hooze prompted a wide range of physical engagement from simple stroking using the hands or the cheek to head resting on the wearer's shoulder.

Moreover, we learned that Hooze could support interactions between strangers to the extent that the accessory appeared to have a function that was unlike what people encounter in their daily lives. For example, during exploration in a public setting (Figures 9, 10), a man approached us and without being provoked, carefully explored the fur between the tips of his fingers. In response, we encouraged him to touch it more, and the man gave Hooze a long stroke and then pressed his hand firmly on it, and asked: "does it do anything, when you touch it?" "Oh, it's vibrating. So, it's like a massage on your shoulder."



Figure 6: Designers playfully enacting an attack to reflect on how the artifact might attract undesirable attention.



Figure 7: Designers role playing in a wooded lot to connect with their animalistic natures, and share intimate moments using Hooze.

Facilitating Humor, and Social Play

Humor and social play emerged out of the design process and we worked to reinforce it with subsequent design decisions, finding ourselves coming "alive" along with the artifact we were creating. For example, as a group with two male designers, we often enacted "overly loving partners" (See Figure 7, 8, 11), challenging norms around what is considered "manly" and "feminine" behaviors. Hooze brought out natural tendencies to freely express affection through physical touching that we incorporated into the design. Furthermore, Hooze supported imaginative role playing that enriched the physical and social interactions around it. In one instance, we took the accessory to a nearby wooded lot and began to connect with our animalistic natures that provoked us to hide behind trees, lurk like wild cats (Figure 7), and stage an unanticipated attack (Figure 6). These playful engagements enriched the narrative that was unfolding around Hooze, humorously revealing how such an artifact might lead to undesirable forms of touching like being mistaken as prey, or a potential mate by (other) wild animals.

Figure 8: A) Designers sharing a moment with Hooze. B) A man leans in to pet Hooze. C) A couple stops to pet Hooze.

Sharing a Moment

Perhaps the most characteristic interaction Hooze facilitated was that of sharing a moment. Much of the footage we captured to document the project depicts the designers engaged in an intimate hug, or gazing into each other's eyes (for example, see Figure 7, 8, 11). Upon reflection, we feel the shared moments Hooze helped create were a special way for two individuals to focus upon each other in the midst of humorous play. They consisted of short episodes of stroking and petting that transformed into more intimate forms of embrace and then naturally resolved without awkwardness, leaving both individuals emotionally elevated, connected, and often giggling.

Inspiring Zoomorphic Design

The zoomorphic qualities we incorporated into Hooze such as the soft fur, subtle movement, and endearing appearance combined together in a provocative way. In fashion, furs invoke complex feelings of pleasure and fear e.g. the comforting sensation of touching furry creatures is accompanied with the dreadful quilt of wearing dead animals. Our design suggests possible avenues for re-engaging with the meaning of furs, where furs are incorporated into fashion as a means of expressing intimacy, comfort, and appreciation or connection with animals. We are provoked to think how else might fashion designers leverage interactivity and zoomorphic gualities to strengthen these connections. For one, we can imagine the design of an interactive bicycle helmet in the shape of a turtle shell that protects the head, but also has qualities of being "alive" that help wearers view turtles as fellow companions, cultivating a deeper appreciation for nature.



Figure 9. Designers gazing into each other's eyes.

Conclusion

There is a growing interest in wearable technologies, yet generating imaginative artifacts is difficult in practice. Using simple prototyping tools we built a kinetic fashion accessory to probe the imaginative potential of this space. Our humorous design practice, material engagements, and concern for supporting touch, play, and sociability all contributed to the imaginative qualities of Hooze. Future work will consider additional expressive and imaginative qualities and further investigate the experience of shared moments the artifact seemed to support.

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