
Internet of Tangible Things for the Home

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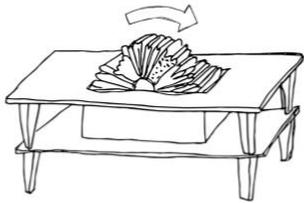
Introduction

In this position paper, we present 2 cases of designing Internet of Things (IoT) systems for the home. Our cases focus on designing for specific homes as a way to expand beyond the common stereotypical view of the home in IoT development—that is, a view beyond the one-size-fits-all single family detached home. The first case is a booklet of 13 conceptual sketches of speculative IoT systems that are designed for a particular type of home (retirement home, AirBnB, hotel room, cabin, etc.). The second case is an autobiographical design project of designing ludic communication systems for the designer's (Aubree's) family.

We argue that by designing IoT systems for a specific type of home, or for a particular home, the system's individual qualities and properties can lead to surprising and inspiring understanding of tangible interaction properties more widely.

Non-stereotypical views of IoT in the home

We start by presenting a project called '*Non-Stereotypical Homes—Curious Proposals for Connected Objects*'. The goal of this project is to use the context of non-stereotypical dwellings (tent, cabin, retirement home, temporary housing like AirBnB, student housing, etc.) to imagine, design, and materialize a series of



11 3D Sculptor

Fig 1. 3D Sculptor takes inspiration from its environment to create stunning 3D interpretations of events surrounding the cabin. The dial slowly turns each day, printing a layer of material corresponding to events in the cabin and on the property (i.e. human visitors, termites, temperature fluctuations, heavy rain, even the neighbor's new deck). As days go by, 3D Sculptor simultaneously builds a new layer and recycles an old layer so that a full year is always on display.

connected and interactive artifacts for homes. These artifacts directly relate to the type of home dwellers are in: they might focus on the temporary nature of the dwellings (in an AirBnB for example), the remote and disconnected nature of certain homes (for example in a cabin or a tent), or the communal living quality of larger establishments (for instance in retirement homes or student dorms).

Our goal with these conceptual and speculative sketches is to reveal the connection between qualities of a home and IoT systems that could fit these qualities. [2]

For example, we designed the 3D sculptor (see fig. 1) to be installed in a cabin where the inhabitants might be present only during weekends or holidays, leaving the home empty of human presence for a majority of the time. The 3D sculptor highlights changes in its environment, changes that are related to human presence, or not. This IoT artifact reveals qualities of remoteness and autonomy, a non-anthropocentric view of the home, and the slow passing of time—qualities that relate closely to what a cabin is. These qualities also lead to surprising tangible interactions: a focus on the space around the object (environmental interaction) as opposed to with the artifact itself [4], an emphasis on observing rather than touching or interacting for humans, and a slowness that is rare in IoT systems.

A second example, the Mama Bear Chair (see fig. 2) is designed for a communal home, where multiple roommates might use a common space and various objects within that space. The quality of the space we highlight in our design is two-fold: 1) common spaces can reduce the sense of ownership on the space or

artifacts for each roommate, and 2) individual artifacts are inevitably connected to each other by being in the same space. The resulting design is a chair that makes itself comfortable or uncomfortable to each roommate depending on how they 'treat' other objects in the space. This concept leads to new ways to consider tangible interactions: focusing on care, sensitivity, tact, and finesse, as well as invisible connections between artifacts in a space.

Ludic Communication in the home

The second project we present is called '*Speculative Visions of Dwelling with IoT Systems*'. In this project, unique systems were designed to explore ways that IoT technology created for a *specific* home and family can facilitate ludic communication [1]. The term ludic comes from "the idea of Homo Ludens—humans defined as playful creatures (Huizinga, J., 1950)—[it] is an antidote to assumptions that technology should provide clear, efficient solutions to practical problems." [3:1].

The systems include a set of four portable video projectors which synchronously play a collaborative YouTube playlist. The system is used to share non-urgent thoughts, curiosities, etc., between family members and serves as a platform for ambient communication. The design explores the concept of magical metaphors [4], that is—opportunities for viewer interpretation—by not providing a one-to-one relationship between the "sender's" intent and the "viewer's" understanding (or lack of).

A second system of portable, wireless home intercoms was inspired by an existing intercom system installed when the house was built in 1974.



5 Mama Bear Chair

Fig 2. The Mama Bear Chair is looking out for its family. As an advocate for other connected objects, Mama Bear Chair morphs in response to a housemate's treatment of other connected objects in the home. When Mama Bear Chair senses mistreatment or neglect, it becomes physically uncomfortable, making sitting unpleasant for the housemate at fault.

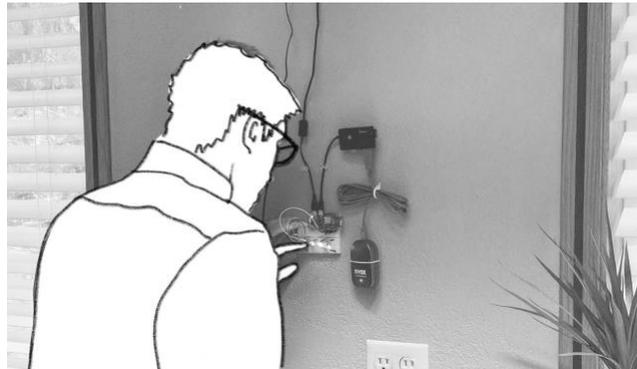


Figure 3: Testing the intercom functionality before soldering.

Using a voice-over internet protocol (VoIP) application and a private server, the intercoms function like portable walkie-talkies within the house (Figure 3).

A third system (still in construction, figure 4) uses "distinct tactile qualities," [4] to facilitate asynchronous communication between the house's three bath/shower spaces. Illuminated wall panels in each bath record and transmit tactile interactions from one bath to the others—allowing family members to communicate through the lights.

Summary of themes

With these two case studies we have explored ways that IoT artifacts and systems can look beyond the stereotypical view of the "smart home" by relating to the nuances of specific types of homes. In this paper, we highlight opportunities for tangible, environmental, and ambient interactions to facilitate design properties for IoT systems, including sensitivity and care toward and between objects and spaces, slowness (inefficiency), curiosity, reflection, ludic pleasure, and interpersonal communication.

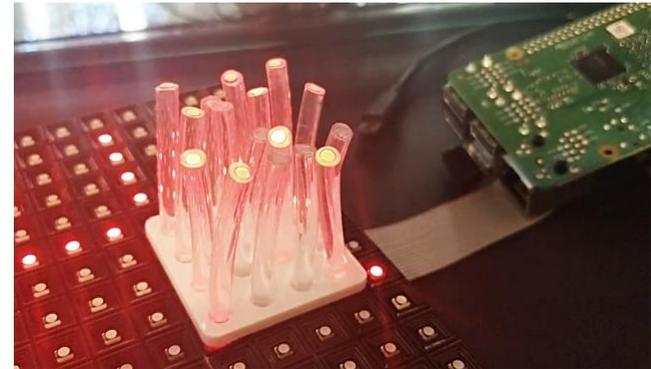


Figure 4: Testing dynamic LEDs, using fiber optics as a tactile interface.

Workshop discussion topics

In this workshop we aim to continue explorations of non-stereotypical and speculative visions of IoT artifacts and systems which foster tangible interactions. As interaction design researchers, we are particularly interested in forging collaborations with researchers and designers who are also interested in emerging IoTT systems. More precisely, systems which reflect the diverse environments and people they are designed to support. We envision a future rooted in continued discussions and explorations of novel, nuanced, artful and tangible applications of IoT systems.

Short biographies

Aubree Ball is Master of Design candidate in the School of Art + Art History + Design at the University of Washington in Seattle. Her professional background is in industrial and architectural design and her master's thesis work is in interaction design research. Aubree uses design in physical space and form to explore and reflect on human relationships to emerging technologies.

Audrey Desjardins is an assistant professor of interaction design in the School of Art + Art History + Design at the University of Washington in Seattle. Trained as an industrial designer and interaction design researcher, she uses design as a way to critically reflect on people's creative tactics to make, adapt, and transform their homes and to investigate potential futures in domestic spaces. Her work results in new methodological frameworks and design guidelines to inform the design of interactive artifacts that are more appropriate and nuanced to fit in people's homes.

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