
Understanding Technology in the Home: Sensory Ethnography and HCI

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Abstract

Digital technologies are increasingly considered an important piece in the puzzle of domestic energy demand reduction. However, for technological interventions to be successful, we need to understand more about how they might fit into the lives and homes of ordinary people. This paper reflects on bringing together methods from sensory ethnography and user-centered design to generate technologies for the home. Beyond practical considerations, it underlines the importance of creating an interdisciplinary dialogue that engages with both theory and method.

Author Keywords

Digital Technologies; Energy; Human Factors; Sensory Ethnography; Collaborative Methods; Interdisciplinary.

ACM Classification Keywords

H.5.2. User interfaces: Theory and Methods; User-centered Design.

General Terms

Design; Human Factors; Theory.

Introduction

While technologies have accompanied domestic life since the introduction of household appliances and consumer electronics [1, 2, 3], the digital age has seen the 'Western' home transform into what scholars and pundits now term a 'media-saturated household' [4, 5].



Figure 1. Interactive floor plan activity

Advances in sensor and communication technologies signal the dawn of an Internet of Things (IoT), suggesting that the home is becoming an increasingly smart environment. This smartness is set to manifest itself, amongst other things, in more energy-efficient systems for bespoke comfort and convenience.

At the same time, people's cultural, economic and structural contexts and ways of living have contributed to slower-than-expected technological progress [cf. 6]. Rather than inventing efficient future homes from scratch, a real challenge lies in incorporating new technological developments that fit into existing, albeit continually changing, environments. In this paper, we reflect on bringing together methods from sensory ethnography and user-entered design to both understand and contribute to the design of technology for the home. Specifically, we introduce the interactive floor plan and home video tour as entry points for situating domestic practices and imagining digital futures.

In addition to the challenges and opportunities these methods entail, we explore points of intersection and demonstrate how our interdisciplinary dialogue has benefitted from a wider theoretical and methodological engagement with how we frame and conceive of digital interventions.

Research context

This paper derives from a study of opportunities for domestic energy demand reduction through digital innovation. LEEDR (Low Effort Energy Demand Reduction, 2010-2014) brings together engineers, designers, social anthropologists and computer scientists to explore energy and digital media use in 20

UK family homes, with the ultimate goal to inform the design of bespoke technological interventions. The project combines longitudinal energy monitoring (gas, hot water flow, electricity at meter and appliance level) with in-depth ethnographic fieldwork and design-centered qualitative exercises. Here we focus on two methods employed at the beginning of the study, as we sought to get to know families and their homes.

Method 1: Interactive floor plan

The floor plan activity was part of an initial Getting to Know You (GTKY) evening. Over a shared take-away meal, design and social science researchers sought to build trust and rapport with participants. The meal also served as the focus for a semi-structured conversation that explored the families' attitudes towards sustainability and energy saving, their hopes and fears for the future, and their current use of digital technologies. After the meal participants took part in a design activity that involved each family member plotting their typical daily routines and movement through the home onto a prepared floor plan of their house [Fig. 1]. They were asked to consider a typical winter weekday and weekend day. Our aim was to begin to understand how they made use of the physical spaces that made up their home as well as to gain insights into family dynamics and organization.

Advantages

- Interactive and collaborative 'game' enjoyed by the whole family
- Visual representation of participants' movements through the home as reflective tool
- Detailed understanding of families' sense of routine, which can be linked to time-use energy monitoring data

- Understanding of peak times within the family routine, and contrasting down times

Challenges

- Depending on family size and level of conversation, it can take time to complete the activity.
- Task relies on family recollections of their routines, although family members enjoyed correcting each other and working out details together.

Method 2: Home video tour

The home video tour method built on Pink's previous anthropological work on the 'sensory home' [7] and is informed by phenomenological theories of place and perception [8]. In the context of LEEDR, participants were filmed as they guided researchers through the home, explaining what they did to make spaces 'feel right' [Fig. 2]. Questions probed about the history of the home, decorative choices, floor surfaces, lighting, cleaning, heating, doors, windows, and the use of audio-visual media in creating the sensory environment. The tour was followed by re-enactments of selected everyday routines. Subsequent analysis was guided by the sensory-ethnographic framework employed during fieldwork: videos acted as aide-memoires for researchers to reconnect with the sensory context, enabling a way into imagining participants' experiences and uses of home. Thematic analyses across households were framed by existing conceptual lenses and also produced new ones [9].

Advantages

- The home is considered as a complex environment, enabling deeper insights into

sensory and material contexts, interrelations, and contingencies.

- Researchers' own *in-situ* experiences provide a form of lived, empathetic understanding.
- Participants can use their whole bodies to show and demonstrate, rather than merely describe.
- Everyday practices are situated, interrelations of spaces and contexts more evident.
- Presenting one's home to camera fosters enhanced reflection about otherwise tacit knowledges and actions. Areas and objects can function as prompts for both researchers and participants.
- The tour is a collaborative research encounter.
- Videos can communicate multi-sensorial understandings to a wide range of audiences.

Challenges

- Participants can feel overly self-conscious.
- The tour works best with one or two participants and can be demanding for children.
- Working with video requires some technical and visual skills, as well as adequate editing software and storage space.

Situated ethnographic understandings and user-centered design

We have found the above research methods to complement each other in a number of ways, and are in the process of integrating our analyses. A common strength is that the methods provide an indirect route into understanding the role and position of (digital) media in participants' homes and everyday practices. They allow us to acknowledge and track the ways that participants move around in their homes as they live their everyday lives and accomplish tasks and routines. Situating existing technologies provides entry points for



Figure 2. Video tour screenshot



Figure 3. Digital media practices

Working with video:

Using flip-out screens helps to maintain eye contact with participants, draw attention away from the camera and put people at ease.

Make sure participants know they can ask to stop recording at any time and will be able to maintain control over how videos are used.

Allow participants to review and cut video materials. In general, treat consent as an ongoing process.

If in doubt about video, agree with participants the extent to which their faces will be visible on screen, or consider combining audio with photography.

Follow basic film-making techniques to use videos not only as research materials but to communicate your findings to others.

Ensure videos can be edited for reproduction in a variety of contexts (online, conference screenings, etc.).

innovations in ways that connect with what people already do in their homes. The methods have also enabled us to develop concepts (such as movement and flow-directing) through which to *understand* what people do in their homes, which brings fresh insights into design research, and challenges the question of what kinds of activity we are designing *for*.

Beyond this, we have found theoretical and methodological connections between sensory ethnography and 3rd paradigm HCI [10]. This has encouraged us to explore how people create place through their coming together within specific areas of the home, and the role that digital media play in this. Thus, we have begun to consider how we might design future interactions with technology that enrich these coming together experiences at the same time as enabling energy saving. Reflection on the notion of place has also reminded us to consider the home as a place in transition. Families evolve as children grow, pets arrive, teenagers leave home, relationships change. This has led us to favor a participative design approach within which the design and meaning of our interventions is negotiated with our participant households and also evolves over time. Most encouragingly from an HCI perspective, the sensory-ethnographic approach helps us to focus on the experiential aspects of home and on how our design interventions should aim to connect with experiences.

Wider applications

Since the GTKYs and video tour visits, we have returned to participants to explore in detail a number of everyday practices, specifically laundry, cooking, personal hygiene and digital media use. At times, the video camera has served to record everyday interaction

without the involvement of the researcher. More often, we have continued to actively engage with people as they went about their everyday activities, in order to find out more about the sensory-experiential, social and practical understandings that inform how, when and why people use various forms of digital media. In this context, we have found it especially helpful to build on our use of reenactments [11, Fig. 3].

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