Implicit Interaction: Information, Intention and Infrastructure

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Abstract
In this position paper I present three in-progress design projects that are initial explorations into *Smart Implicit Interaction,* which is investigating data as a design material and a new paradigm of interaction for the Internet of Things. The first project, Context Clues, critically examines our existing interactions and exchange of implicit information across digital mediums. The second project, Manuals of Misuse, is an Internet of Things design brief in which students are exploring the peripheral intentions embedded within everyday objects to design novel connections while exposing hidden patterns of behavior and engagement. The third project, Phygital Layers, is an architectural study seeking to understand the implicit relationships between physical, technological and social infrastructures within domestic environments. While all three projects differ across scale and medium, they offer potential avenues of investigation into designing for people, data and the built environment.

Author Keywords
Implicit interaction; Internet of Things; designing with data; smart home.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Our interactions with and through technology are becoming increasingly dynamic, contextual, intangible and invisible as our physical environments are ubiquitously embedded with sensors, actuators and intelligence. Pervasive and with unbounded potential, the Internet of Things (IoT) is a key catalyst of this paradigm shift towards implicit interactions. While explicit interactions contain information that demands our attention for direct engagement or manipulation, implicit interactions rely on peripheral information to seamlessly behave in the background until appropriately shifted into attention [11]. The inevitable choreography between explicit and implicit interactions requires a careful consideration of constraints, contexts and intents ultimately driven by the meaningful collection and relevant appropriation of data. Consequently, our new long-term *Smart Implicit Interaction* project aims to investigate data as a design material and propose a new paradigm of implicit interaction relative to the Internet of Things.

As both the *Smart Implicit Interaction* project and my corresponding PhD studies are at a very early stage, I am currently investigating the topic from varied perspectives within three example projects. The first project, Context Clues, critically examines our existing interactions with implicit, i.e. suggested or implied, information across digital mediums such as conversational interfaces and social media. The second project, Manuals of Misuse, is an IoT design brief in which master's students are exploring the peripheral intentions embedded within everyday objects and the corresponding physical and contextual affordances to design novel connections. The third project, Phygital Layers, is an architectural study seeking to understand the implicit relationships between physical, technological and social infrastructures within domestic environments. Though distinctly different across scale and medium, the projects similarly investigate what could and should be the future of smart, mediated and data-driven environments.

Information: Context Clues

Conversational user interfaces are a tacitly complex, ubiquitously universal and historically grounded paradigm of text based communication. Metadata and usage habits within conversational user interfaces, provide both explicit and implicit information [8]. For example, “received”, “seen”, “active” and “last online at” not only communicate an explicit message status relative to the intended recipient, but can also serve as an implicit acknowledgement, indication of other activity or deliberate avoidance [9]. What other implicit information exists about us through our interactions and usage of digital products, services and systems? Could this implicit information be a viable form of communication or actuation? And what is the appropriate fidelity of implicit information to form meaningful narratives? These questions are being explored through a combination of autoethnography and speculative augmentation of my own interactions with metadata in conversational user interfaces and social media platforms.

Autoethnography has been chosen as an initial research method due to both its qualitative nature and opportunities for first-hand reflection on the subtleties of meaning-making embedded within implicit information [5]. Though unstructured, I have been routinely documenting my interactions with metadata over the past three months through screenshots on my

mobile phone and laptop. When convenient, I annotate the screenshot immediately, otherwise I post-reflect in a digital journal (i.e. Google Document) with particular consideration towards the internal (conversational) context and the external (peripheral) contexts, both digital and physical, that influence meaning-making.

In addition to autoethnography, I have also begun critical designs that augment metadata within conversational user interfaces, such as "seen", "seen again", "looking at", and "typing to someone else". While initially intended to be provocations regarding boundaries, fidelities and tradeoffs of information willing to be shared, the speculations also seek to highlight the multitude of conversations and interactions simultaneously occurring and thus implicitly influencing one another.

The primary interest that has emerged as a result of these autoethnographic and speculative investigations is the reciprocal relationship between metadata and context that results in conversational palimpsests and networked narratives. Therefore, I am interested in how these themes might translate from digital space to the built environment, in which layers of personal data and physical traces contribute to a multitude of experiential narratives.

Intention: Manuals of Misuse

Technological forecasts often predict that someday in the future everything will be connected. What is everything? And why is connected so often synonymous with tangible interactions being transferred to mobile applications or voice-based assistants? Additionally, these solutions primarily focus on efficiency and automation, signaling a shift from engagement to a frictionless relationship with technology [3]. Is this shift necessary, or do our physical things have overlooked abilities, hidden meanings or magical uses? The project Manuals of Misuse, given to first year master's students in the course *Interaction Design as a Reflective Practice*, investigates these questions by examining our everyday interactions with faceless objects [10], and reimagines how their existing or potential misuses might playfully control or meaningfully communicate with other people, places or things while exposing new patterns of behavior.

In small groups of two to four, students were first asked to pick a non-technological object and define, document, reflect upon and communicate the intended use from the perspective of either a designer or end-user. After creating a clear definition of intended use and mapping associated micro and macro interactions, groups investigated how the object is or could be misused and the corresponding physical and contextual affordances that enable these misuses. While the concept of misuse was deliberately ambiguous, our (i.e. the course leaders) intention was for students to defamiliarize [1] themselves with everyday artifacts in order to identify and critique the peripheral intentions that mediate physical, environmental and social engagement [15]. The final stage of the project, which is currently in progress during the writing of this paper, asks students to design novel connections based on these peripheral intentions while utilizing existing affordances.

Although the final designs have yet to be revealed, many interesting themes have emerged. For example, one group is exploring how a window might augment rather than mediate threshold conditions. Another

group, upon investigating coin collecting as a monetary misuse of defunct currencies, is interested in designing for obsolescence. Furthermore, handbags have been recognized for their communication of personal boundaries and 'saving space' in public places, while ice cream has been identified as a social tool to persuade, tempt or console. Perhaps most notable overall is the non-utilitarian, conceptual nature of these themes that is both atypical of many Internet of Things products and indicative of implicit intentions, behaviors and engagements. Therefore, how might implicit data trails of misuse, rather than explicit data trails of use, be more proactively harvested to meaningfully inform the built environment?

Infrastructure: Phygital Layers

The architectural concept Shearing Layers refers to the physical components of a building that evolve at different timescales [4]. The six components in order of decreasing longevity include site, structure, skin, services, space plan and stuff. While 'site is eternal', the clothing, furniture, appliances, electronics and artifacts that constitute stuff are frequently moved, transformed, repurposed and replaced. This dynamic malleability across form and function affords the embedding of emerging technologies, also evolving at a rapid rate, to make stuff connected, intelligent and autonomous [13]. Though this integration has resulted in many innovations, it is unclear how the enduring architectural components implicitly inform the design and implementation of emerging technologies. Therefore, this exploration is investigating how the potential of technology is impacted by the propensity of architecture.

Previous research critically acknowledges a relationship between visions of technological futures and outdated notions of domestic, social and cultural norms as programmatically defined by architecture [6][13]. This relationship has been most frequently explored in critiques of smart kitchens and connected appliances, which convey the preservation of old-fashioned domestic roles despite promises of life-changing innovation [2][7][12]. Complementary research has identified emergent needs, unmet by both technology and architecture, of prevalent social classes such as global nomads, the precariat and political refugees [13][14]. These needs include ambiguous sites, hackable structures, personalized services and dynamic space plans.

Therefore, this proposed research project seeks to understand the implicit relationships between physical, technological and social infrastructures that result in the preservation of old-fashioned roles, unmet needs of emerging social classes and potential limitations of technological progress through:

- A continued literature review on the relationship between programmatic definitions of space, domestic roles and technological innovation.
- Interviews with Architects, Interaction Designers and Technologists regarding the perceived disciplinary constraints and assumptions.
- An interdisciplinary design brief in which Architects, Interaction Designers and Technologists create novel solutions for emerging social classes.

The aspirations of this exploration are to further a meaningful and appropriate integration between

technology, people and the built environment through cross-disciplinary collaboration.

Contribution to the workshop

While the *Smart Implicit Interaction* project, my PhD studies and the ongoing investigations are all in the beginning stages, I hope to contribute to the workshop by sharing three initial and distinct project ideas and approaches regarding people, data and the built environment.

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