

The Internet of Things: Designing Proto-Infrastructures

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“The Internet of Things,” or (IoT) describes a trend advocating that all sorts of physical artifacts become connected to and controllable from the Internet. According to this vision, a coffeepot might be controlled alongside a thermostat to have a home warm and the coffee on when a person wakes up; or sensors in the basement might email you if your basement is flooding. While this all seems sanguine, contemporary IoT technologies rely on central servers, well-defined APIs, and black-boxed electronics, and are built only to be used in specific, condoned ways. The Internet of Things exists simultaneously as a rhetorical practice, an organization of actors, and as an assemblage of things with its own kind of vibrancy (Bennett 2010). It is an assemblage of people, technology companies, concerns around privacy, corporatism, upgradeability, cost, material objects, utopianism, and so on. All of these actors play a part in the IoT in practice, and understanding both what these are and how they operate at a low level is important to understand what kinds of values and practices are being built into them—and what others might be left out. One way to examine these assumptions is through considering the IoT not as a system of objects in themselves, but instead as endpoints for infrastructure—as hardware that manifests assumptions around what should be done, as well as by whom.

The promise and rhetoric of the IoT offers a means to examine in domestic settings how cumulative computational relationships between things operate to produce social effects: between humans and their environment; objects and their surroundings; objects and the Internet; and objects among themselves; while taking into account histories, materialities, and so on. This is infrastructure, but in a nascent product space, it is *proto-infrastructure*. Star notes that “infrastructure” has characteristics (among others) of transparency, standardization, being built from an installed base, and becomes visible on breakdown (Star 1999). As the Internet of Things is a contested site, one where many major companies are developing their own bespoke hub and spoke systems in order to own the home, the IoT gestures towards becoming infrastructure. It begins to assemble complex

mixtures of standards (WiFi, Bluetooth, electrical power), and practices (APIs, use cases, consumer demand, investor responsibility). At present, we see a rich *mess* (Law 2002) in contemporary IoT; simultaneously a location for contestation in what “home” means, a battleground for future corporate influence, and a *design thing* (Atelier et al. 2011). More and more, the Internet of things is creating design thing as proto-infrastructure. This perspective serves to reveal the edges of the Internet of Things: by understanding the component parts and their assumptions as representing infrastructural assumptions, it’s possible to understand their implicit social relations before they become invisible.

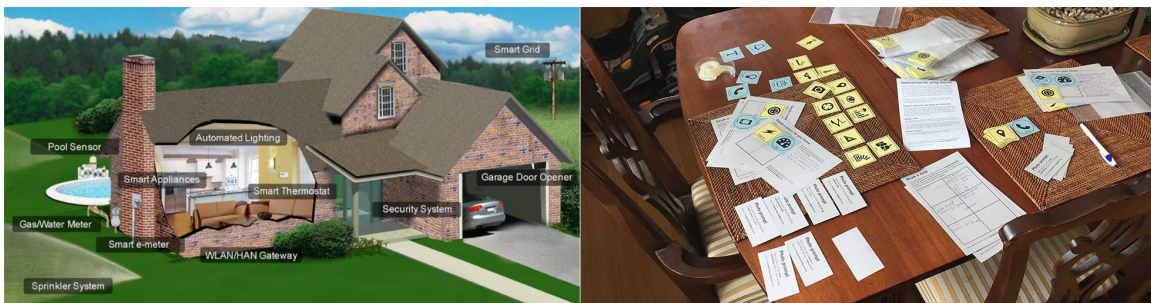


Figure 1: Corporate conception of "an IoT Enabled Home" (left); Probe kit used with cohousing community members (right)

To do this, I’ve begun a pilot study on cohousing residents. So far, I’ve visited Touchstone Cohousing¹ in Ann Arbor, Michigan. Cohousing provides a way to examine IoT proto-infrastructure without making many of the same assumptions that existing companies do: promotional materials frequently describe standalone buildings with garages, pools, or other relative extravagances as being representative of typical domestic life in the IoT (Figure 1, left). Instead of that, cohousing offers different understanding of the edges of homes, where there are three different levels of home life: public life, public/private life (at the village level), and finally the private life of the home itself. Considering extreme users (Djajadiningrat, Gaver, and Fres 2000), and marginal practices (Ljungblad and Holmquist 2007) provides a way to gain insight into the center. Cultural probes (Gaver et al. 2004) offer a means to grasp how residents in these communities understand increasingly-ubiquitous sensing platforms. Figure 1 (right), shows a probe kit. It asks residents to create maps of their domestic life, to produce hypothetical sensor concepts for their own home or community, and a photo-elicitation

¹ <http://touchstonecohousing.org>

activity provides prompts around what is or might be considered sensor-like.

Future plans for this project involve prototyping and deploying speculative IoT objects and systems that begin to map the edges of the Internet of Things as a design thing in its own right. Design produces reconfigurations of infrastructures and materials in order to create new contexts for products and services. In this way, object-based prototyping instantiates new arrangements of social forces, and not solely an object in itself (DiSalvo et al. 2014; Jenkins 2015). These prototypes will examine the Internet of Things as a location to understand human relationships with emerging proto-infrastructures. From this perspective, the Internet of Things changes from suites of consumer products or objects that exist for people to be used exclusively in the here and now into speculative social configurations: they postulate systems to create possible encounters between people, objects, and values.

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