

HealthBand: Campaigning For An Open and Ethical Internet of Things Through An Applied Process of Design Fiction

Abstract

This paper discusses the creation of a design fiction that seeks to embody Sterling's (2005) *spimes* concept – near future, Internet-connected, manufactured objects. *HealthBand* is a fictional open-source wearable device born in a future where public healthcare has become increasingly privatised. Social equity and citizen empowerment sit at the forefront of its design – the product is the culmination of crowd-sourced expertise and production capital. We contextualise the fictional device in relation to current proprietary Internet of Things products, democratised and open technological practices like the *Maker Movement*, and two previously identified design criteria for spimes – *synchronicity* and *wrangling*. We assert that the fiction can help to begin to establish spimes as a useful rhetorical lens through which product designers can speculate upon more socially responsible and ethical technological product futures that offer plausible alternatives to the homogenised, unsustainable and profit driven product design cultures of today.

Author Keywords

Spimes; Social Innovation; Internet of Things; Design Fiction

1. Introduction

The past decade has witnessed a growing interest in a corollary of ubiquitous computing, the so-called *Internet of Things* (IoT). Coined in 2004 by Gershenfeld et al, the term is increasingly being used to denote a class of everyday objects whose material elements are augmented by digital capabilities such as embedded software and connectivity through wireless Internet, global positioning (GPS) and radio-frequency identification (RFID) (Author, 2014).

One product sector to experience much IoT development is personal fitness devices. A key facet of these connected objects is that they are predominately *wearable*, that is, users attach the products to their clothing or wear them in direct contact with parts of their body. Such wearables are able to monitor their environment and display real-time data whilst also sharing information with other devices.

With commercially produced wearables helping to make the practice of self tracking everyday and routine amongst wider publics, and QS research giving academic credence to capturing such data, designers and manufacturers have begun to identify opportunities for devices which specifically monitor serious health conditions.

The recently launched *Kardia Band* by AliveCor is a prominent example of such. It takes an electrocardiogram (ECG) reading of its wearer's heart with the aim of detecting *atrial fibrillation* (AF). The device integrates with the Apple *Watch* by replacing the latter's non-functional strap. When the wearer places their thumb onto *Kardia Band's* metal sensor it completes an electrical circuit. ECG data is sent to the Apple *Watch* via high-frequency audio and wearers' can view their heart reading on the watch's screen (AliveCor, 2016).

2. Opening Up The IoT

The increasing accessibility of digital technology is affording individuals and communities the freedom to innovate and manufacture products without intervention of conventional corporate stakeholders or industrial scale processes. From physical products created using rapid fabrication tools like CAD and 3D printing, to digital internet based apps and services, this 'open sector' is challenging the established norms of centralised, profit driven design culture (Green, 2007, Anderson, 2012).

The term *democratised innovation* (DI) (von Hippel, 2005) is often used to denote the practice of products and services being developed by the same people who ultimately use them. DI cultures like the Maker Movement, 'hacking', Fab labs and open hardware and software development, see people share knowledge and expertise to design and build bespoke Internet-

connected objects (McEwen and Cassimally, 2013). Von Hippel calls people who personally innovate *lead users*. He argues that those who engage in such activities mostly do so because the mainstream marketplace does not satisfy their specific needs. He also posits that enjoyment gained from the creative process itself – learning and problem solving – is a prime motivator for lead users.

Within traditional proprietary innovation models, designers and manufacturers exploit internal assets and intelligence to develop standardised, 'closed' products. In DI's case, knowledge, resources and technologies are diffused quickly, efficiently and, more often than not, *freely* through networks of online and offline communities. This collaborative activity results in products which directly benefit those who created them and frequently society at large (von Hippel, 2005).

DI differs from Chesbrough's (2003) *open innovation* concept as the latter places emphasis on the manufacturer. It sees producers collaborating with outside partners to share the costs and risks of product innovation. Yet the impetus for such design activity is not ethically or socially motivated, rather, it is concerned with profits, patents and intellectual property, which remain primarily with the manufacturer.

3. Spimes

3.1 What Are Spimes?

The futurist Bruce Sterling coined the term *spimes* in 2004 to denote a class of near future, sustainable, manufactured objects. Sterling (2005, p.11) envisions spimes to be “material instantiations of an immaterial system... they are designed on screens, fabricated by digital means and precisely tracked through space and time throughout their earthly sojourn.” Author (2016) argues that the origins of spimes are *in the present* as they are likely to develop out of today’s product culture. As a result, spimes’ earliest ‘material instantiations’ would share some technological attributes with present day IoT devices.

Such commonalities have led some to use *spimes* and the *IoT* interchangeably to denote an Internet-connected object. We contend that this is a fundamental misappropriation of Sterling’s term. Whereas today’s IoT products like fitness and healthcare wearables are proprietary, that is, they are designed and manufactured en masse by centralised, corporate brands, a spime-based paradigm would, in contrast, be built on more open, distributed and socially equitable design-innovation activities. Spimes then, can be seen as not only an extrapolation of current technologies but also a lens for envisioning how nascent democratised design practices might grow and potentially reshape industrial product design cultures over the coming years.

Like the progressive innovation culture within which they are born, a spime object’s design would be distinctly protean in character. Rather than “forever remaining the same... spimes would have the innate ability to transform and reflect changes in technology, cultural trends and peoples’ needs” Author (2015, p.12). This sits contrary to the design of present day IoT devices which are predominantly ‘closed’ – they offer no scope for user augmentation such as customization, maintenance or the capacity for upgrades.

Peoples’ relationships with spime objects would also have similarities with product cultures of the past. Sterling (2005) notes that prior to World War II, people had simpler, more linear relationships with their material things. They were more aware of the provenance of their objects. Such transparency became extremely muddled in the transition to our current technoculture where there is an overreliance on increasingly complex material extraction, manufacturing, supply chain and consumption infrastructures. In a spime-based future, people would have a direct hand in designing and manufacturing their objects and artefacts. To use Toffler’s (1980) term, they would be *prosumers* – both producers *and* consumers.

3.2 Spimes: A Design Fiction

The concept of spimes are in essence, “rhetorically futuristic... a category of imaginary object that is also an intervention in the present

and... are 'forward looking' akin to the actually futuristic objects they create" (Hales, 2013, p.6). Whilst early spimes may come about through extrapolations and convergences of today's technologies and creative practices, it is yet not possible to 'actually' design and manufacture spimes. Accordingly, Author (2016, p.2) calls for the use of the speculative design methodology *design fiction* to help "envision potential near future worlds in which spime objects might exist as well as to explore the types of people-product relationships spimes may possibly facilitate."

Sterling (2005) originated the term design fiction and has since defined this method as "the deliberate use of diegetic prototypes to suspend disbelief about change" (cited in Bosch, 2012, para.3). Here he is appropriating Kirby's (2010) notion of 'diegetic prototyping' which denotes how a futuristic object or product might be rendered 'material' and fully functional in 'diegesis', in other words, as a 'prop' embedded in a fictional narrative environment or 'storyworld'. As Tanenbaum (2011, para.5) states, the positioning of the designed object within a fictional frame is central to the method as it enables designers to "make an argument about a potential future by demonstrating that future in a context that a large public audience can understand."

"Design fictions should therefore not be seen as an attempt to predict the future or design a specific product solution," stresses Author (2016, p.3), but more so as "a strategy for opening up

inclusive debate about *how* and *why* futures are designed and what they might mean." Similarly, for Bleecker (2009) the aim of a design fiction is to create a discursive space in which the prototype is free of the constraints of normative commercial design practice and can challenge peoples' insular and habituated perceptions and expectations of the role products and services play in their everyday life.

4. HealthBand

4.1 Exploring Two Design Criteria for Spimes

HealthBand is a design fiction prototype that explores two of Author's (2015) spime design criteria – *synchronicity* and *wrangling*. As per Author's schema, these criteria help to frame the spimes concept in relation to social innovation and ethically responsible design practices. The *HealthBand* diegetic prototype is a means for creating debate about the ways in which open and democratised design cultures might continue to disseminate, giving more people the means to innovate and create their own personalised internet-connected objects.

Author maintains that presently, social innovation design practices and technologies like the Maker Movement, 'hacking' and open source hardware cannot be considered 'mainstream' approaches to the design and production of products. They are "niche activities conducted in the shadows of mass manufacturing and consumption." (Author, 2015, p.14). Further, a broader dissemination of

spime design activities might come about through *synchronicity*, that is, collective creativity and expertise. The notion of *synchronicity* is in many ways similar to Rodgers' *diffusion of innovations* (1962) theory which put simply, is the process by which an innovative idea or technology is communicated through different channels among society over time (Author, 2015).

Sterling (2005, p.22) stresses that "in a spime world, designers must design, not just for objects or for people, but for the techno-social interactions that unite people and objects." Sterling categorises those who design spimes and their interactions as *spime wranglers*. However, while Sterling places 'designers' at the centre of a spime-based paradigm, Author (2015, p.16) contends that a transition to spimes will not only see "a shift in *how* to design, [but] there would also likely be a shift in *who* designs." More open, distributed design-innovation practices would also broaden the types of people who would engage in wrangling.

Making parallels to both Toffler's notion of *prosumers* (1980) and Von Hippel's *lead users* (2005), Author (2015, p.16) asserts that "in a synchronic society, the acts of creation and consumption would no longer be mutually exclusive. With design expertise and tools more widely dispersed, wrangling would not only be limited to established practitioners such as interaction designers or product designers. Multitudes of people would be consuming the

products that they themselves have had a hand in creating."

4.2 The Campaign As a Fictional Frame

The *synchronicity* and *wrangling* criteria form the foundation for the *HealthBand* fiction. The following image shows pages taken from the fictional digital campaign document for the product. It depicts the first three designs – a diabetes monitor, a dementia memory aid and a hand stabiliser for Parkinson's disease. The document explains the origins of and motivations behind the product and discusses the success of a crowd-funding campaign which funded the production of the first three bands. Each of the three models is presented in detail with the back-story of how and why each design was created. The document also details how people can become actively involved in developing the project further – by donating funds, creating new modules based on an open design template, or simply purchasing the device.

In essence, the *HealthBand* fiction offers a vision for a wholly democratized healthcare device. Born in a near future where public health services have become increasingly privatised, the product is the culmination of crowd-sourced design and production capital – an open source, internet-connected health wearable product. Social equity and citizen empowerment sit at the forefront of the *HealthBand* design and it can be regarded as a bottom up, 'do it yourself' netizen-led response to real-world health issues. By

HEALTHBAND



DIABETES MONITOR

DEMENTIA MEMORY AID

PARKINSON'S STABILISER

#WEARITWELL



DOING IT OURSELVES



Hi, my name's Gary. On the left is a photo of me with my cousin Arthur. He was diagnosed with Type 1 diabetes when he was 2 years old. My Auntie and Uncle have found managing Arthur's illness very difficult. The government's privatisation of the NHS in 2026 has left them with little to no support for Arthur. Like so many people, they can't afford extortionate private healthcare rates. It means that they have had to rely on old and often complex equipment plus hand outs from health banks and other charities.



I studied creative technologies at university and now work as an interaction designer in Manchester, UK. I know a fair bit about user experience design, electronics and coding. My best friend Phil works as a commercial fabrication engineer and is really good with rapid prototyping technologies including 3D printing. Together, we decided to try and come up with a better way of monitoring and managing Arthur's diabetes - a way that didn't require expensive trips to the doctor or equipment fees.

This was the beginning of HealthBand...

MODULAR DESIGN



extrapolating the present trend for *quantified self* devices alongside the nascent field of *e-health*, the fiction seeks to both highlight and question the role that emerging social innovation design practices and technologies like the Maker Movement, ‘hacking’ and open source hardware, could potentially play in the creation of future personalised technological devices. Fundamentally, the fictional device sits in contrast to present day IoT products, such as activity trackers and fitness monitors, which are primarily produced in a profit driven, mass-produced context, negating any scope for user augmentation.

As explained in Chapter 4, a key tenet of design fiction practice is the creation of a prototype that is ‘rendered material’ within ‘diegesis’ - a fictional world in which such a product could plausibly exist (Bleecker, 2009). We assert that the campaign document acts as a ‘situating device’ for the *HealthBand*. Ultimately, the aim of the design fiction is to open up a ‘discursive space’ in which broad audiences can easily engage with the *HealthBand* concept and question the desirability of the future world that it creates.

5. Initial Conclusions

With this paper, we have sought to help position spimes as a useful rhetorical lens through which product designers can speculate upon more socially responsible and ethical technological product futures. We contend that our design fiction process subverts the envisioning practices

undertaken by the commercial design field, whose primary aim is to sell products and not to question the societal impacts of such devices. Although fictional, we argue that the *HealthBand* prototype offers a plausible alternative to the homogenised, unsustainable and profit driven product design cultures of today.

6. Future Work

Elaborating upon Frayling’s (1993) *Research Through Design* methodology, Gaver describes manifestos as such:

“Typically, such manifestos will describe design practice to illustrate their approach, and borrow theories to justify it, but their primary function is to build an account of a practice to be pursued in the future.” (Gaver, 2012, p.938).

We see the *HealthBand* prototype as one of a number design fiction projects that will culminate in a *design manifesto for a sustainable, ethical and open Internet of Things*.

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