

Crafting the Wearable Computer

Sarah Kettley

This extended abstract outlines a novel methodology for the development of computational wearable artefacts as everyday sites for authentic engagement. Contemporary Craft was reflexively analysed as a rich resource for such an approach through the collaborative realisation of a suite of wirelessly networked 'Speckled Jewellery'. The key contributions for the Wearable Computing community comprise a set of preliminary protocols for craft in design, a novel approach to the identification of distributed user groups, and a new method for the evaluation of wearable artefacts for authentic experience.

Background

Wearable Computing as a cultural artefact

Wearable Computing in 2002 was a field with an overriding aesthetic essentially indebted to the borg (Rhodes & Mase 2005). Early dissatisfaction with the aesthetics of wearables (Co 2000, Orth 2001) has informed more recent user centred approaches to challenging the implicit determinism of the field, and a perceived disjoint between the vision of developers and actual experiences in use (Boehner et al 2005, Dunne et al 2005, Watier 2003, Viseu 2005). The work presented here is a part of that discourse, and took as its starting point a white paper published in 2001 describing the everyday as the field's 'final frontier' (DeVaul et al 2001).

Towards authentic experience

In seeking to understand what the everyday might mean for Wearable Computing, consumer demand for authentic experience was identified as a key driver. Market research was finding a significant shift towards the 'slow', towards quality, the unique and the exclusive (Lewis & Bridger 2000). 'Authentic' products and services embodied stories and took responsibility, were from identifiable producers and places, and represented a niche market that was yet significantly widespread. Drawing on the philosophical and pedagogical literature (Golomb 1995, Tochon 2000), a working definition of authentic experience was arrived at which resonated with contemporary work on 'seams' and ambiguity in Interaction Design (Chalmers & MacColl 2003, Gaver et al 2003). In this view, contexts for active meaning making are emphasised through ambiguity in the objects and their presentation in relation to existing lifeworlds (Hallnas & Redstrom 2002, Kettley 2005a).

Contemporary Craft as a design resource

In employing Craft as a design approach, it was nec-

essary to differentiate between the more traditional craftsmanship and contemporary practice. A sub-project for a patchworked comfort blanket for young children (Kettley & Smyth 2004) and two empirical investigations with contemporary makers resulted in a series of protocols for contemporary craft for design. These included an emphasis on emergence and risk taking, on material knowledge (expanding 'material' to cover human interactions and technologies), and an undecideability in framing outputs (Kettley 2005b, Kettley 2005c). Contemporary Craft was found to offer not only many of the internal characteristics of authenticity as mentioned above, but also the interactional qualities of risk and ambiguity that provide a rich context for human meaning making and thus authentic experience.

An everyday lifeworld and objects as actors

It was important for this view of authentic experience that the user group already be enacting the everyday through existing social ties, and a friendship group was identified to take part in the project over two years. The discovery and description of these five women's lifeworld became an important part of describing the texture of an everyday that wearables might want to inhabit. The methods used to do this included 'cultural probes', a social distance questionnaire, and self-monitoring measures drawn from psy-

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chology (Ethington 1997, Gaver et al 2004, Gangestad & Snyder 2000). In seeking to account for the ways in which novel objects are configured by people, Actor Network Theory offered a particularly flexible set of principles from which to work. Like craft, it is characterised by undecideability, and levels the impact of objects and ideas with that of the human actor within a network of meaning (Latour 2005). It is scalable, meaning that an object can also be viewed as a collection of formal and behavioural elements, acting as a

composite agent (Ellis 2004), and it enabled the researcher to approach the act of adornment as an act of bringing a wearable artefact into play.

Speckled Computing - an enabling technology for wearable applications

Speckled Computing is a European funded project aiming to provide Ubiquitous Computing with a generic enabling technology in the form of very small wireless transceiver nodes with programming and sensing capabilities (Arvind & Wong 2004). Deployed in large numbers, speckled networks will be capable of self organisation and may be used in medical, and stock control applications, as well as full size gaming and art. Currently building a 5mm cubed version, the vision of the research is that of a one millimetre cube form that may be embedded within other materials and mechanisms to enable it in situ. The Crafted Wearable project made use of the ProSpeckz II and the ProSpeckz 2K prototypes in two iterations, and the suite of jewellery evaluated at the Royal Scottish Museum in October 2005 represented the first working application of the technology.

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Speckled Jewellery

Five pendants communicating at a frequency of 2.4GHz were constructed, one for each of the friends. The interface consisted of five coloured light emitting diodes, each a unique identifier for a node in the wireless network. Within a range of approximately twenty metres, these would flash at one of three rates to indicate the distance of the other detected nodes. Three distances were set as thresholds based upon social distances found in greeting habits with the women, arrived at through drama activities and discussion. These were defined as *intimate* (up to thirty centimetres), *social* (between thirty centimetres and a metre), and *distant* (over one metre).

Evaluation

There were three elements to the evaluation: an informal out-of-the box session, a task-based session at the Royal Museum of Scotland, and an individual interview. The first two provided a rich set of audio visual

data, and the last were captured in notes taken by the researcher. The transcriptions of all of these were then analysed using Discourse Analysis (Coates 1996, van Dijk 1997). Axial coding, a technique found in Grounded Theory (Borgatti 2004), was applied to draw out three major strands of a narrative recounting what the participants made of the objects, *how* these configurations were arrived at, and where this sense-making took place. To relate this narrative back to the aims of the research, a novel technique was devised to give an indication of the notional closeness of the system to the women's lifeworlds. In this method, affective comments are plotted against four notional spaces - the immediate situation, the participant's own lifeworld, others' imagined lifeworlds, and fantastical worlds (Kettley & Smyth 2006).

Results and reflection

Overall, the women in the friendship group were found to successfully negotiate existing configurations of the objects as adornment and communication device, and had no difficulty in creating a new hybrid identity for the objects, describing them at an early stage as being 'useful jewellery', 'like nothing else', and as being able to 'stand on its own as it is'. The novel plotting technique revealed most responses to be concentrated in the positive sector of the 'own lifeworld' band (i.e. the situated everyday), meaning that the women were able to make sense of the objects in relation to their own experiences. The crafted objects exhibited a multivalent internal visual language that invited wide ranging associations, and a cultural ambiguity open for negotiation in social interaction, providing an ongoing and dynamic context for authentic experience. Future directions for research include crafted interactive objects with increased levels of functionality.

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