

Visualising Social Space with Networked Jewellery

INTRODUCTION

This presentation outlines a current doctoral research project developing a series of networked ‘smart’ jewellery. There are three main strands to this research: the provision of an application led approach for the novel technology of Speckled Computing; the analysis of ‘craft’ as a way of seeing, and of Contemporary Craft as complementary to the expanding toolbox of HCI (with a reciprocal introduction of new methods and materials to crafts praxis); and the visualisation and analysis of a specific social space, within which the jewellery is placed. It is the third of these strands that this presentation will focus on, describing considerations in the design of methods for data collection and analysis using Grounded Theory and Social Network Analysis.

BACKGROUND

Novel Technology

Working with the Speckled Computing Consortium, Scotland [1], the jewellery serves as an application platform for the test and exploration of miniaturised computers. Issues concerning physical product design and packaging can be explored, and of course the nature of interaction such distributed systems present for the Human-Computer Interaction community. The Speckled Computing research is currently at the start of its second of five years, with the central vision being to realise the vision of Ubiquitous Computing through the development of programmable, self-organising computers with sensing capabilities, measuring only one millimetre cubed. En route, the prototypes of this vision are already taking various physical forms: ProsPeckzII was a quarter the size of a credit card, and a couple of millimetres thick, while ProSpeckzIII has a smaller footprint, but has six stackable layers, becoming more of a cube than a card. The endless flexibility of jewellery forms allows any interim working prototype of the technology to be tested embedded within a network of products, and the technology in turn allows for unique aesthetic and conceptual exploration of sensing networks in social situations.

Contemporary Craft

The design of the jewellery has been approached not from a standard product or engineering design point of view, but from that of contemporary crafts praxis. The motivation for this approach springs from a desire to deliver richer experiences for the human actor in relationship with the product, embodying familiarity and provocation in more complex arrangements than is presently found in Wearable Computing. Where jewellery has been used in past wearables research, it has been done so ‘opportunistically’ [2], without taking into account the nature of the worn object itself, its relationship to the body, or its further meanings within a social space or ‘lifeworld’. The process also brings to crafts praxis novel interdisciplinary ways of working, tools, and computational materials, which have not been available to the crafts practitioner before. It serves as a model of possibility for both fields, and so

charting the interdisciplinary development process is in itself an important part of the project.

Specification and the Interaction Algorithm

Three pieces of jewellery have been implemented with ProSpeckzII, the first working Speckled prototype. There are two brooches and one pendant, each with its own 'speck', a PCB board fitted with eight 3mm LEDs, and powered by two 3V coin cell batteries (figure 1). The standard algorithm for inter-speck communication, wherein all specks within range and sight are found, and relative distances are dynamically established, has been modified to create light displays dependent on proximity. Three distances are set to trigger an increase in the display frequency, at one metre and over, between 30cm and 1metre, and below 30cm. These distances were chosen as a result of work with a specific group of women, the 'user group', and roughly represent distances at which they used increasingly intimate modes of greeting. The algorithm also 'remembers' interactions, retaining a visual record of the most recent social encounter for a minute after the women have parted, with frequency slowing to the default display over time. Finally, the possibility for a 'rogue interaction' has been built into the pendant in the form of a pressure sensor, giving the wearer of this piece the opportunity to override the displays of all other pieces within range, replacing it with its own version.

The jewellery pieces themselves have been developed using Perspex, Formica, and precious metals (figure 1). The main body of each piece has been fabricated almost entirely in plastics in order to minimise radio interference at short distances, and to allow for further research into the effects on inter-Speck communication of increasing the amount and placement of metals within the design.



Figure 1

Towards Evaluation

The design process is just at the end of its first iteration, and as such, there are numerous issues to be resolved with the hardware, the algorithm, and the jewellery itself, which requires further work to be successful both as a piece of engineering, and as a piece of contemporary craft. Human-Computer Interaction issues of, for example, user control, learnability, and the wider affective experience, cannot be properly investigated until these problems are dealt with. What can be done is a preliminary analysis of the social space into which the network of jewellery will be introduced. Doing an early analysis will allow comparisons to be made at the end of the project, and thus theories may emerge regarding the impact of the jewellery network on this social space as a result.

What is Social Space?

According to Lefebvre, social space emerges from a set of relations, corresponding to different social and productive arrangements [3]. Both he, recently, and Georg Simmel, in the early twentieth century, acknowledged this space to be a sociological fact, and saw geographic space to be an element in its production. It is dynamic, constituted by and descriptive of the relationships experienced by those individuals within it. In his writing on the metropolis, Simmel discusses the ‘urban personality’ and the management of personal space through conscious control of frequency and type of interaction with others [4]. The social space in this research is that of a group of six women who were chosen initially for their membership of the same exercise class, and for their declaration of ‘friendship’ with each other. The daily interactions and distances that constitute and represent these women’s experiences of their friendship group are what is of interest to the research, and in particular, how the ‘shape’ of this social group may change with the introduction of a new medium for communication, in the form of the networked jewellery. Figures 2 and 3 below show typical forms for simple networks, the first a complete overview, and the second an egocentric star form.

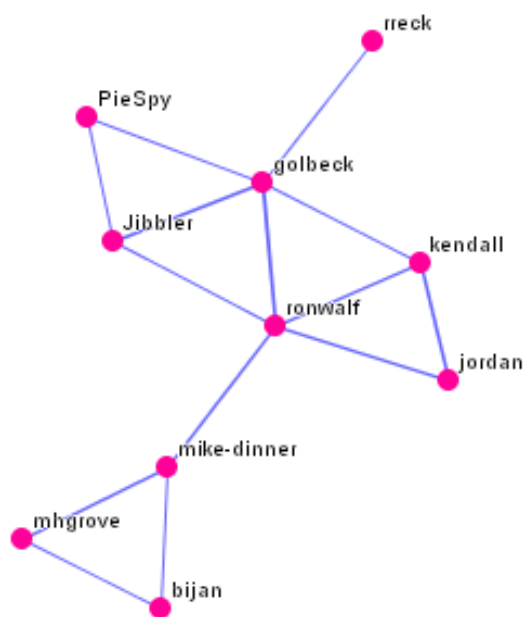


Figure 2
complete analysis form

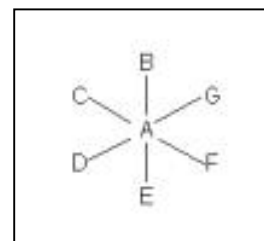


Figure 3
ego-centric social analysis

How does the jewellery visualise the social space?

Meanwhile, the jewellery will serve to visualise the social space as it is enacted. This happens in an extremely subtle manner through the choices made by interacting humans, reflected in their clothing, adornment, speech patterns and probably most easily recollected, in the modifying of accent to meet another person in conversation half way, as it were. These changes are dynamic, if often very slow, but serve as powerful social indicators. Thus the formal elements of the jewellery itself can be said to reach into and affect social space. However, it is the accelerated visibility of this that is of interest in the networked jewellery. It literally takes social interaction in the form of greetings at three distances and translates that into visible output worn on the body. This visible output has the potential to be read as another social language as its wearers become expert in recognising the various combinations of pattern and frequency that result. Thus what is normally veiled, if not entirely hidden, is made visible. Its visibility alters according to the expertise of the onlooker – to newcomers it would seem opaque, while to novices, still veiled. There is an interesting element of ambiguity in the representation of the sensed data, and thus in the ensuing social interaction, which may also be explored over more longitudinal study.

How might the jewellery affect the social space?

The visualisation of this information is expected to provoke new forms of behaviour and interaction between the group members. It may be used in subtle status games, or by individuals to align themselves with others more to their liking or advantage; it may expose roles more blatantly than normal, forcing members to be more conscious of their relationships with others; it may promote caring, or it may promote bullying, in the case of the necklace wearer for example; or it may result in ambiguous displays of group exclusivity in larger social situations when mixed in with other groups. The women may find it interesting to play games, affecting each other's displays and thus their self-determination to a certain extent. Individual members may have different attitudes to the risk of their display being changed by another's actions, finding it exhilarating, threatening or maybe just facile. There may be different intensities of attitude regarding the wearing of a badge of membership, as it were, and to the possibilities for extending the group or controlling its growth.

AIMS IN DESIGNING THE RESEARCH

The problem for HCI lies in this constitution of space through everyday actions. It resists demographic definitions, and studies based on traditional segmentation risk missing relevant information, while forcing the research to fit pre-existing definitions of social groups. This problem currently finds resonance in market research, which suggests that attitudes are now cutting across these demographic identities. For example, 'authenticity' has been identified as central to a new type of individualistic, informed consumer, transcending "all ages, ethnic groups and even, to some extent, income" [5]. If we want to design for authenticity, then, how do we identify a meaningful user group to start with? Therefore, the first main aim of this part of the research is to reflexively examine the social space of this friendship group through Social Network Analysis, and the second is to look for evidence of changes to that social space as a result of the jewellery network.

METHODOLOGIES FOR ANALYSIS OF SOCIAL DISTANCE

Georg Simmel's concept of 'social distance' as 'geometric' as well as 'metaphoric' is central to the project's approach, in particular taking its cue from Ethington's reappraisal of the important constitutive role of its geometric aspect [4]. While Ethington emphasises the literal geographic distance between, for example, the addresses of respondents, it is also generally recognised that time is an important dimension of the space experienced by humans as social beings. In particular, with interactive systems, time can, metaphorically, be seen to conflate with geographical space, for example, in the frequency and timing of individual interactions. A devised questionnaire for the social distance scale of friendship groups is based on these frequencies of defined interactions, rather than on geographical information. This is still geometric in Simmel's own use of the term, and in Ethington's re-visitation of it, but this is only part of the story – to complete it we need to also take account of the 'metaphoric' experience, the subjective understanding of this space, in order to see any relationship between the two. Grounded Theory and Social Network Analysis are proposed as general methodologies for the analysis of data, and a selection of quantitative and qualitative methods for its collection.

Grounded Theory

Grounded Theory allows theories to emerge from data as it is analysed. An intense, immersive technique, it usually employs verbal protocols, which are coded and recoded many times as the theories develop. Strengths are its embeddedness in the minutiae of real life, while weaknesses lie in its dependence on the skills of the researcher in coding and drawing out meaningful theories.

Social Network Analysis

The strength of social network analysis lies in its ability to make visible complex relationships of local and global patterns, and in its elegant ability to combine the affective experience with objective data [6]. Boundaries and roles become apparent in its visual representations of social relationships, allowing theories to emerge and be further investigated. As a visual tool, it can also greatly aid the communication of concepts and theories with others. Graphical outcomes can focus on the individual experience of the network in an 'ego-centric' approach, or on the overall network make up in a 'complete' approach.

Data Collection

Two methods have already been implemented in this research with the friendship group. Improvisation games were followed up with a discussion to identify typical greetings scenarios, including typical gestures and relative distances of greetings, in defining the three distances for the jewellery display changes. Further, IDEO's collage activity method was used to find characteristics of some of the women's existing attitudes to existing possessions and common activities, giving some pointers to the kinds of activities and vocabulary that might be used in developing a Social Distance Scale Questionnaire [7]. The themes this is being designed around are:

- Media for interaction – what traditional media do the women use to contact each other? What communication is afforded by worn artefacts and how?

- Types of interaction – Simmel’s philosophy of society rested on “principles of conflict, reciprocity and interaction” (Ethington 1997). What patterns of intention and effect emerge from the data for this group?
- Frequency of interactions – the geometric aspect of the social distance should be evident in when and how often the women interact with each other.
- Attitudes – the women’s feelings with regard their friendships with the others in the group can be notionally quantified in the scale, and corroborated through verbal protocols in follow up interviews.

Interviews in the women’s homes will then be held to generate subjective versions of the frequency, intention, and media of communications with other members of the group, and written diaries used to give objective data on actual interactions over a sample time. The first draft of the proposed questionnaire, with over sixty questions on everyday activities involving interaction, can be seen in appendix i.

CONCLUSION - A CUP OF SUGAR AND A LIFT TO THE AIRPORT

The raw results of the data are expected to be as banal and apparently insignificant as the activities enquired about in the questionnaires and interviews, but the networks it should allow to be unveiled will be more finely grained and grounded in reality for it. It is expected that the shape of such a small network will be strongly constituted by its agents’ subjective experiences as much as by geometric measurements, but that these geometries, in other words, how often individuals interact, will have a direct correlation to the experiential characteristics of the social space. It is not known what the impact on the space will be of introducing the novel technological artefacts to it, but it is hoped that through these two methodologies, interesting theories will be able emerge. There remains a great deal of reading and consideration to be done in finalising the questionnaire, and once the main body of the project is over, its quality and the method of its application should be reflected upon for future use.

REFERENCES

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