

# Strengthening Community with Embodied Social Networks

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**Social Network Systems have become highly applicable to everyday life, but continue to remain on the desktop for most users. This paper reports on initial analysis of groups interacting with a social network system in the real-world, in this case a conference setting. The system, Polyphonet Conference, and its RFID card interface together allows rich interaction between users. Ethnographic observation of user interaction, with the use of video data collected at the time of use, was used to assess what social benefits may be afforded by the system. This paper suggests that the act of adding to one's network may in itself help to generate and strengthen community. Using the notion of folk computing, community is seen to be generated particularly well when it occurs via the embodied action afforded by a combination of virtual web-mining and subsequent user authorship.**

*Community, Polyphonet, RFID, folk-computing, social network.*

## 1. INTRODUCTION

This paper explores the meeting of two lines of research: the development of social network mining and visualisation, and human-computer interaction in temporary communal spaces. In recent years research has begun to move away from using social networks as simply a unit of analysis to a more proactive use of networks to connect the interests of individuals and groups [1, 2]. Social matching software aims to bring together individuals who have similar interests or characteristics [3] and may include the ability for users to suggest elements of their own identities to be used in the analysis and subsequent matching. This trend has also provided opportunities for the development of systems in which users directly view and alter their social networks in virtual space, including many popular online social network systems [4,5,6]. In this paper we present an initial analysis exploring the connectivity that occurs around and through social network technology in a real-world setting. We are interested in how humans interact with a social network system in a semi-public space and as co-present, rather than distributed, communities [7]. Though there has been continuing research into collaborative work in face-to-face settings, notably in the form of studies of technology use in the work place [8,9], it is only relatively recently that attention has turned to the community building that occurs in other settings.

Inspired by the vision of folk-computing [7], in which communities are strengthened through their use of oral and tangible 'folk-games', and work on embodied interaction in HCI [10], the following analysis illustrates how an interface and social network system may help build real-world communities.

## 2. POLYPHONET SYSTEM DESIGN

Polyphonet Conference has been developed with the aim of enabling participants of conferences and other events to build relationships with others present, based on their previous connections via other colleagues, potentially with future impacts on research collaborations. The system consists of two aspects, an online web-browser in which users can see their social network consisting of participants of the conference, and a kiosk-based interface, where users can log in to the system, an act that additionally affects the network. Prior to the event, the World Wide Web is crawled using registered participants to the conference as the 'nodes' of a network. The web-mining then uses a search engine to establish the relationships (if any) between participants (represented as 'edges' on a network) and the strength of those relationships, according to the number of hits on a search engine (the process is described more fully in [11]). The result is that a social network consisting of the participants of the conference and the strength of their relationships can be displayed to users.

Figure 1 shows a screenshot of the page as seen by a user once they log into the system, whether at their own computer or a kiosk. This homepage, known as 'My Page', provides the user with information about members in their network, shown on the middle-left of the screenshot. To the right is a list of members with strong relationships in the network. Additionally, information is given about papers or poster sessions that the user has bookmarked. To the bottom of Figure 1 can be seen the user's social network diagram. This can be expanded to full-screen dimensions by the user.

In addition to the functions provided by the online browser, on-site functionality is given in the form of a kiosk-based interface, where up to three users are able to log in together, thereby viewing their joint network diagram.

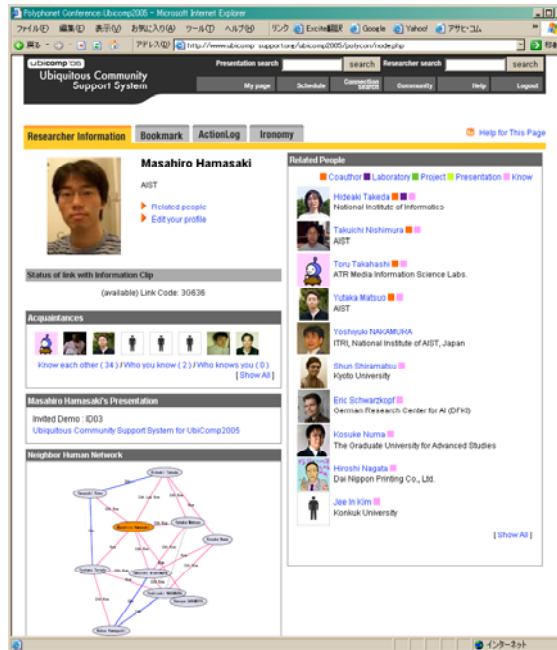


FIGURE 1. Polyphonet 'My Page'

The social network is built prior to the conference if users have registered, or at the conference, in which case some time is needed to mine the Web. Users are then able to modify their network, by adding other conference participants through two additional methods. Firstly, they can select a participant's name and add them to the network by selecting a 'know' link. These types of links are then marked as 'know-links' on the diagram. Secondly, they can add members and be added to other members networks by logging into the system at a kiosk together. At the conference each member is given an RFID card, which is then registered to his or her name. This allows them to log into the system at kiosks individually—in which case they are taken to their My Page—or together, in which case the system automatically adds members to each others' networks (if they are already not part of the network). This latter method also labels the network links (edges) as 'touch links'. Users are thus able to trace the development of the network from its initial web-mined form, to the diagram as modified at the actual event. Figure 2 provides a screenshot of a joint network as seen when logged in together with the RFID cards. The three users images are at the left, coloured according to the RFID reader that they used to log in.

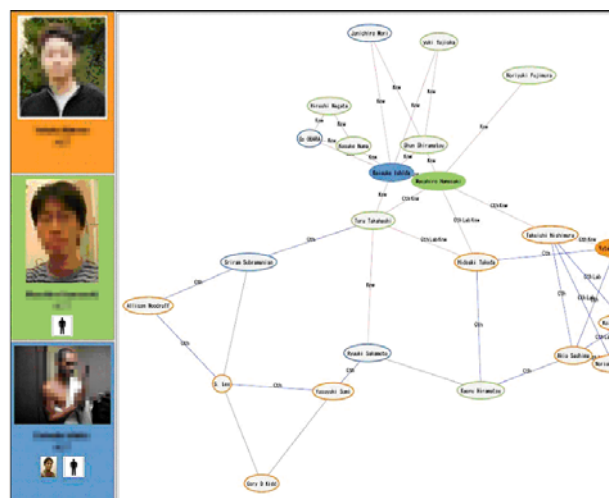


FIGURE 2. Polyphonet joint network of three users

### 3. USER STUDY

#### 3.1 Methodology

Polyphonet was tested at two conferences in 2005, *JSAI 2005* and *Ubicomp 2005*, each held inside Japan and having close to 500 participants over a period of three days. In order to observe the usage of the system, video and audio data of users at a kiosk was gathered over the entire length of the conferences from multiple angles. This, in addition to the access log data on the database and ethnographic observation by the project's researchers at the time, has allowed detailed and repeated viewing of users' actions. There is now a strong discipline of analysis of conversation around and with technology [12]. Incorporating ethnomethodological study [13] with recent perspectives of technology as equal actors [14] is providing a viewpoint of the interaction with the system that incorporates both the affordances of the technology and those of the human users. We present our initial results below, though further development and analysis of Polyphonet continues.

#### 3.2 Results: Embodied Social Networks

While it was not possible to view directly the users interacting with the system on their own computers, viewing the video of their interaction at kiosks has proved to be enlightening. Two observations are pertinent to the aim of Polyphonet as a community-building tool. Firstly, once introduced to the system, users were keen to add other members to their networks. They added via 'know link' those conference participants who they felt they had research relationships with and also those that they had no formal relationship with, but whom they knew from other conferences. This illustrated the difference between the system as envisaged by web-mining and that as understood by many users. Most members' online identities (where they use their full name) may be expected to be research or work-related. The web-mining will therefore build work-related networks from this data. Yet, users desired to modify these networks to more accurately reflect their own perceived relationships, which may be personal or friendship-based.

Secondly, users would discuss quite intensely the meanings of the networks in relation to their communities as perceived personally. When users would disagree with the initial network as provided by the web-mining, their negotiation involved the construction of a modified network and then passing this orally to the other members when logged in or standing by the kiosk monitor together. Members would deliberately log in together with their RFID cards to add each other their networks, including serendipitous meetings of acquaintances from previous events. While web-mining provided the base network, conference participants used the embodied nature of the RFID cards and kiosks to modify the social network visualisations; the embodied action being one of both technologically building a network and socially building relationships and community.

This latter observation points to the role that learning took place in the use of Polyphonet at the conferences. Individuals who had adjusted their social networks on the system acted on the boundary between new users and Polyphonet, utilising the tangible interface of RFID, kiosk and network, to introduce new users to the system via 'touch link'. They thereby acted as 'brokers' [15] to their own communities, other members of which were often with them physically at the time.

### 4. DISCUSSION

The results of our deployment of Polyphonet to date provide an insight into embodied computing [10] in relationship to temporary co-present communities. In their work on Folk Computing, Borovoy et al [7] suggest that three features are important to develop community with technology. These are authoring, passing and tracking. Polyphonet has two of these features. Principally, the creation of know-links and touch-links by users is an act of authoring. In their papers on i-balls and memetags by Borovoy et al [7,16], subjects created small digital items that could be passed from user to user. In Polyphonet, users authored the social network itself via their modifications online and with RFID. Folksonomy [17]—the act of tagging often used in online social network systems—may be regarded as another act of authoring. We suggest that, seen in this light, the use of embodied social network systems can be a form of contemporary 'folk game'.

Action around a kiosk with multiple users is both a physical and an oral form of 'passing'. Users orally negotiate and explain their networks to each other, and, they are able to then physically modify their networks accordingly. Unlike i-balls or memetags, which may be primarily authored individually, social networks exist jointly between users; they consequently suggest actions of passing networks *within* the negotiated process of authoring them. In order for users to play this folk game, it is necessary to provide some form of resource with which to play. In Polyphonet, the web-mining provided such a basis. Using a tangible interface, such as the RFID cards used with

Polyphonet, appears to provide another resource; in a sense this being another 'actor' that prompts interaction and hence the basis for community. The manner in which users could easily log in with other members and then discuss the modifications done or deemed necessary, was learned and then taught to others. Folk games also take this form.

Though the system enabled authoring and passing, in order to more fully explore the folk computing aspect of Polyphonet, it may be necessary to allow more tangible passing (such as the creation of mobile devices or tags) and subsequent tracking of authored networks. The passing we observed took place mainly around the kiosks. Though the fixed nature of these kiosks afforded opportunities for interaction, users may benefit from the ability to carry their networks away from the location to other spaces and settings. Additionally, greater tracking of the development of those networks over the course of events and afterwards should provide another resource for users to explore their own community. One of the most significant elements of community-building can be the intimacy gained through a sense (real or imagined) of a 'shared' history [18,19]. Giving users the ability to view a history of the development of their social networks may provide this resource.

## 5. ACKNOWLEDGEMENTS

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