Presence and Use: Sensors In Community Gardening

Geraint Jones
UCL Interaction Centre
University College London
London WC1E 6BT
geraint.jones@ucl.ac.uk

Yvonne Rogers
UCL Interaction Centre
University College London
London WC1E 6BT
y.rogers@ucl.ac.uk

Nicolai Marquardt
UCL Interaction Centre
University College London
London WC1E 6BT
n.marquardt@ucl.ac.uk

Abstract

Sensor technology offers the opportunity to augment our experience and understanding of 'natural' environments, however introducing technology into shared natural spaces can also disrupt the experience of these environments.

Our research with forest gardeners and other community food growing groups suggests that *presence* in the shared space is vital. We argue that successful nature technologies must minimise disruption to presence to be accepted. Situating data into the environment can support community practices in shared spaces, without disrupting core aspects of the experience.

Author Keywords

community gardening; community data analysis; situated interfaces;

ACM Classification Keywords

H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous

Introduction

Sensor technologies can help us to augment our experience and understanding of natural spaces, by

revealing information we wouldn't otherwise be able to sense (such as the rate of photosynthesis occurring in a leaf), and by helping us to integrate information in new ways, such as understanding aspects of the environment (like light levels) which change over time. However, embedding technology in natural spaces also has the potential to disrupt the experience of the space.

Community food growing represents an interesting case for exploring this tension, as it is an area where sensor technology could be beneficial [3], but where existing technologies have been rejected [7].

Why would we want sensors in the forest garden anyway?

Establishing and maintaining ecosystems with the intent of producing food is a complex task requiring domain knowledge and understanding of local environmental conditions [6]. There are webs of interdependencies between species and a multitude of environmental variables which change over time on multiple nested cycles (seasonal , diurnal, lifecycle), chaotically (weather) and with long term trends (climate). Decisions such as what to plant and where to plant it have to be taken for the garden as a whole [6], and these interdependencies can be especially difficult to grasp due to the extended timescale of action and reaction.

Sensor technology can support community groups in making these planting decisions [3, 6]. A number of technologies have been developed to help farmers and gardeners make planting decisions and assist with maintenance, such as 'Precision agriculture' sensing and analysis techniques used in agribusi-

ness [8]. However, despite demonstrated benefits in commercial settings ranging from large agricultural concerns [8] to smaller horticultural businesses (such as vineyards, [2]), this kind of technology does not transfer well to a community context [3].

Non-use and rejection

Both Odom [7] and Goodman & Rosner [4] observed resistance to technological augmentation of practice in community growing groups. Odom argues that this is due to community members feeling that introducing technology to the growing space will make things 'too easy', prevent the development of holistic understanding of the environment and interfere with community building and learning interactions that occur between people in the growing space [7]. People worry that 'Technology' will take away from the essence of the activity; it will prevent 'getting hands in soil' [4].

Hirsch [5] and Odom [7] conclude that garden level sensing technology is not appropriate for urban agriculture groups. However, others have argued that it is the specific *design* of many technologies that is inappropriate to a 'natural world' context, rather than technology itself [1], and [4] point out that although participants expressed concerns about technology, they were actually observed interleaving technology with their practice.

Rejection seems to focus around automation, the removal of agency and the adding of intermediation between the person and their chosen task - for instance, Goodman & Rosner [4] describe one gardener's rejection of automatic watering / weeding systems: "I don't want to be cut free. I might want

to be informed, but I want to have an engaged relationship". Hirsch [5] posits that the resistance is due to the 'hobbyist' nature of the groups, and that more commercial entities may not be as resistant, and indeed research on sensor networks in vineyards has shown that optimisation and automation were desired in this more commercial context [2]. However, there were still some aspects that participants felt should never be automated - for instance, when to harvest is always a 'judgement call' that growers wanted to make themselves. Additionally, even here participants felt you 'can't farm remotely' as there is a need to visit, see and touch the crop [2].

The importance of presence

The rejection of 'technological augmentation of practice' [7] in the previous section appears to be driven by fears that the technology will interfere with the relationship with the growing space through automation and the reduction of agency [4], and thus be detrimental to learning, community building and the experience of 'getting close to the soil'. Ultimately, these fears are around the disruption of *presence* in the natural space; the establishment of distance between people, the space and the others that inhabit it.

The importance of presence has been a core thread throughout our ongoing contextual research on community food growing groups,(comprising of contextual interviews in community food growing groups, design workshop and long term study with a forest gardening group), underlying decision making and knowledge formation and dissemination processes.

We have observed a number of key themes across

our studies, but the most salient for decision making is that for community food growing groups, **decisions are 'ad hoc' and in the garden**. Most of the groups perceived their decisions as ad hoc and off the cuff - community members explained their process as "...just wing[ing] it", however observing decisions being taken it is clear that although such decisions are highly 'in the moment', they are informed by knowledge about the space and the domain. Systems that support this kind of decision making must also be present in the space in order to be accepted and used.

Additionally, **learning and education is important, and rooted in the physical space**. Learning about the environment and about growing in general was vitally important to community members. Both their own learning, and the teaching of others was considered important. The former was strongly tied into 'learning by doing', and the latter to peripheral participation, both anchored in the physical space of the garden. Skills are learned and shared through action and knowledge is gained by participating in discussions and ad hoc decision making and experimentation. Situating information in the environment can support this learning focus; not only can the data help people to acquire knowledge about the environment, but additionally shared artefacts support learning via peripheral participation, e.g. when experts are discussing a course of action and novices are peripherally involved. Automating or centralised approaches that reduce presence interfere with this knowledge building practice.

Designing for presence?

Designing to enhance presence may provide a route to supporting the co-located, collaborative decision making and learning processes observed in these communities. We are working with a forest gardening community to investigate whether closely mapping data onto the physical space of the garden can enhance presence and support planting decisions, and to explore what form that mapping should take. We have deployed environmental sensors into the garden and will introduce a series of prototypes for community members to use to reveal and interrogate the data within the garden. We intend to iterate on the mappings based on the usage and reactions to the prototypes, resulting in a final design that will be valuable to the specific community we are working with, as well as helping us to understand how we can design to support *presence* in this context.

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