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+flow paper+

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Abstract

We present +flow paper+, an ambient visual interpretation of natural activities that occur in public spaces such as a cafés. +flow paper+ is an interactive visual extension of physical actions and activities: an interactive wallpaper that responds to the users' movements in the café. It investigates the possibility of designing installations that promote personalisation and customisation of public environments. +flow paper+ is informed by an approach to design that emphasises engagement, by providing open-ended situations that engage the user in reflection on the use and acceptance of technology.

Keywords

Everyday activities, flow, subtle activities, reactive, café, wallpaper

1. INTRODUCTION

The integration of processing power into everyday objects and environments often referred to as Ubiquitous Computing has been driven by strong visions such as Weiser's 'Calm Computing' [9] standard, or Philips' 'Ambient Intelligence' [1]. As a greater number of devices and objects inherit processing power, we are beginning to experience and encounter places in more dynamic ways. Everyday objects can now be uniquely identified from a distance and are bestowed with information. Thus the ways in which technologies are physically arranged and perceived are changing [2]. The increasing availability of these devices opens up possibilities for technology and our interactions with technology to be experienced in terms of the activities that make up our daily lives.

Until recently, the main purpose for information technology has been to make certain tasks more efficient, but as technology becomes deeply embedded within the context of our daily lives, we are faced with the challenge of designing objects and systems that engage us in richer experiences. Our interaction with and perception of technology is as much about how people feel about it, as it is about how we use it [4]. However the understanding of user experience remains somewhat limited and to some it remains a "fuzzy concept" [4]. McCarthy and Wright [4] argue that experience should be thought of in terms of "felt or emotional quality of action and interaction". To understand the experience of using technology we must understand and empathise with the "emotional response and the sensual quality" that is produced by its use [4]. As designers, we recognize that the user interacts with technology not just in a functional task-oriented manner, but also on the larger social and cultural embeddedness of the activity. How we engage our users in reflection over their own understanding of technology opens up new options for users as well as designers. Sengers et al. [6] argue that "reflection itself should be a core technology design outcome for HCI" [6]. Increasingly our design environments are becoming places of personalisation and customisation. Reflection on technology and the use of technology "brings unconscious ascepts of experience to conscious awareness, thereby making them available for conscious choice" [6]. Thus reflection opens opportunities to experience oneself and ones' relationship to technology in vitally different ways.

The challenge is to design technology that in its primary appearance opens up a space for reflection and asks questions about its being as a piece of technology. Sengers and Gaver [7] propose designing to intentionally support

multiple interpretations; these open ended systems are not tailored to one specific fit and open up many ways of experiencing the technology [7]. This approach embraces and encourages multiple, overlapping and somewhat ambiguous depictions of multiple users' experiences. Designing with an open-ended approach allows for a rich portrait of the multiple roles the technology can play in the users' life. In this method it places the interpretation of experience and meaning into the hands of the user and encourages our technology to become more flexible and reflective and adaptable to users.

The concept for +flow paper+ revolves around interactive wallpaper that responds to the users' movements in the café. It investigates the possibility of designing environments that promote personalisation and customisation of public environments. It illustrates a focus on the "experiental nature" [2] of public spaces and how ubiquitous technologies can enhance and reflect these experiences through natural activities that occur in the physical space.

2. RELATED WORKS

2.1 History Tablecloth

Gaver et al. [3]'s History Tablecloth draws attention to the flow of objects over a surface in the home by signaling how long things have been left upon it. If an object is left on the table for a while, a glowing halo forms beneath it that grows slowly over time, until the object is moved. The History Tablecloth is designed to raise issues about the desirability of using technology to emphasise existing behavior.

The History Tablecloth engages the user in a playful manner for a greater degree of personal engagement. The tablecloth was designed to create a situation in which the history of flow of the objects in the home could become visual to the users. The tablecloth addresses the issue of movement of objects in the home in which the interpretation of the situation is left to the user. During the field study of the History Tablecloth, the tablecloth was described as minimally to the occupants of the household.

The nature of the object detection on the table was limited due to technical difficulties however what the authors perceived as limitations or errors were perceived as interactive richness by the users. The tablecloth became a focal point for various speculations in relation to how it operated and its reaction to different objects as they were placed on the table. The 'erroneous' behavior that the designers conceived as a problem afforded a more interesting interactive experience for the user. The Tablecloth doesn't dictate peoples' reactions or suggest what activities they might pursue. Its purpose is intentionally ambiguous. It simply creates a situation that is novel and potentially significant, and leaves people to find their own meaning and interpretation within it.

Figure 1: History Tablecloth [3]

2.2 Activity Wallpaper

Activity Wallpaper [8] is an ambient visualisation of activity information, based on an analysis of audio data. The design of the visualisation is used as example in a discussion about the requirements of information presentation for public spaces.

Activity Wallpaper explores how a place can obtain an electronic "memory" of how it is inhabited: how people move around, socialise, make noise or spend time there. The wallpaper analyses audio from the cafe, sensing various characteristics of the current activity level, such as the number of people speaking or the amount of background noise. The more the color diverts from the background, the noisier the cafe. The number of "dots" in each row represents the crowd, so the greater number of dots, the larger the crowd was at that particular point. The Activity wallpaper allows patrons of the café to observe the activity levels at the café. With a look at the projection, patrons can see how the activity level at the cafés fluctuated over certain time periods.

This opens analysis and multiple interpretations for the users. The visualisation activity is intended to act as an amplified memory for the café. By displaying the activity

history of the café it enhances the cafés' aura and give patrons of the café a space for reflecting on how the café is inhabited.

Figure 2: Activity Wallpaper [8]

These related works illustrate how systems can engage the user without constraining how they might respond. The open-ended design of the technology enhances the users' experience within their environment. These systems raise issues and awareness about the desirability of using technology to emphasise existing behaviour.

3. BRAINSTORMING WORKSHOP

To encourage reflection within the design process an informal brainstorming workshop was conducted within a café. These sessions were held in this setting so that the attendees could recount activities that had occurred in cafes that they had been in previously. The workshops consisted of three sessions. Each of these sessions consisted of four participants. The participants comprised of a cross section of students that represented the 20–30 age group. The first part of the session was centered on word association activities. The attendees were given different words and were asked to brainstorm around them and associate meaning

to the words.

The second half of the workshop focused on discussion about cafés. The conversation focused on:

- Why people would frequent cafes;
- Who they went there with;
- What they liked about particular cafes they frequented;
- Recount stories about good and bad experiences that they had in cafés;
- Their experience of technology in a café.

The attendees also related why they would prefer one café to another and what activities they performed in their preferred café and whether the activity that was to be performed dictated their choice in café.

From the workshop the attendees stated that the main motivation for visiting a particular café was the ambient environment. They stated that the physical settings (comfortable settings) were the main reason for visiting a particular café. The physical environment has an impact on their perception of comfort and pleasurable experiences within the café.

A number of low-tech prototypes were constructed with the attendees. The attendees were asked to reflect on the prototypes and asked to reflect on their interpretation of the meaning of the prototype. The final prototype was conceived from these sessions. A description of the prototype is discussed in the next section.

4. DESCRIPTION

+flow paper+ is interactive wallpaper that maps the user natural activities in a café to visuals in the café. It allows the user a space of reflection within the café by transforming their natural activities into an ambient visualization that can transform and reshape and engage the users' environment without constraining how they might respond.

Instead of using information that pertained to the user (i.e. from some portable device that they were carrying or using), +flow paper+ uses sensing data generated from within the cafe to generate a unique environment for the user of the cafe. The data that is sensed in the café is provides inputs to the system that control the visuals on the wallpaper. The café is fitted with a number of sensors that are embedded in the cups, saucers and tables of the café (physical settings). When the user of the café interacts with the physical objects in the café, it affects the flow and patterns on +flow paper+. The users' actions are mapped in a somewhat ambiguous fashion that attempts to engage the user and provide a point of reflection and aesthetic experience.

Scenario of use: The sensing objects know where the object is in the context of the café and determine the way the object is being held. The user takes their objects to the table.

The location that the user takes in the café determines where the pattern is generated on the wall. The rate of activity at the users table determines the flow or rate at which the pattern is produced. The amount of activity that occurs at the table controls the intensity of the pattern. The type of activity that occurs also controls the visual patterns on +flow paper+. Jerky movements generate patterns that are reflective of this type of movements. Softer movements in the café generate more organic patterns.

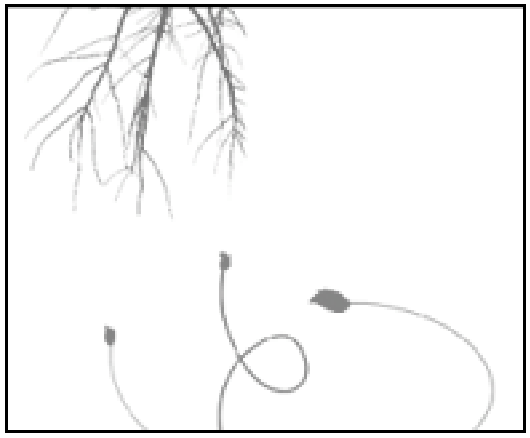

Figure 3: +flow paper+ representation of users' movements

Within the context of a café, the activities that occur within them are basic, daily operations. We all know how to eat, drink and socialise within these environments. +flow paper+ attempts to reflect these activities of everyday life and transform them into an ambient visualisation that can reshape and engage users without constraining how they might respond. +flow paper+ allows the user to create and shape their physical environment by responding to the users' natural movements in the café. It focuses on providing a gentle overlay of experience that is open to interpretation in terms of meaning. This offers a wider notion of how people might engage and interact with their environment [5].

+flow paper + seeks to be an un-intrusive way in which we act in our public spaces. The use of the technology is supported in a natural free flowing manner. This allows the user to reflect on their activities and the role that they play in controlling the technology. It caters for awareness of their actions within the context of the café and supports freedom of use within the environment.

5. CONCLUSION

I propose on building on the existing frameworks of reflective design [6], experience design [4] and Sengers' work on engaging multipile interpretations of systems [7] in building an approach which allows the user to engage with technology in more meaningful representations of experiences. The manners in which we occupy and use spaces affect our experiences within these environments. Technology embedded in the space can have the capacity to enrich and layer the different social and cultural characteristics of the physical space.

Designing systems that are open-ended and responsive in ambiguous fashion cater and create a space where the user can engage in reflection and thoughts on the implication of the use of technology within the environment. It provokes the user to react and become an active process in the creation of their environment.

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