

Achieving pervasive awareness through artwork

Salah Uddin Ahmed

Department of Computer and Information Science
Norwegian University of Science and Technology

Sem Sælands vei 7-9
7491 Trondheim, Norway

salah@idi.ntnu.no

ABSTRACT

Aesthetics and ludic aspects of pervasive awareness applications make the awareness system more attractive and aesthetically pleasing to its users. The same objective can be achieved by adding pervasive awareness features to an aesthetic object such as an artwork. In this article we describe how an artwork can be transformed to an pervasive awareness application by adding awareness features into the artwork.

Categories and Subject Descriptors

J.5 [Computer Applications]: Arts and Humanities: Fine arts.

General Terms

Performance, Design, Human Factors.

Keywords

Pervasive Awareness, informative artwork, installation, aesthetics

1. INTRODUCTION

Art in public space such as installation arts have a good opportunity to convey messages to its spectators apart from providing aesthetically pleasant experience to the users. The concept of pervasive computing promotes the idea of integrating computing in everyday objects and activities. In this way it makes scope for providing pervasive awareness in a certain context to its users. New media art especially artworks using computing technology placed in a public place can be a media to support pervasive awareness. In this paper we would like to present Open Digital Canvas, an artwork, placed in a working space and discuss the possibilities to make the artwork informative for its spectators by incorporating pervasive awareness features in it.

2. RESEARCH CONTEX

Open Digital Canvas is an art project which is part of the SArt project conducted inside the Software Engineering group at the Department of Computer Science in the Norwegian University of Science and Technology. The main objective of SArt group is to explore research issues in the intersection between software engineering and art. Oates looks at computer art as an information system and proposes to extend IS research agenda to include computer art [1]. Similarly we regard the software developed in the context of art as to be considered for software engineering research and thus extend the scope of software engineering research to include research issues found in the intersection of software and art.

Since 2006, members of SArt have taken part in three interdisciplinary projects involving both artists and software engineers: Flyndre (<http://www.flyndresang.no>), Sonic Onyx

(<http://www.soniconyx.org>) and Open Digital Canvas (http://mediawiki.idi.ntnu.no/wiki/sart/index.php/Main_Page). In the first two projects the artworks are sculptures with interactive sound systems. Flyndre takes as input parameters from the environment such as the local time, light level, temperature, water level and depending on these parameters creates music by exploiting algorithmic composition techniques. Sonic Onyx takes as input audio files and text files which are sent by users from their handheld devices such as mobiles or PDAs through Bluetooth technology. It converts those files into sound files which are later played by the sculpture. The third project, Open Digital Canvas, aims to embellish a white wall with a number of main boards with LEDs (Light Emitting Diodes) on them, creating a big matrix of light pixels. The project creates a platform that allows freedom of artistic expression and holds the concept of openness by keeping the hardware, software and behavior as open as possible.

We have observed that the evaluation of these kinds of artworks do not solely depend on the aesthetic evaluation or the aesthetic experience gained by the users. Rather the evaluation is a complex equation here which includes the social and psychological effect of the interactive work on its users. This is an interactive experience that involves its users/spectators with actions and following reactions which can be integrated with issues like social, educational, learning, awareness and personal preferences etc. In this article we would like to present how an artwork which was built with the intention of presenting aesthetics by means of technology can be extended with added layers of features to convert it into a pervasive awareness system while maintaining the original idea of aesthetics undisturbed.

3. OPEN DIGITAL CANVAS

The history of the project starts in 2005, when an architect student, Åsmund Gamlesæter wanted to build a LED facade for a house. A sister LED wall was built as a result of the same project at Samfundet, student social activities building of NTNU. Later a first prototype at the department of computer and information was built in 2007 by Nicolas Mendoza, a master's student in this department [2]. In 2008, students from the course expert in team mounted the cards in a room in the IT building which is now called as open digital canvas. The room is used for meetings, seminars and as a lunch room in general.

The main artistic idea behind the wall is to make it an accessible display screen for all who wish to participate. Three groups each with six members from the course TBA4850 – Experts in Team worked on setting up the canvas and tried some artistic expressions to be portrayed by the canvas. The canvas itself is media or tool for artistic expression. The idea was to keep it open for artistic expression and keep the system open for users. Users

can access the canvas from internet and use the canvas to display whatever they want.

The groups of students have utilized several artistic expressions, for example one group called as group yellow, proposed peaceful, organic imagery considering the room as a functioning space [3]. Such images were that of waves, a slowly burning fire or birds flying around. These ideas were directed towards a sort of interior decoration of the room, designing an integration of the display with the room. Although this group had a lot of interesting ideas about what to display on the canvas, due to the lack time they could not decide what was possible or presentable on this wall. Finally, they ended up with written words which they regarded as one of the most powerful and lasting methods of conveying a message. These symbols i.e., texts, create messages that can express pretty much anything, from the tedious to that of an intellectual spark, evoking emotions ranging from love to hate and burning passion..

The second group, group orange, had several artistic ideas at the beginning, but finally they created a little bunny which will change its mood corresponding to the sound level in the room [4]. Little bunny animation can have several states such as sleeping, wake up, jumping, stretching, flapping ears and spinning depending on the sound level in the room. The more the sound level in the room, the more active the bunny will be.



Figure 1. The Animation of Bunny.

The third group had an idea to create some form of interaction between the screen and the people using the room [5]. The final idea that they settled for was to display an ECG wave propagating along the screen on the wall in the same manner as one would see it on an ECG monitor.



Figure 2. The complete ECG wave after having traveled from left to right on the screen

If the system could monitor the sound level in the room, this level could be visualized by varying the distance between each ECG wave. The canvas is placed in a meeting/lunch room where most of the people attending the room are employees. The group consists of mainly grown up people who are working most of the time sitting in their desks and looking at the computer screen and presumably doing less physical exercises. The group had the concept that by watching the heart and art, with the ECG wave, maybe some people start to think of their own heart as a concrete thing which needs nursing and training and hopefully start to do something to keep it healthy as long as possible

4. TOWARDS PERVASIVE AWARENESS

4.1 Different Kinds of Awareness

The concept of ‘awareness’ has come to play a central role in Computer Supported Collaborative Work (CSCW), and from the very beginning CSCW researchers have been exploring how computer-based technologies might facilitate some kind of ‘awareness’ among and between cooperating actors.

CSCW researchers use the term awareness in combination with different adjectives to mean specifically the type of awareness, e.g., ‘general awareness’ ‘collaboration awareness’, ‘peripheral awareness’ ‘background awareness’ ‘passive awareness’ ‘reciprocal awareness’ ‘mutual awareness’ etc [6]. In a Pervasive awareness system the awareness information is generated from ubiquitous devices located in a particular environment. In the following section we describe how we can add general awareness and perspective awareness features in the described artwork.

4.2 Adding Informative features to an artwork

The concept of adding features to an ordinary artwork is not a new idea. Interactive institute in Gothenburg, Sweden used the idea of adding layers of information on artworks to make the artwork as information displays. Redstrom et. el describe how other kinds of information can be mapped onto the design surface as well, making pieces of art more explicitly reflect aspects of its environment [7]. They call this kind of art “Informative art”.

We argue that the information when carefully collected, organized and displayed can turn an ordinary artwork to an informative art. For example, in the artwork described here, the first group presents texts on the display that provokes some ideas in its viewers. These texts can provide general awareness. In order to make this artwork to convey awareness about the workplace, the environment and the people where the artwork is located, we can choose information relevant to the workplace.

The department has five floors and eleven research groups. The physical divide by the floor and the activity divide by the groups make the intercommunication between the groups hard and limited. But the meeting and lunch room which is shared by all employees can convey information about one group to the others.

Even though the department’s website has a page dedicated for news and events but that needs a person’s direct attention. Besides some information are not published there for example, group specific or out of the department or out dated news.

Here we represent some scenarios which can convert this artwork into an informative art and work as workspace awareness system:

1. *Two more Chinese PhD students are joining in the software engineering group in the project of Alf Inge from August 2008.*

The department has many foreign students. It might happen due to the grouping divide in the workplace a Chinese student at the artificial intelligence group does not know the news at all until the new students arrive here. Besides, this is a kind of information which is not published in the department news as well.

2. *Guest lecturer from Brazil will give a presentation on his research institute in the next software engineering group meeting dated 29th June 2008.*

This is an internal group meeting and even though the presentation may not be relevant for many others, but some people from other group might be interested to learn about research institute in Brazil.

4.3 Adding Pervasive awareness features to an artwork

The purpose of pervasive awareness is to help connected individuals or groups to maintain a peripheral awareness of the activities and the situation of each other, e.g., their well-being, their availability for interactions, or an overview of their activities. To achieve pervasive awareness we need to add data collected from peoples current activities. The second and the third group have used the idea to collect sound data through sensors. With little modification second and third group's idea can be used to collect peripheral awareness data. For example, instead of placing the sensor in the same room, it can be placed in another room and then the change of bunny's mood will reflect the level of activity in other room. When placed in the same room it provides redundant data as the people in the room can see the number of people and increase of sound level and activities directly. Apart from the room where the canvas is placed, there are two other lunch rooms in other floors. So it might be interesting to see what is going on those rooms. Alternatively, six sensors can be placed in six floors and the canvas can have six animations of bunny corresponding to each floor. In this way the canvas can show the level of activity and people's movement in each floor. A webcam can capture the image of the canvas which can be live streamed on a website. Thus all the employees can see the status of people's movements in different floors sitting in front of their desks.

Each LED in the canvas can be individually programmed and accessed from internet, so it can be used to represent an individual employee by a LED. Thus number of LED lit can represent how many people are present there in each floor. This gives the viewer a feeling of connectedness or improves visibility to see each others co-existence when they are hidden by the walls and floors placed in between them. While part of the screen can be used for this, the other part can be used for posting text messages. Text message like "A and B will have a small coffee break at lunchroom 054 at 14:00." This message not only informs other colleagues about the status/activities of A and B, but also is a sort of invitation for others who want to join them for a coffee and

chat. In this way the canvas can play the role of a pervasive awareness system in the department.

5. CONCLUSION

Art Installations has a special advantage of supporting ubiquitous computing along with provision of aesthetics and pleasant experience for its users. In this article we have shown how an artwork can be configured and upgraded to support pervasive awareness in a workplace setting. Feeling connectedness is an important issue; the increasing popularity of social networking applications like myspace, facebook, wayn and so on reveals peoples need towards feeling connectedness. We believe that implementing different prototypes of pervasive awareness applications in workplace will reveal the importance of feeling connectedness among the employees.

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