Framework for Experimentation with Ambient Wall Displays

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Abstract. Ambient walls have been proposed as a means of displaying different forms of awareness information in organisations. The ambient walls that have been developed vary widely in terms of their dimensions as well as the size and type of lights used to make up the display. Typically, the ambient wall is physically constructed and researchers then experiment with different information content and visualisations. We present a framework that supports experimentation with ambient wall displays in terms of, not only the types of awareness information displayed and its abstract representation, but also the physical properties of the display. The framework may be used for the rapid development of applications for specific walls as well as supporting the design of physical walls suited to a specific application.

1 Introduction

Within the field of CSCW (Computer Supported Cooperative Work), researchers have tackled the problem of raising community awareness in order to promote knowledge sharing within an organisation and extend cooperation beyond formal project boundaries. The aim is to make users aware of events and the activities of other members of the community in a manner that does not disrupt their normal working practices. Specific projects can be categorised according to the sources of information displayed and how it is visualised.

Ambient displays embed the information into the physical environment with the intention that the information should be displayed in a way that is, not only non-disruptive, but also calming to the users [1]. These displays may take many physical forms ranging from wall-mounted screens to sculptures and may also involve different senses such as sound and touch instead of, or as well as, sight [2,3]. Aesthetics play an important role in the design of ambient displays and a number of projects have a close link to art either involving artists in the design of the ambient display or visualising information based on artworks [4].

Hello.Wall [5] and Open Wall [6] are examples of ambient displays that use a wall of lights to display awareness information. In both cases, a physical wall was designed and built and then experiments were carried out with different kinds of awareness information and visualisations. We believe that it is important to develop tools to support experimentation with ambient wall displays.
before building actual physical walls. Further, these tools should be based on general software frameworks that would also support the rapid development of applications for specific ambient walls once constructed. We have developed such a framework and, in this paper, describe the main components together with an example to demonstrate its use and flexibility.

We present the background in Sect. 2 before describing our approach in Sect. 3. An overview of the architecture is given in Sect. 4. Details of the transformation and projection processes are presented in Sect. 5 and the framework itself in Sect. 6. Concluding remarks are given in Sect. 7.

2 Background

Hello.Wall is an ambient display that was developed within the Ambient Agoras project [5]. It is 1.8 metres wide and 2 metres high with 124 light-emitting cells organised in an eight-row array structure. Different light patterns were used to represent different types of information. They also distinguished between public and private patterns to make it possible to communicate personal information to users in a public space. Note that the Hello.Wall was designed to provide notifications as well as awareness and therefore also provided means to detect users and allow them to interact with the wall. Interaction was done through a special ViewPort device carried by users and they defined three communication zones — ambient, notification and interactions — based on the distance of a user to the wall. Experiments were carried out to evaluate how well the Hello.Wall and supporting artifacts could facilitate communication between remote teams. A wall was installed in a lounge space at each of the remote sites and dynamic abstract patterns used to visualise awareness information about the presence, availability and mood of remote users.

The Open Wall was developed as part of the more general SArt project exploring research issues in the intersection of art and software[1]. Open Wall is a wall-mounted display consisting of 96 circuit boards each with a 5 by 5 grid of LEDs. The circuit boards are in turn arranged in a 16 by 6 grid. Each LED can emit light with 99 possible intensities. Once the wall was built, students and also artists experimented with the wall and proposed a wide variety of content designs. A web-based interface allowed designers to easily upload and view content. Although the main focus of the Open Wall project was the design of content rather than the investigation of awareness, a number of the proposals were related to social awareness such as displaying a world canvas of Twitter updates or showing movement within buildings.

Not So White Wall[2] is an interactive wallpaper that uses heat sensitive ink and a resistor matrix to present large scale pixilated images, that slowly change.

Having worked on other awareness projects [7, 8], we were interested in investigating the use of ambient walls for displaying various kinds of awareness information. However, we wanted a flexible and low cost way of being able to

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1 http://prosjekt.idi.ntnu.no/sart/
2 http://www.nastypixel.com/prototype/not-so-white-walls