

*Place-stat** ambient signage system

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Abstract. Signage systems in public buildings usually present visitors with static information that relates to the spatial or thematic layout of the space. In this paper we present the design of an ambient signage system for public spaces called *Place-stat**. *Place-stat** addresses the question of how to present visitors in public spaces with contextual dynamic information such as flows of people and data.

Keywords: Ambient signage systems, urban informatics.

1 Introduction

The *Place-stat** signage system is designed for public spaces such as museums, libraries, shops and restaurants where traditional signage systems depict information relating to spatial, thematic layout or hierarchical structure often in a static format. *Place-stat** is a flexible signage system designed to present information about dynamic flows of people and data in places. Which are the popular areas of a museum? How many users are connected to the public Wi-Fi? Are some of the data streams we can present, and can affect visitor's experience of a place.

*Place-stat** signs combine an electronic display with an interchangeable physical outer shell that helps contextualise the information presented. The display is an 8x8 RGB LED dot-matrix that allows us to show glanceable information whilst allowing for a reasonable level of detail to be displayed. The outer shell complements and contextualises the information presented by the display, suggesting the subject it relates to. The shell can be easily laser-cut from a variety of materials including wood, plastic or cardboard to suit different applications and settings.

2 Design rationale

Ambient information displays are a core area of research in pervasive computing systems. They address the need to display information away from the computer screen in a non intrusive way. Ambient displays frequently interface systems that would otherwise not be visible without a computer screen, such as sensor networks or flows of network data. Their application ranges from commercial products [1] to art projects [2].

One property that characterises ambient information displays is the one to one relationship that exists between the display and the information presented. In other words, often a single type of information i.e a stock value is mapped into a single display element; for instance a colour, motion or sound range [1][3][4][5][6]. As a result of this close coupling between display and data, ambient displays seldom have the flexibility to communicate effectively more than one set of information, neither do they have the expressiveness to show more than one perspective on a set of information.

When designing *Place-stat** we purposely wanted to address the design limitations of other ambient information displays. Without using a full resolution LCD screen, can we design a display to present information that can be easily seen from a distance? Can we reuse the display for other types of data? Can we compare two different aspects of the same data set? Or even observe different states in the information over time?

By using an 8x8 RGB LED dot-matrix display we have the flexibility of 64 pixels at our disposal, these allow us to show highly abstracted representations of data, i.e a colour range, so it can be glanced from a distance but, crucially, we can use more figurative representations such as graphs, icons or basic animations.

The outer shell that surrounds the digital display introduces another layer of meaning into the signage system. We use this layer to contextualise the information by giving it a form that is conceptually connected with the source of data presented. For instance, if showing information about the flow of people the shell can take the form of a cut-out avatar, immediately relating the data presented by the contained display (Fig.1 illustrates an example).



Fig. 1. Initial sketches of *Place-stat** displays.

Dynamic sources of information such as those coming from context aware systems, social networks and urban computing systems play an increasing role in our everyday experience of buildings, streets and cities. We often access those sources of information through a computer or mobile device, mostly away from the place they relate to. By introducing a dynamic display in the context the information relates to, we open new opportunities for the development of new interactive experiences and services in the built environment.

3 Technical implementation

The display in the *Place-stat** sign is an off-the-shelf 8x8 RGB LED dot-matrix display which incorporates a controller board. The controller board operates at 5V and has a standard SPI interface to communicate to it allowing to run the display. We use an Arduino board [7] to communicate with the display's controller acting as an interface between the incoming data and the information displayed.

The incoming data comes from a gateway interface running on a local computer. The gateway interface is a custom program that gathers data from various sources, currently, twitter, rss feeds as well as custom data providers such as sensor networks, and sends a data packet to the Arduino board. The data packet is composed of graph type, colour and data values to be shown. The arduino board runs a custom program that is essentially a low level graphing library that turns on or off each one of the LEDs according to the data received and sends via SPI a 64bit buffer of data onto the display controller to be displayed.

We have currently tested two communication modes between the data gateway interface and the display. The first connection is a standard USB that provides both power and a communication link with the board and we have also tested a wireless ZigBee link between the data provider and the display.

4 Future work

We have a fully working prototype of our *Place-stat** signage system and have successfully connected it to several data streams; for instance, the number of users connected to a Wi-Fi network, website hits, twitter feeds and a number of sensor inputs, we are looking to demo some of these at Pervasive 2010. We are currently working on the implementation of a wireless communication layer for the device so it can be easily updated remotely, also allowing the devices to update in realtime.

The *Place-stat** signage system will be tested in a public exhibition space in the coming months, with a particular emphasis in analysing the extent the information presented affects people's experiences of a space.

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