

Art, Information and Office Door Displays

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Abstract

We present a prototype of a display that allows users to use pictures to convey information useful in day-to-day life. Our display is designed for the doors of faculty offices at universities, and can show a variety of information a style based on the art of Mondrian. Our implementation of this system uses a Glass Vision display, and was successfully tested at our university. The system is further integrated into the environment by using RFID sensors to automatically detect objects leaving or entering a room.

1 Introduction

[Weiser and Brown 1996] have argued that “calmness” is a “fundamental challenge for all technological design of the next fifty years”. Examples of “calm” transmission of information can be seen in the “informative art” of Lars Erik Holmquist’s group in Sweden [Ljungblad et al. 2003], the Information Art project at Georgia Tech [Plaue and Stasko 2004], and the ambient displays of the MIT Media group [Wisneski et al. 1998]. We are developing an information display with similar motivations for university offices. It is designed to replace the traditional slider with a visualisation that allows users (faculty members) to give information to passers by. The main features of our display are:

- **One to many.** In comparison to the systems cited above, the conceptual model of our system includes both “users” (faculty members) and “viewers” (students, staff, other visitors). That is, we use informative art to transmit information *on behalf* of a user. In addition to offering new challenges, this also opens an extra avenue for system evaluation (identified as an especially difficult area in [Holmquist 2003], with the comment that “we have been struggling with the concept of evaluating informative art”.)
- **Peripheral and central.** Figure 1 shows an example system image. Each block of colour gives information about the display’s user, such as when they might return to the room. For viewers who require no information, the display simply forms a piece of peripheral background “art”. But, any viewer who knows the significance of the squares and lines and centers their attention on the screen can learn about the user.
- **User-centered design.** The display can automatically change its state both according to a set timetable, and by recognising RFID tags. A user can attach RFID tags to specific items, for instance files that they regularly take to meetings. When they pass through the door of their room, they move the object within the range of the reader to automatically update the display’s information (the system optionally provides audio feedback for confirmation). The purpose is not to

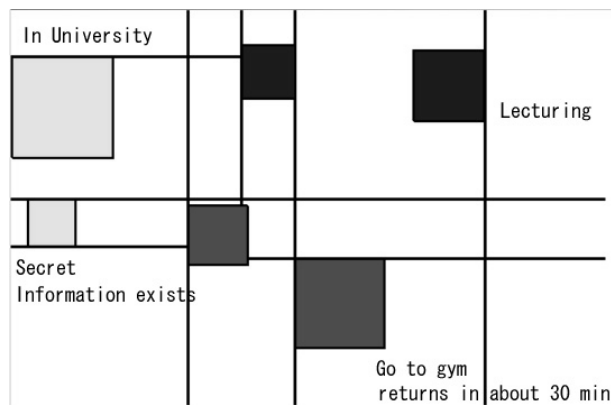


Figure 1: Door display, with system-generated explanation

track the position of the objects; the objects simply act as a simple way to determine where a faculty is going, without the need for a full tracking system such as the active badge system of [Want et al. 1992].

The RFID tags integrate the display into the environment of the user, but viewers may still have problems interpreting the image. Thus, we include one further sensor. It is a simple proximity sensor that detects when a person is within a meter of the display. This sensor allows the option of overlaying textual explanations on the screen to unambiguously describe what the image represents (as shown in the example of Figure 1.)

2 Physical System Installation

The faculty offices in our university face onto a communal corridor. The “wall” to this corridor is made of plain glass, so we created a display by mounting a projector on the ceiling inside the faculty office and projecting onto a Glass Vision display (a thin, holographic film) that pastes onto the inside of the glass. The Glass Vision screen is transparent when viewed from the reverse side, so it does not interrupt the field of view when seen from inside the room.

Inside the office, a host computer running a Java image-creation program is connected to the projector. The computer must always be on; we use a cheap laptop to minimise noise. Both the proximity sensor and the RFID reader are attached to the computer. The waveband of our RFID reader is 13.56MHz — a zone robust against ambient noise, unaffected by the human body and dirt. However, sensing distance for this waveband is only a few centimetres. This proved adequate for our initial system; indeed, it was suggested to us that the need to deliberately scan an object could be appreciated by users who do not wish to publicise some information (such as their going home early).

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3 Performance and Potential

Our system is still in the prototype stage, so the final form of an interface that allows users to configure the system to their needs is still being developed. We are working on an initialisation system that enables a faculty to match the information to display (timetable, time to return to room, amount of queued email, etc.) with position on the screen, and style (such as a square of increasing or decreasing size, a moving line, or different patterns of colour change). However, to evaluate our current system, we produced a simplified version in which the placing of the squares and lines is fixed. Specifically, we selected three main squares to convey information (see Figure 1):

- Upper left: Whether the faculty is at the University. Automatically toggles a square when detecting a tag attached to some object such as a briefcase that the faculty carries to and from work. The square size and colour do not change with time.
- Upper right: Time until faculty returns from a lecture. Initialised when detecting a tag (e.g., attached to a textbook). The quadrangle gets smaller at a rate by which the size will be exactly 0 when the lecture finishes, allowing for some tidying up and transit time.
- Lower right: Using the gym. A common activity for the faculty testing the prototype, who usually returns in about 50 minutes. When a tag (e.g., attached to a gym bag) is detected, a rectangle appears, and become gradually smaller until after 50 minutes it disappears completely.

The lower left quadrangle is also used, although it is not mapped to a specific meaning. A rectangle appears or disappears when a specified tag is passed by the reader. The intention is for the faculty to be able to use this quadrangle for whatever purpose they desire, for instance passing a message to a limited group. When the proximity sensor detects the approach of people, each quadrangle's meaning is shown using text information on the screen (as shown in Figure 1).

We conducted only a basic evaluation by leaving the display running and asking for feedback from 16 students that passed the faculty room in the course of an afternoon. Initially, most of the students could guess that the display was intended to convey some information, but none of the students could guess what this information was without an explanation. After explaining the display (either verbally or by moving close enough to activate the proximity sensor) we asked the students whether they thought a character-based display would be more effective, but they all said no, and many commented that the display gave the information understandably while being more stylish and visually appealing. Based on this feedback, we can begin to claim that our display is integrated into its environment and can satisfy viewers who look at it both peripherally and centrally. Future directions include increasing the number of sensors, a remote maintenance/customisation tool and integration with other software, such as mailers and calendars.

Finally, although Mondrian-like pictures are very suited to our work, we can also consider other variations of design. One example we suggest is *Karesansui* (see Figure 2). This is one of the styles of gardens in Japanese Buddhist temples. *Karesansui* gardens feature rocks surrounded by a “sea” of pebbles. This design rivals Mondrian paintings for simplicity, and information could be given to *Karesansui* images

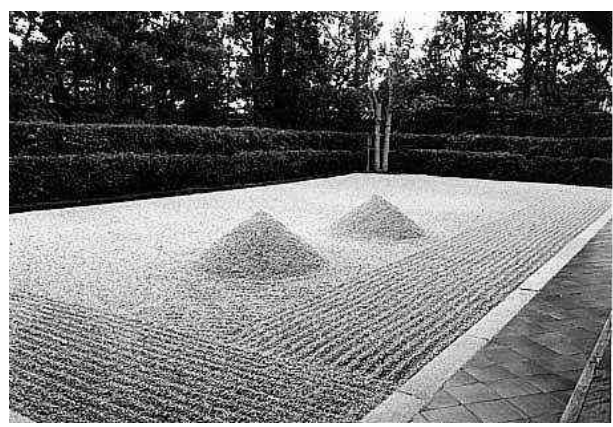


Figure 2: Japanese garden *Karesansui*

by varying the size and positions of rocks. This is also a contemplative, relaxing design. Another similar example is *Nishikigoi* carp in a pond. The patterns on the fishes' backs, their number, or their patterns of movement could be used to express information (e.g., when a faculty is busy, many *Nishikigoi* move quickly together). *Nishikigoi* ponds are often found in Japanese high-class restaurants or the gardens of high grade houses. So, such an image would also convey calmness and maybe also a high status.

4 Conclusions

We have developed an art-based office door display that integrates into its environment via an RFID reader and a proximity sensor. With this display, users can meaningfully communicate information to people who visit or pass by their rooms. We believe this union of user, viewer and information through art opens the door to further research possibilities.

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