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# Hello.Wall – Beyond Ambient Displays

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**ABSTRACT**
We present a ubiquitous computing environment that consists of the Hello.Wall in combination with ViewPorts. Hello.Wall is a new wall-sized ambient display [4,2] that emits information via light patterns and is considered informative art. As an integral part of the physical environment, Hello.Wall constitutes a seeding element of a social architectural space conveying awareness information and atmospheres in organizations or at specific places. The display is context-dependent by reflecting identity and distance of people passing by. Hello.Wall can "borrow" other artefacts in order to communicate more detailed information. These mobile devices are called ViewPorts. People can also further interact with the Hello.Wall using ViewPorts via integrated WaveLAN and RFID technology.

**Keywords**
Ambient display, informative art, social architectural space, context-dependent, sensor-based interaction, interactive wall, interaction design, mobile devices, smart artefacts, ubiquitous computing environment, calm technology

## HELLO.WALL AND VIEWPORT

Hello.Wall is a piece of unobtrusive, calm technology [3] exploiting humans' ability to perceive information via codes that do not require the same level of explicit coding as with words. It can stay in the background, only perceived at the periphery of attention, while one is being concerned with another activity, e.g., a face-to-face conversation.

### Borrowing another Artefact

We propose a mechanism where the Hello.Wall can "borrow" other artefacts, in order to communicate more detailed information. These mobile devices are called ViewPorts and can be personalized using short-range transponders. Due to the nature of the ViewPort's display, the information shown can be more explicit and it can also be more personal. Depending on their access rights and the current situation (e.g., distance to the wall; see below), people can use ViewPorts to decode visual codes (here, light patterns), to download ("freeze") or just browse information, to paint signs on the wall, or to access a message announced by a light pattern. See figure 1.

Figure 1. Interaction at Hello.Wall using ViewPort as „borrowed display"

## INTERACTION DESIGN

Interactions among the different components are supported by two independent RFID systems and a wireless LAN network to enable a coherent and engaging interaction experience. The RFID systems cover two ranges and thereby define three "zones of interaction": ambient zone, notification zone, and cell interaction zone (see figure 2). They can be adapted, e.g., according to the surrounding spatial conditions.

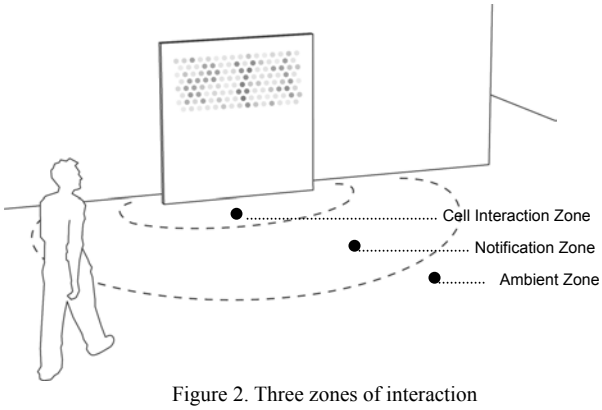


Figure 2. Three zones of interaction

The zones were introduced to define "distance-dependent semantics", meaning that the distance of an individual from the wall defines the interactions offered and the kind of information shown on the Hello.Wall and the ViewPort.

It should be noted that multiple people can be sensed at once in the notification and cell interaction zones.

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### Interactions

When people are outside the range of the wall's sensors (in the *ambient zone*), they experience the ambient mode, i.e. the display shows general information that is defined to be shown independent of the presence of a particular person.

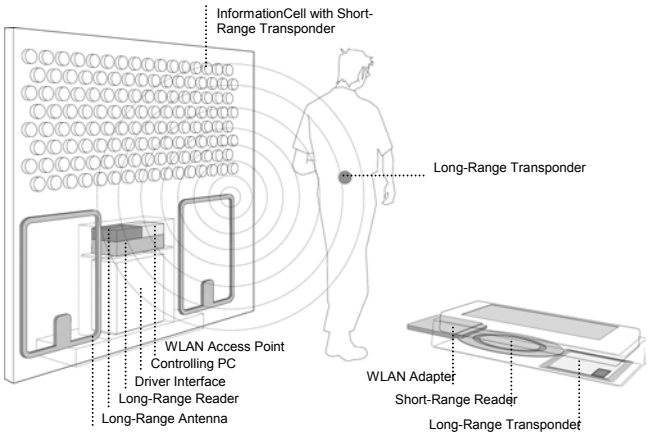


Figure 3. Communication and Sensing infrastructure of Hello.Wall and ViewPort

People within the *notification zone* are detected via two long-range readers installed in the lower part of the Hello.Wall (see figure 3) and people can identify themselves to a ViewPort via the integrated short-range reader. Once a person is detected in the notification zone, depending on the kind of application, data can be transmitted to the ViewPort and/or distinctive light patterns can be displayed for notification. These can be personal patterns known only to a particular person, group patterns, or generally known patterns. Within the *cell interaction zone*, people that are very close to the Hello.Wall can interact with each single cell (= independent interactive "pixel") or several cells at once using a ViewPort to read the cells' IDs. Simultaneous interaction using several ViewPorts in parallel at a Hello.Wall is supported as well. These features allow playful and narrative interactions and there is also a charming element of surprise that may be discovered via single cell interaction.

## TECHNOLOGY

Each of the 124 cells of the Hello.Wall contains an LED cluster and a short-range transponder (see figure 4). The brightness of the LED clusters is controlled by a standard PC via a special driver interface with control units using pulse width modulation. This interface also developed by us consists of 17 circuit boards.

The ViewPort is developed on the basis of a PocketPC with 32bit RISC Processor, touch-sensitive color display and 64MB RAM. Its functionality is extended through a short-range (up to 100mm) reader unit and a WaveLAN adapter. Additionally, the ViewPort is equipped with a long-range transponder. Thus, the ViewPort can be detected by stationary artefacts as, e.g., the Hello.Wall, while at the same time identify nearby artefacts through its own reading unit.

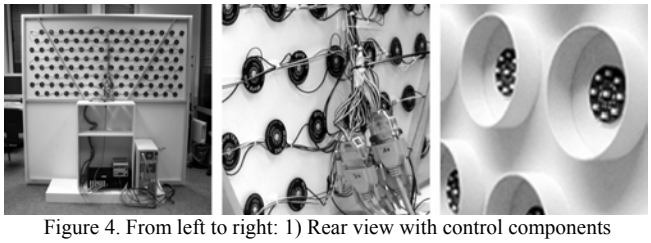

Figure 4. From left to right: 1) Rear view with control components 2) Wiring and transponders for each cell 3) Cells with LED clusters

## APPLICATIONS

Atmospheric aspects that can, e.g., be extracted from conversations [1] are mapped onto visual codes realized as light patterns which influence the atmosphere of a place and the social body around it. While the Hello.Wall serves a dedicated informative role to the initiated members of an organization or a place, visitors might consider it only as an atmospheric decorative element and enjoy its aesthetic quality.

Communicating atmospheric aspects of an organization includes general and specific feedback mechanisms that allow addressing different target groups via different representation codes. Individuals as well as groups create public and private codes depending on the purpose of their intervention. The content to be communicated can cover a wide range and will be subject to modification, adjustment, and elaboration based on the experience people have.

Sample applications are presented in the video. They include radiating the general atmosphere in an organization or at a place, distributing more specific and directed information, various forms of playful close-up interactions, and support for team building and coherence through "secret" visual codes mediating, e.g., acitivty levels among the team's members. To learn more about the acceptance of applications, we are currently running user experiments.

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