IN-Visible: Perceiving Invisible Urban Information through Ambient Media

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ABSTRACT

In this paper, we introduce IN-Visible, an urban system that enhances the contact between people and the subway. IN-Visible was conceived as a two-way system that brings users of the subway closer to the "exterior" urban environment and, through ambient media, provides walkers-by with knowledge about the subway, such as timings, motion, etc.

The intention is to reflect upon how, using ambient media, structural urban elements can have an adequate impact on the urban space and make that meaningful for potential users.

We propose one way of implementing this idea in the surroundings of one specific subway station and discuss ways in which the system may be generalized so as to serve other stations, trains and cities.

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General Terms: Design; Performance.

Keywords: Ambient Media; Urban Impact; Transportation; Subway; Visibility; Underground; Urban Elements; Communication; Urban Networks; Urban References; Awareness.

INTRODUCTION

The initial idea for IN-Visible came from the fact that urban activities take place within cities due to the existence of numerous structures that are usually invisible. In fact, the growth of cities has implied the use of the underground space as a container for valuable infrastructures. However, from an urban point of view, it is interesting, if not ethical, to make the important structural elements which the city is built upon stand out in order to have an appropriate impact on the urban space.

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Figure 1. Ground lighting sequence

Being the subway system a crucial network in cities, and considering that its presence in the urban space is somewhat insignificant, we argue that it is possible and reasonable to enhance computationally its physical impact on the urban space in order to improve its relation with users.

IN-Visible is a two-way system based on the use of ambient media that is intended to make the invisible visible. Essentially, it will enhance the presence of exterior references, such as buildings or squares, inside the train, and will make the motion of the train perceptible at the ground level so that users can be better informed about subway timings than with the mere timetables.

OBJECTIVES

In the past, several projects have explored the use of ambient media and computation to make people aware of non-perceivable phenomena. For example, Pinwheels [1] allowed people to visualize the internet information flow in real space. In the case of ambientROOM [2], several ambient media displays, such as waterripple shadow and air flow, were proposed in order to enhance people's awareness of the background. We believe that such uses of ambient media can be all the more meaningful as they refer to more traditional

Figure 2. Video display in underground space

phenomena, namely concrete urban phenomena. In the subway's case, there are three kinds of objectives that we intend to reach:

- direct usefulness in the short term: firstly, the fact that people inside the train are able to see what's above them at the ground level not only gives them concrete references and enhances their feeling of orientation, but also makes the ride more pleasant by simulating the outside world. Secondly, having the possibility to know through ambient media the subway's timings makes the whole subway system more efficient.

- indirect usefulness in the long term: the elements of the system will gradually become references of their own within the city.

- flexibility: the system should be flexible enough so that it can adapt to other subway systems. Namely, implementations of the system should integrate local cultural urban elements.

SYSTEM DESCRIPTION

In this section, we will describe the implementation of IN-Visible in the Boston subway system, more specifically in the Kendall/MIT station. As mentioned above, IN-Visible is composed of two parts: the interior one and the exterior one, whose outputs are respectively displayed inside the train and in the outer urban space.

Regarding the latter, the intention is to use existing urban elements at the ground level and endow them with computing technology in order to represent metaphorically the motion of the trains running in the ground. Usually, sidewalks in the Boston area are made of red bricks, and we believe that our purposes can be fulfilled by turning these into computer-activated elements that do or do not cast light according to the position and motion of the subway below. The idea is to start the lighting sequence of the sidewalk pattern (figure 1) before the train actually gets to that location. According to experiments made, it takes at least 45 seconds to go from the ground level to the train platform, and pay for the fare in the mean time. Therefore, we envision that a 1 minute and 30 second delay should be enough for users to go through that whole process comfortably and still catch the train.

The interior part of the system consists of the visualization of the "outside world" inside the train. The idea is to replace the glass windows with transparent screens that display motion pictures of the urban space above. As such, the feeling of disorientation that often affects users will be diminished because they'll be able to see exactly in what part of the city they are. The video will be pre-recorded, as presently it is too complicated to have real-time images of the environment above the subway's route. However, several versions of the video will be built so as to provide the user with visual information on time of the day and weather. Computer technology will collect information on the position and speed of the train, and use that information for displaying the video on the screens accordingly. We believe that this not only will make the ride more enjoyable (we just have to compare riding the subway when it's in the exterior and when it's inside a tunnel), but also more practical (figure 2). However, whenever the train enters a station or goes above ground level, the user should have access to the actual visual information from outside; therefore, since the video will only be displayed while the train is in a tunnel, we envision the use of transparent screens that can either display images or function as normal glass windows.

FUTURE DIRECTIONS AND CONCLUSIONS

Although video simulations were made and provided encouraging initial observations, in-loco experiments have yet to be made. While there is no simple way to simulate accurately the proposed system, we envision that a simulation based on the use of projectors that cast the exterior images on the windows of the subway could yield positive results and some feedback and critique from actual users. Regarding the outer part of the system, simulation would require longer term experimentation, as it consists of an urban element that people would have to get used to and gain confidence in order to work properly.

We believe that in time the design we propose can be greatly improved so as to serve better the city it belongs to. Firstly, the perception of the subway in the exterior urban space can be optimized if not only the surrounding space of the stations is considered but also the space above the whole subway's route (streets, squares, parks, etc).

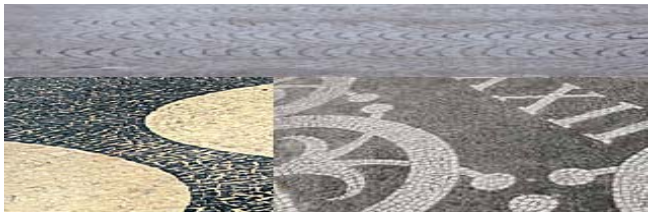

Figure 3. Sidewalk patterns in other cities

Secondly, as mentioned previously, this system is likely to be adapted to other contexts other than the one we discussed above.

As such, we believe that its implementation can benefit from computationally enhanced urban elements that have some meaningful relation to the local cultural and physical context (figure 3). Regarding the inner part of the system, the main focus on how to improve it consists of developing ways to display real-time live images instead of pre-recorded ones.

So far, research in the field of Human-Computer Interaction has mainly dealt with small and medium scale artifacts and spaces. We believe that IN-Visible will contribute for broadening the range of HCI by making it meaningful at extremely large scales such as the urban scale.

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