Coupling real and virtual environments

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Scope

Many people are continuously cooperating in several electronic environments. Electronic environments and physical world are intertwined. How to manage presence and interaction in and between the physical and electronic environments?

Introduction

Current trends in mobile computing postulate a highly networked future where a range of portable devices are interconnected via a global network of the form of the Internet. This move toward global connectivity of devices is mirrored in initiatives to provide data networks to the home. These trends suggest a considerable growth in massively heterogeneous networks that will allow a variety of devices in a wide range of situations to communicate. This arrangement will allow the use of these devices to be flexibly combined to support a range of human activities.

This interconnectivity will also see a closer meshing of the real and the virtual. The rapid growth in augmented reality and the development of smaller interactive devices will allow physical spaces to become increasingly computational. This growth in tangible electronic devices will be mirrored by the development of electronic spaces such as those supported by on-line virtual worlds. The next few years will also see these two spaces become increasingly intertwined such that wherever we are we will somehow be connected to an electronic landscape parallel to the real world.

Extensive adoption of information technology supporting co-operation and communication, and the increased importance of communication in work, as life in general, have made many people being present in the physical environment and the electronic environment simultaneously. Some examples are: a person leaving her avatar in the collaborative virtual environment while attending to a meeting, or someone keeping the door to the office open while participating in a video conference. This makes the physical and the electronic worlds intertwined and dependent on each others. Accordingly, these two environments, the electronic and the physical, could be considered as one large shared "cyber environment" within which people co-operate in several places simultaneously.

Real Environment → **Virtual Environment**

Cyber Environment

Figure 1. The relation between cyber environment, real environment and virtual environment.

To operate successfully in the cyber environment, it is important for people to be able to manage their presence and interaction in and between the physical and electronic environments. This means coupling the "environment in focus" with other environments within which one is present, e.g., to enable a person to stay aware of what takes place in a collaborative virtual environment which she participates in while leaving the workstation for a meeting. Information about what goes on in other environments than the one in focus, is probably only one way of managing one's presence and interaction when involved a range of environments simultaneously. How to provide people with such information is not obvious however. Because the focus is on another task, e.g., a meeting in the physical world, people must not be informed about everything taking place, the information must not be obtrusive, and so on.

Research Challenges

When trying to understand and design a cyber environment where the visitor feels as if he/she is present and has understanding of what is taking place a number of questions arise. The following are some of those

The cyber environment
We are familiar how things work within our physical environment, but the electronic environments gives the creator full freedom to create whatever he/she wants why we can not say for sure how things work within the cyber environment.

- What are the dimensions of cyber environments?
- How can the freedom of creation be used or misused?

Bridging real and virtual environments

- In developing transmedia environments what affordances can be provided that cross from the physical to the virtual and vice versa?
- What should be mimic from the real to the electronic environment?

The user and his/her actions
People will constantly change their focus between the real and the virtual environments. Also activities take place in both. Some resources are of more importance then others and of different importance to different users.

- How should people become aware of different activities?
- How do users manage the transition between the real and the physical?
- What support can ubiquitous computing and ambient media provide?

Access to resources

- Should all information be subjectively presented?
- What can be accomplished if information is presented objectively?
- What are the issues of privacy and security in locating users and resources in the electronic world?

Interaction between people

- How do you get someone else attention?
- How do you gain the attention of users without invading their personal space?

Mobility

- What forms of access to the electronic can be provided from mobile devices and how do they relate from desktop access?
- How do mobile users appear in the virtual world and what are the consequences of been located in both the physical and electronic world?
- What are the best forms to represent the simultaneous mobility of users and resources in the real and electronic environment?