

# The Equator 'City' Project

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City deals with the way that ubicomp technologies' integration with communications networks supports interaction between people in different locations and contexts where, by definition, they have different resources at hand. As they discuss and refer to contextual information, heterogeneity is inevitable: one person can use the non-digital resources of his or her location while others have only digital representations of that location. A case that is more easily handled is audio: each person will hear his or her own voice and sounds from other nearby sources differently to others, because of the digitisation and transmission of audio, but we have become relatively accustomed to handling this.

A much more challenging heterogeneity is that of people's position, orientation and gesture within rooms, buildings and streets. For example, a museum exhibition room may present much greater visual and tactile richness than the room's digital representations, e.g. maps and VR models. The City project addresses this inevitable heterogeneity in urban spaces by coupling media together, tracking activity in each medium and representing it in others, and so letting participants interweave these media in their social interaction. The project is about interweaving the digital information about a city with its traditional structures such as its street configuration and signage, and treating activity in streets, maps, VRs and hypertext as peers.

Set within the Equator Interdisciplinary Research Collaboration, project members from Glasgow, Bristol, UCL, Nottingham and Southampton are mixing mobile computers, wearables, wireless systems, hypermedia, recommender systems and virtual environments [1], in ways driven by theory of HCI and computer supported cooperative work, and by observational studies. We are exploring ways that people can interact and maintain awareness of each other, even though they may be spatially separated and using a variety of interactive media. Theoretical work considers the relationship between new and traditional media, and how system design might change to interweave media in order to support social interaction and interpretation. Field studies of cultural institutions have helped us understand the potential settings of use of our systems, and raised many design issues. And, of course, we have been building and experimenting with systems.

Last year we carried out user trials of a system involving three visitors to the Mackintosh Interpretation Centre, which is in the Lighthouse Centre in Glasgow [2]. The hypermedia and VR users were in other rooms, out of sight (and sound) of the 'Mack Room'. One person used a mobile computer, and had his or her position in the room tracked via U.

Bristol's ultrasonics [3]. The second visitor used text and 3D VR-style graphics, with co-visitors shown as simple avatars. The third visitor used text and 2D graphics. Hypermedia documents were automatically delivered based on a visitor entering a zone or location in the room. Each person could speak with the others, and each was shown the others' locations on a map or in the VR. The trials revealed the ways that people could get past the obvious differences in the technologies they had at hand, and to really have a shared visit experience where they focused on the exhibition rather than the experiment, and on their tasks and social interaction rather than the tools and system interaction.

This year we have been rewriting the system, extending it to cover more of the city, to offer asynchronous awareness between visitors, and to better support disconnection and uncertainty in communications and positioning systems. We have moved away from the experimentation with strong asymmetry in the media people use, and now offer a more symmetric arrangement where each person has 2D and 3D graphics on wirelessly-connected mobile computers. We continue to do field studies of city visitors, and to work on new design issues such as seamfulness—design that takes full account of the inevitable uncertainty and inaccuracy of sensing, wireless communications and modelling [4]—and the gradual accommodation and appropriation of ubicomp technologies by users, whereby users find novel and contextually appropriate ways to use, change and understand our technological designs.

## References

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4. Chalmers, M., MacColl I. and Bell M. *Seamful Design: Showing the Seams in Wearable Computing*. To appear in Proc. Eurowearable 2003, Birmingham, UK.