

Mobile Bristol

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Abstract

This paper describes the initial projects of Mobile Bristol, a collaborative initiative between industry and academia in Bristol, UK. Mobile Bristol is using the city space as a test bed for research into pervasive mobile computing and how context-aware information can add an extra digital dimension to augment physical surroundings.

Introduction

The Bristol Wearable Computing Project is a collaboration between the Computer Science Department at the University of Bristol and Hewlett-Packard Research Laboratories, Europe. To explore the potential of wearable computer devices and the integration of digital services and the physical world, together we have developed a suite of programs which use context sensing devices to enable relevant information to be delivered to the users of wearables.

Our current device is designed to fit in a jacket or bag. It consists of a small portable computer, batteries, a series of sensors and networking hardware that enables access to a wireless 802.11 network.

This wearable enables access to a city-wide project that we have set up called Mobile Bristol, a test bed to take our research from the lab and into the public space. We have installed an 802.11 wireless network around the city of Bristol that will allow us to develop projects to enable interaction with this urban space in new and exciting ways.

Ideas for uses of the wearables combined with the network include commercial, touristic and educational (see wearables.cs.bris.ac.uk). For our first set of projects where we have worked in collaboration with artists and content producers, we are creating soundscapes that react to presence, sending location-dependent audio files to the wearable user. The designer of each soundscape is able to locate a sound in a space, assign different sounds to a building or a bench, or a public art work, adding a layer of digital experience to the physical surroundings.

Our first installation was located in the atrium at HP Research Labs. "The Woods - a Year and a Day" by artist Liz Milner and musician Armin Elsaesser, is an audio augmented exhibition using pools of audio linked to large photographic images (<http://ginger.hpl.hp.com/hosted/mbristol/tliz.htm>) This first piece of work allowed us to test some of our concepts and develop software to be used when the research testing moved outdoors into public open space.

The three initial projects to be located in the city also use the atrium space at HP Research labs to allow the artists/producers to develop some of their ideas, and to allow for reflection by the software/hardware designers as to how

best to develop the interactive tools and the system infrastructure.

Project One: Millennium Square

Millennium Square is the location of one of our first outdoor projects, created in collaboration with artist Annie Lovejoy and composer/musician Roger Mills (www.herenorthere.org/msquare). There are two parts to this project, the soundscape, and the artist-designed wearable.

Millennium Square is a public space (45 x 55 metres) in the heart of Bristol's Harbourside, located outside Explore@Bristol, a hands-on science centre. In recent years the Harbourside has been redeveloped as a residential and leisure space. Millennium Square features a number of pieces of public art, such as water sculptures, a light installation (the Zenith), and statues of city notables such as Thomas Chatterton and Cary Grant.

The Millennium Square soundscape adds a layer of digital experience to the physical attributes of the square. This experience is only audible to the wearable user; the square seems silent to anyone else. The soundscape is located broadly in three areas of Millennium Square;

The Imaginarium is a huge mirror-tiled ball, part of the exterior of Explore@Bristol. There are a mixture of audio samples here that reflect the multi-culturalism and diversity of the city. These range from interviews and conversations to city sounds and music.

Around the water features there are sounds associated with water, such as children playing in the fountains, maritime histories, and sea shanties.

The light sculpture, Zenith, is located in the centre of the square and appears as 52 small lights embedded in the ground as an analemma. This figure of eight is used to represent the on-going collaboration between the artists from herenorthere and singers from Bristol's twin towns of Tbilisi and Hannover, by locating different pieces of music and voice around it. The wearable user mixes the tracks by the way they choose to walk around the analemma. Each user's path will be different, and the intention is that they collect a cd of the audio trail that they have created.

Mobile Bristol is providing hardware, software, technical support and access to the 802.11 network for the artists.

Project Two: Bristol Slave Trade Trail

This project is inspired by the Bristol Slave Trade Trail that was written by Madge Dresser, Coletta Jordan and Doreen Taylor to coincide with an exhibition at Bristol City Museum and Art Gallery. Available as a booklet, the trail takes the reader on a walk around the city, past buildings that have a relevance to Bristol's historical association with slavery. The

soundscape version of the trail will include a multi-layered set of narratives located around these relevant places that allow different historical voices to be heard as well as modern responses to the historical facts. Elements of the original gallery exhibition are being transferred to a website by Bristol City Council, and some of this digitised material will be available to the soundscape user. The Mobile Bristol project also plans to work with a local drama group and a youth film project to produce short video clips to be streamed to the wearable user.

We are interested in finding ways of furthering participation by allowing people to add to and augment the trail with their responses as they follow the pre-written histories. Interested parties working on the historical content include local historians, academics, artists, community workers and city council officers.

Project Three: A New Sense of Place

Much literature today focuses on the lack of opportunities for children to play safely without parental control and intervention. Young people become constrained to play only in spaces that are perceived as safe by the adults around them, and it is harder for them to develop a sense of the place that they live in if they can not explore their environment further as they grow up. We took this as our starting point; to explore whether young people would be allowed more free access to their local environment if we could use wearable devices to overcome parental concerns about child safety and mobility, and whether young people themselves would find the technology fun, interesting or useful.

The multi-disciplinary group includes researchers from HP labs Bristol, the University of the West of England (Community Information Systems Centre), Bristol University (Computer Science, Geography), and Futurelab (<http://www.nestafuturelab.org/>). We are using the common ground of the project to investigate a variety of concerns:

- the impact of wearable devices on young people's play, learning and interaction with their outdoor environment.
- the way that young people's personal 'maps' of their environment change depending on their age and gender, and if it possible to help them expand the areas they are allowed access to in order to create a new sense of place.
- working with young people as creative collaborators in the development of the project, rather than as end users of a product.
- how young people would like to use the wearable technology available now to augment their own environments, and what they would like to see as future developments.
- how can this technology be used to create a compelling experience.
- developing software so that the young people can use the technology to be as creative as possible with as little interference from adults as possible.

Workshop sessions have been run with two different groups of school students aged 11-12 building their own soundscapes, where they were able to record voice and music, and use pre-recorded music to augment a space. They created a variety of soundscapes, some music-based, others contained information or instructional elements, while some were based

on games such as a treasure hunt. We conducted a brainstorm with the school students to elicit their ideas about the future impact and potential of the technology. Our next plan is to take the technology into outdoor space such as school grounds, a park or a playspace, and enable young people there to create personal soundscapes.

Future Plans

Mobile Bristol aims to develop a secure and robust technical infrastructure that covers as much of the city as possible. In its first phase it is restricting the network to several key locations before it is rolled out across the city at a later date.

The projects described in this paper are using initial locations, such as Harbourside and Millennium Square, to test out the concepts as well as the technology. One of the aims of Mobile Bristol is to make the technology we are using as accessible and appealing as possible to a wide variety of users, so that they can use the systems without high levels of technical support. The workshops and collaborations with artists and content producers push the development of the software to be used for soundscape creation. At the same time there are researchers working on the technical infrastructure for Mobile Bristol, so that once it is both secure and robust enough, we will be able to allow greater levels of involvement to other interested parties who have ideas for collaborative, context-based interactive pieces of work.

We held a successful one day conference in Bristol at the beginning of 2002 which articulated the scope and potential of the technology to an invited audience, and where we showcased "The Woods - a Year and a Day" (<http://ginger.hpl.hp.com/hosted/mbristol/>). The conference generated expressions of interest, identifying future collaborative partners with a broad range of interests and backgrounds.

Mobile Bristol is continuing to develop the original three projects at the same time as identifying new projects that push different strands of the research. There are crossovers and links between the different projects, for example on the development of the application tools. Also, we are developing links with industrial and fashion designers who are interested in the 'packaging' of the devices and how to integrate the components into clothing.