HOSTS: AN INTERACTIVE CINEMA WORK IN PUBLIC SPACE

M. Rieser[1], C.Randell[2]

[1]Professor of Digital Creativity IOCT De Montfort University, UK, The Gateway, Leicester LE1 9BH UK
mrieser@dmu.ac.uk

[2] Visiting Fellow, Department of Computer Science, Bristol University UK, University of Bristol, Senate House, Tyndall Avenue, Bristol BS8 1TH, UK,
cliff@compsci.bristol.ac.uk

Keywords: Interactive, Cinema, Public, Art, Wireless

Abstract: This paper examines the concept, staging and evaluation of *Host*s: an interactive cinema work using ultrasound sensing and infrared sound transmission in the large public spaces of Bath Abbey. The work was based on the unique assignment of video characters to specific audience members, the characters moving from one projection screen to another in response to spectator movement. The authors consider the artistic and technical issues in mounting the work and analyze the nature of audience responses and the possibility of further the development of such work using locative technologies.

1.0 Concept

Emerging technologies of interaction and the changing nature of audience engagement present a radical challenge to Western narrative art in both its vehicles and traditions. Boundaries between established media forms (i.e. games and cinema) are thrown into question and the very concept of creative authorship problematised. In this context, *Hosts* explored the creative potential of interactive art and narrative forms in a site-specific 'free' or wireless public space. This project focused on new forms of public mobile art, where interaction has become 'untied' and spatialised (mapped onto real places or geographies).

2.0 Description

Hosts was an ambitious project inspired by the motif of Jacob's Ladder on the West front of Bath Abbey. It was shown in Bath Abbey Church between 9th and 27th February 2006.

Five giant screens were hung at strategic points of the Abbey space. Users wearing a special ultra-sound emitting badge and wireless earphones triggered the presence of a variety of evanescent projected video characters. As the participant approached a screen, these individual characters appeared to move forwards from a deep space and come into focus. By standing in front of a screen they were eventually be paired with and addressed directly with a series of aphorisms by their individual character. If the participant then moved on, the characters too would pass from screen to screen, keeping pace with them. In this way, once a participant had entered the installation, they too became part of the diegesis or story-space.

If a visitor stood for more than a few seconds in front of a particular screen, the figure turned in the direction of the viewer and returned the visitor[s] stare. The video sprite would look the visitor up and down, or turn away in seeming distraction, finally speaking in a series of poetic aphorisms, also seen as animated text on the screen. On a separate lateral screen evanescent figures were continually climbing up and down two ladders, mirroring the motif carved on the Abbey frontage. In this last part of the installation were pictured two adjacent vertical ladders, disappearing beyond the screen edges. On one ladder the characters were continuously climbing upwards and vanishing. On the second ladder they are climbing downwards from the top of the frame and walked off screen.

The piece was a reflection on human life and death, presence and absence. The "Hosts" could be taken to represent a variety of presences: from the angels of Jacob's Ladder, to the spirit of people who had earlier inhabited the same space, or even be seen as fragments of an individual mind. The emotional mood varied from calm statement to private and painful irony and the encounters change depending on a randomised selection sequence for the video sprite characters and sound sequences.

Figure 1 Hosts installation

Hosts combined poetry, performance, animation and cinema in a unique blend. The words of the spoken and animated aphorisms seem to be apparently those of humans, fraught with ambiguity and misunderstanding. The participant was captured by the characters and drawn into their drama in the same way that an unwilling captive passenger in a train can be given someone's life story. This is not always a comfortable experience. *Hosts* was intended as a spiritually enhancing experience for a public audience, not usually drawn to a media art gallery.

3.0 Thematic

The main direction of my recent work has been in examining the nature of theatrical and interactive installation spaces where poetry and performance can be re-imagined as a part of a hypertextual universe. In pursuing this direction we attempted to synthesize aspects of cinema, video art and more primitive and associative spaces to create a narrative form based primarily in a physical environment, rather than a virtual one. In my previous installations a directly theatrical approach to audience evolved, here, as in my *Understanding Echo* installation, is an attempt to root interactive narrative in a magical space corresponding to a

part of the audience's 'collective unconscious', where "memory, dreams and reflections" could rise to the surface. But, as in the subsequent *Triple Echo*, direct address is a way of *excluding*, as well as *including* the audience.

The textual aspect of this work may be reminiscent of a number of approaches pursued by other artists in this field from Barbara Krueger to Jenny Holtzer. It is in fact quite different. Where these artists have adopted and subverted the genre of the advertising slogan to magnify the impact of their words, I deliberately adopted the opposite approach: integrating discrete and dynamic textual elements in ways intended to recall the inscription of texts celebrated in religious works when the word of God is made manifest; except that here the words of the aphorisms are those of humans, fraught with ambiguity and misunderstanding, without authority. Perverse and fragile they hover between the portentous and the mundane, inflected over and over into different meanings by the video characters. An auditory *palimpsest* is created in the mind of the audience, with one phrase overlaying another.

In the treatment of the video are echoes of Bill Viola and even Tony Oursler. However, the form of the interaction breaches the hermetic world model of those artists: spatialised narrative and the poetic monologue are fused together in the environment of the piece. Once an audience entered the installation they were part of the diegetic space and were continually addressed directly or obliquely by the characters, who followed their chosen target from screen to screen across the space. This strategy evolved out of the concept of "sticky" video, also explored in *Triple Echo*, where the audience is adopted not so much by characters, as by the text, in which words follow them from screen to screen, but also issued through the mouths of three characters in very different forms.

Language is central to the work both as spoken address and as inscription. What fascinates me is the way inflexion alters meaning and the same text can become a very different communication when spoken in different ways by different characters. The advent of new media has enlarged our understanding of the text and underlined aspects of Barthes's famous concept of the 'death of the author" in many new ways. The meeting and changing meaning of texts in and through the audience reception is planned to be taken to a new stage by further locative aspects of the project

across the city of Bath, where avatars using location and aphorism will be matched to generate new associations and reveal histories of the city, which are distinctly "unheimleic".

4.0 Further Phases

GPS enabled PDAs and location polling will be used to map the video sprites on to a large area of Bath. They will emerge on screen and speak when triggered at concealed locations, following participants around the city. A website will enable further aphorisms to be submitted by the public and mapped to locations. Participants will be able to create an animated 3D avatar simply by submitting a portrait photo and text via their mobile device. Collaboration with Bath University Computer Science department and E-mobiLArt is anticipated for this phase of the project.
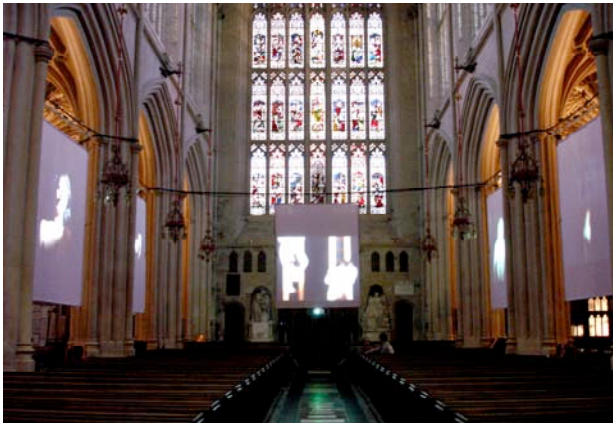

Figure 2 General view of Abbey with screens

5.0 Research Methodology

Hosts was part of a larger AHRC funded research project *The Mobile Audience* which looked at the changing nature of audience engagement in mobile and locative Artworks, of which *Hosts* formed a two-stage experiment dealing both with situated (Hosts in the Abbey) and in the later phase, locative and mobile forms of delivery. The nature of free audience interaction in public space made possible by new technology and the degree of engagement with subject, understanding of the implied interaction, and the distraction or relevance of the technology to the artwork, were all examined via an exit questionnaire.

The potential for the new visual and auditory languages and strategies of narration was tested by the fixed installation. The key research question was how such work might alter the mode of

audience participation and reception? Where the physical space overlapped the space of diegesis, could this emergent space for art and performance create new perceptions of familiar space and place in an audience? The qualitative audience reactions were used to test these questions.

The difficulties of mounting such an ambitious work in a public space in continuous use meant that some of the answers were at best partial, compared to controlled tests in closed environments, but this in turn raises another set of questions about the best methodologies for examining this hybrid border between art and technology and the appropriateness of the available tools for evaluation.

6.0 Delivery

The project utilised ultrasound-tracking software to detect human presence and its duration in allocated space zones, corresponding to the screen areas. Information was passed to control computers, which co-ordinated the video feed to individual projectors from networked machines. The presences were filmed on high definition digital video and transferred as QuickTime files to their hard drives.

Vertical screens were placed at strategic opposite points of the Abbey. A visitor triggered the presence of the video characters through the use of positional detection devices (Ultrasound Chirpers) and interpretative software. A 3D audio landscape of *a capella* tonal voices accompanied the visitor between the screens on infrared wireless headphones and formed a changing audio landscape. The artist worked with composer Richard Barnard and singer Angharad Thomas on this aspect of the piece.

7.0 Visitor Tracking.

7.1 Requirement.

The Hosts installation required that visitors to the Abbey were recognised as they stood in the central aisle looking towards the screens hung on either side of the nave. A number of technical solutions were considered. A camera viewing the appropriate area for each screen combined with face recognition software could provide a possible solution [1]. This approach was rejected as research indicated that this would present challenges involving control of the lighting in the

Abbey, simultaneous multiple face recognition and the likely generation of false positives.

Alternative solutions demanded a combination of heading and position detection requiring the users to wear a tracked device or tag. Several technologies were considered to meet this requirement. Firstly RF beacons were considered. A Bluetooth receiver behind each screen could detect devices in front of the screen [2]. This approach would not be able to determine which direction the visitors were facing, and also would be affected by the density of visitors with significant latency.

Secondly infrared beacons were investigated. A sensor on the screen could detect a body-worn infrared device. The directional properties of the device would determine if the visitor was looking at the screen, and a simple code would identify the visitor [3]. Typical IR devices have a narrow angle of transmission (up to 45 degrees) and have to be pointed explicitly at the receiver to enable communication. Multiple devices can be employed to widen the transmission angle, however in this case where the target screens are adjacent to each other; there was likelihood that the wrong screen could be triggered.

The final technology we considered was ultrasonic. This provided a similar configuration to an IR beacon with the added potential of carrying out time-of-flight measurements to enable positional measurements to be made. The directional characteristics of ultrasonic transducers were also more appropriate with transmission angles of up to 120 degrees. The drawback was the speed of operation limiting the amount of data that could be transmitted over an ultrasonic link, and the potential for interference between devices. These factors were not considered to be significant as only a small number of visitors would be using the system at any one time, and the pace of the experience did not demand a fast response. A system designed by the University of Bristol was chosen as a starting point for our experiments [4].

7.2 Development.

The original design featured a 'chirper', which generated three ultrasonic pulses whose precise timing provided an identifying code. The pulses were between 30ms and 40ms apart in 2ms preset steps providing a total of 36 possible combinations. The repetition rate was determined using a prime number algorithm in order to minimise collisions. The chirpers were able to be worn as pendants,

and were powered by two button cells which ran continuously for over one month without replacement. They are shown in Figure 2.

Figure 3 "Chirpers"

A network of six transducers, placed around the relevant screen, received the ultrasound pulses. These were connected to a PIC microcontroller, which recorded the times of arrival of the pulses. The timing data was sent from the PIC to a *gumstix* single board computer. The data was processed using a least-squares minimisation process and the Levenberg-Marquardt algorithm [5] to give 3D positioning with an accuracy of greater than 10cm. A range limit of 8m was to prove problematic in the Abbey installation. The tops of the projection screens were 6m above the floor, and the visitors around 5m from the screens. This meant the tracking system was operating at its limits and consequently was unable capture sufficient data to perform reliably.

However the 3D tracking solution was beyond the requirements of the Hosts application. The visitors were constrained to the central aisle of the Abbey, and we are only interested in their position along this aisle. The problem thus became single dimensional and could be solved using only two receiving transducers positioned at the bottom of the screen, 2m above the floor. This eliminated the need for the use of high level processing in the *gumstix* and a solution could be found using simple geometry implemented in the microcontroller. The area of coverage for a single screen is illustrated in Figure 3. Within the aisle the accuracy was greater than 15cm.

In order to minimise the cabling in the Abbey the tracking receiver units were initially connected to the main application computers, (Apple MacBooks) using the Bluetooth (BT) serial interface. This configuration was attempted both with the *gumstix* integrated BT module, and using external serial BT dongles with the microcontroller only implementation. While the performance was satisfactory with a single screen/sensor in

operation, it became increasingly difficult to add further connections as additional screens were brought into use. Indeed it became impossible to activate four systems simultaneously. We assumed that this difficultly was caused by the frequency-hopping feature of Bluetooth. A hard-wired cable solution was eventually implemented on the day of opening!
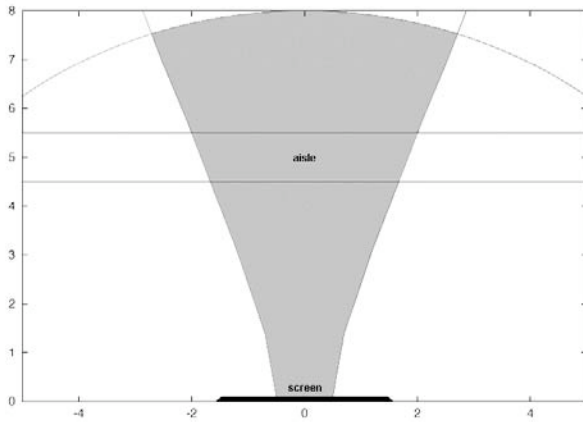

Figure 4 Single screen coverage

8.0 Evaluative Methodology

Video and photographic evidence was collected throughout the screening of Hosts. All visitors who participated in equipment loans were asked to write commentary and an exit poll of users via a questionnaire was also collected.

8.1 Qualitative Reactions to Hosts

The comments from users were overwhelmingly positive as evidenced both by anecdotal evidence and visitor book commentary. Quotes such as *"Inspiring and magical experience"*, *"Magical, calming, beautiful"* and *"Ethereal and far more worthy of the Turner Prize than the recent recipients"* were matched by occasional caveats such as *"Potentially interesting but interaction unclear"*. But downright excessive appreciation was evidenced in more than one entry: *"I found I didn't want to leave. I was captivated and moved by it. A real experience with impact and emotion. I felt that a guardian angel was guiding me. Brilliant."* and *"Think it's totally brilliant, mesmerizing and brilliant innovative use of wireless video and technology. Can we have more and more innovative stuff in Churches and the Abbey?!! Love the voices and the actors-*

everything just right. Thanks…" and more the gratifyingly thoughtful: *"Level of absorption increases with time."*

8.2 Quantitative Reactions to Hosts

The quantitative data was collected from a small, but representative exit sample of 18 out of an audience of 450 listed participants who had used the full headsets and Chirpers (It is estimated that the more general audience of spectators was at least 4500). The logging of all participants using the equipment revealed an average engagement with the work of 15-20 minutes. Participants in the detailed survey answered questions positively on the technology's ability to enhance their experience (over 75%-see Table 1). In terms of feeling in control of the experience, the results were less definitive- 40% felt this to be true and a further 55% felt it true *in parts* of the experience.
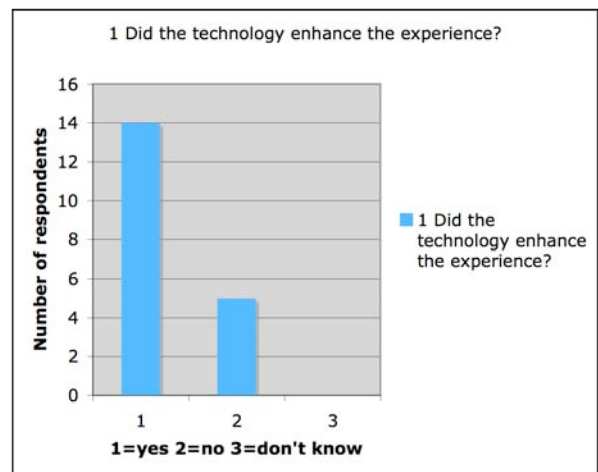

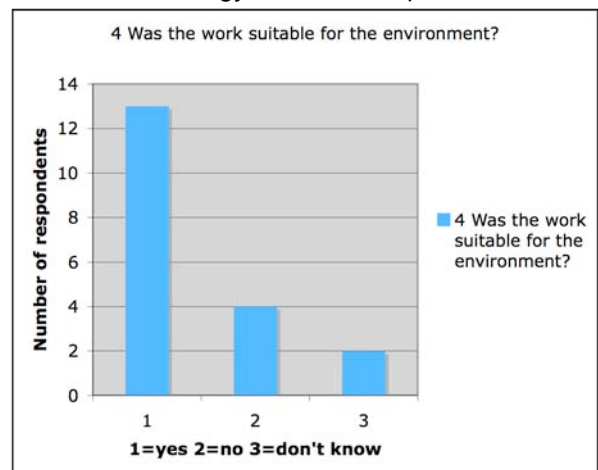Table 1: Technology enhanced experience

Table 2: Suitability for the environment

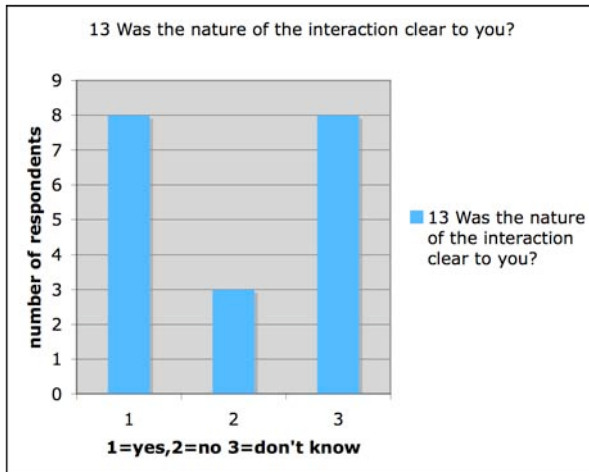**13 Was the nature of the interaction clear to you?**

Table 3: Clarity of the interaction

The sound quality of the mobile headsets was variable, but only 10% felt it had ruined their experience, the vast majority (65%) felt that it "sometimes" interfered. Just over 40% felt that the nature of the interaction was sufficiently clear, with a further 40% believing it to *partially clear*.(see Table 3) In terms of being aware of other people's interaction only 30% felt that they had been, making the experience very much an individual one. As to the aphorisms being "thought-provoking", 47% thought they were and a further 38% thought they "sometimes" succeeded. Nudity was definitely no issue and the vast majority considered themselves as regular gallery-attendees and, encouragingly wanted to see more work of this type in the Abbey church (65% - see Table 2)

9.0 Conclusions

Hosts was a successful attempt to engage a general audience in a complex public artwork, catering for passive observers and active participants alike. The sensor technology worked reliably for the duration of the exhibition, after a long period trying to use and then abandoning Bluetooth transmissions. The environment of the Abbey was a difficult one, with religious services necessitating the removal of screens by a folding and pulley system at regular points in the month. Small adjustments to content during the exhibition, such as shortening the "idle" period of unrelated video movement before the Host locked on to the wearer of the ultrasound device, helped the user to relate to the material and engage with the personal nature of the work. The exit polls were taken after these adjustments. Surprisingly the random sound cutouts from the infrared line-of-sight wireless headphones, which were inadequate, largely due to budget constraints, had less effect on the quality of the user experience than anticipated. The lack of time to test *in situ* was a major drawback, but one to be expected in a non-gallery environment. *Hosts* relied on directed interactivity, but although the clarity of interaction was not immediately obvious to all of the audience, this did not result in a reduced experience, in fact the technology was still seen as enhancing the artwork. The qualitative comments reflect that it was a strong and positive experience for most users, with the art to the foreground rather than the technology. *Hosts* should be seen therefore primarily as a multidisciplinary artwork which functioned well in its situated context, based on a complex technology, which was also able to communicate at a level of meaning and experience, which reduced that technology to a simple matrix of support. It could also be seen as a successful collaboration between actors, artists, musicians, animators and computer scientists and engineers, which raised difficult questions about the means to evaluate such trans-disciplinary research.

Endnotes

[1] W. Zhao, R. Chellappa, A. Rosenfeld, P.J. Phillips, Face Recognition: A Literature Survey, ACM Computing Surveys, 2003, pp. 399-458.

[2] O'Neill, E., Kostakos, V., Kindberg, T., Fatah gen. Schiek, A., Penn, A., Stanton Fraser, D. and Jones, T. (2006). Instrumenting the city: developing methods for observing and understanding the digital cityscape. UbiComp 2006, pp. 315-332.

[3] R. Want, A. Hopper, V. Falcao, and J. Gibbons, "The active badge location system," ACM Transactions on Information Systems, vol. 10, pp. 91-102, Jan. 1992

[4] Paul Duff, Richard Swinford, Michael McCarthy, Angus Clark, Henk Muller, Cliff Randell, Shahram Izadi, Andy Boucher, Andy Law, Sarah Pennington, A New Method for Auto-Calibrated Object Tracking. Proceedings of the Seventh International Conference on Ubiquitous Computing. pp. 123–140. September 2005.

[5] J. J. More. The Levenberg-Marquardt Algorithm: Implementation and Theory. In G. Watson, editor, Lecture Notes in Mathematics, v630, pages 105–116. Springer Verlag, 1978.