# *Time Telescope*: Encouraging Engagement with Heritage through Participatory Design

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**ABSTRACT**
*Time Telescope* is a site-specific digital art installation which allows viewers to explore an area of the city of NewcastleGateshead at various points in history. The installation formed part of a project in which a participatory interaction design process was used to engage young people with the heritage of their local area. The telescope itself and the project through which it was designed is discussed in relation to the goals of the project and its impact upon the young participants.

**Author Keywords**
Participatory design; cultural and architectural heritage; digital art; interaction design; rapid prototyping

**ACM Classification Keywords**
H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous;

**INTRODUCTION**
*Time Telescope* is a site-specific interactive digital artwork which uses video and animation to allow the viewer to 'look back in time', surveying an area of the conurbation of NewcastleGateshead at different points in history. Designed and built by local young people and installed on the viewing deck of the BALTIC Centre for Contemporary Art, the telescope and the design project during which it was built were designed to form a focal point for engagement with the architectural and cultural heritage of the area.

Time Telescope was built during a year-long project during which a combination of approaches from HCI design and art installation were used as framing devices to help the young participants engage with cultural heritage themes. Over the course of the project, existing participatory design approaches were extended by allowing the young people to participate in every stage of the design process, from planning and specification, to prototyping software and hardware to final fabrication and installation of the device through drawing upon recent advances in rapid prototyping technologies.



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**Figure 1. *Time Telescope*, installed at BALTIC**

**BACKGROUND**
BALTIC is an internationally renowned art gallery, sited on the banks of the river Tyne. Housed in a converted flour mill, it is one of the tallest buildings in the area and since its opening has been one of the principal visitor attractions in the North East of England. The Tyne gorge, in which the gallery stands, is a dramatic post-industrial landscape, dominated by 7 bridges, and rich in traces of the ship-building and coal-mining industries which were once the principal activities of the city.

BALTIC has, since its opening in 2002, maintained strong connections with the communities around it through an active arts education and outreach programme. This engagement with the local community and connection to the city is considered vital to sustaining both the gallery itself and the arts community in NewcastleGateshead. As the gallery has no permanent collection relating to the area, the organisation often draws upon the iconic status of the building as an engagement tool, with architecture and heritage tours, and art workshops relating to the building a common feature in its programme of events: however, engaging young people with the heritage of the area was considered a particular challenge.

Digital technology been successfully used as a tool for engagement with local heritage [1] and it seemed likely that focusing a heritage engagement project on a digital installation might help engage younger audiences in particular.

## RELATED WORK

In recent years, museums and cultural venues have begun to experiment with participatory design as a tool both for directly engaging communities of visitors and for designing more effective exhibits [2],[3]. Typically these projects involve participants and designers working together in the early phases of a design project to produce low-fidelity prototypes and specifications, which are then resolved by professional designers and/or fabricators [4]. Configuring the specifics of the design process to the needs and abilities of participants is often a focus of this type of approach [4]; however, in most cases, participants are excluded from the final design and manufacture of resulting artefacts [5].

The *Time Telescope* project attempted to increase participants' level of engagement by including them in the entire design and production process, from initial specifications through to assembling and installing the installation and curating a surrounding exhibition, building on approaches by Gaye and Tanaka [5]. This was achieved by relying heavily on recently available methods of rapid prototyping and fabrication in order to allow the participants access to all aspects of the building process.

## DESIGN

As discussed, the goal of the *Time Telescope* project was reasonably straightforward: to encourage young people to engage with the cultural and architectural heritage of their local area. A secondary goal was to strengthen the gallery's links to its younger audiences. Besides these engagement goals, emphasis was placed on enabling the participants to use the project to develop skills which they felt would be useful to them. This approach was designed into the process partly as a reward for their participation: by allowing 1-1 access to an experienced digital artist with an unusual skillset.

BALTIC recruited a group of volunteers to work on the project, largely through direct contact with various audience groups, including volunteering associations, local art groups and through approaching visitors to the gallery. 9 participants were recruited with ages ranging from 16-22, of which 8 were female and 1 was male. All of the young people recruited expressed a strong interest in the arts and all professed to having little knowledge about their local area.

Weekly sessions were scheduled over a period of 9 months. The participants were first presented with a brief in the form of a location (the viewing deck) and a format (that of the type of coin-operated telescope often seen at tourist venues, but one which could look back in time). From this starting point, the design of the telescope installation was conceived as interpretive: a way of discussing and learning about the architectural heritage of the vista visible from BALTIC's viewing deck. How the telescope might work, the technologies, techniques and materials used in its construction and - most importantly - its heritage content was left up to the participants.

Each building and learning session was led by a digital artist (the author) whose role it was to facilitate discussions, coordinate the various tasks involved in the design and production of the installation and train the participants in the skills they identified as necessary to build the device and its content. The goal was to allow the participants maximum freedom to explore the subject matter while also learning and applying new skills in craft, design and technology.

Early in the project, these sessions were largely dedicated to research. Initial group sessions involved field trips 'into the frame' including tours of the quayside by a local history society and walks around the area visible from the viewing deck. The local history group was able to provide archive photography, historical maps and artefacts from various periods. The exact venues for this fieldwork were often determined by the young people; for example one girl was keen to include a prehistoric vista, which necessitated a visit to a local natural history museum to look at carboniferous fossils from the area.

The participants then began to design the installation, starting from what could be seen from the viewing deck and using their newly-acquired knowledge to reconstruct this vista at various points in history. The arrival of the various bridges in the scene was suggested by one participant as a factor which could determine the selection of time periods (NewcastleGateshead's significance throughout history as a crossing point on the river Tyne meant that a bridge had existed in roughly the same place since Roman times). After selecting a number of time periods which seemed both reasonable in scope and sufficiently exciting to make, the participants used large scale (A0) drawings to lay out the various tableaux, gradually filling in the locations of modern buildings with period structures and props.

As the content of the installation was taking shape, the participants also began to plan what form the telescope would take. Initially, this was a daunting task as none of the participants had experience with programming or interaction design: the young people were encouraged to forget about what they thought might be technologically feasible and focus on how visitors to the gallery might experience the work, borrowing strategies from Reeves, Benford et al. [6]. In a series of discussions, they were asked to consider how the device might entice visitors in, how they might interact with the installation and how to quickly impart the knowledge they had learned through the device.

Designs were drawn up on paper and refined over a period of several months. From an early stage, the group was keen to keep the interaction scheme simple and intuitive, with the device mimicking a real telescope wherever possible. Once a form had been established that the participants were happy with, they constructed a full size cardboard mockup to see how the device would work at scale. Materials and forms were then selected which the group thought

referenced the industrial heritage of the area but would also be safe and robust enough for visitors to use. With the author's guidance, a simple electronic system was designed to map rotation of the telescope to changes in the view through the eyepiece and the participants experimented with Max/MSP/Jitter in order to devise software to run the video output of the work.

For the video content of the piece, asset lists of figures, animals, vehicles and props were drawn up and the participants allocated roles amongst themselves as to who would create which elements. The young people used fieldwork and archive research to reconstruct well-known features such as the city walls, the roman and medieval bridges and the changing landforms, using a combination of Photoshop, After Effects and 3DS Max. The finished telescope was exhibited for 3 month at BALTIC and was complemented by an exhibition about the project, curated by the participants.

## TECHNICAL DESCRIPTION

*Time Telescope* was built using a combination of small-scale industrial fabrication and rapid prototyping techniques. The frame of the installation was constructed from 5mm aluminium sheet, plasma cut into profiles resembling struts in an aircraft's wing. These profiles were bolted into place using threaded steel bar. This construction was planned to allow ease of construction by the participants who had little experience of engineering. The telescope could be entirely assembled by the participants with simple hand-tools.

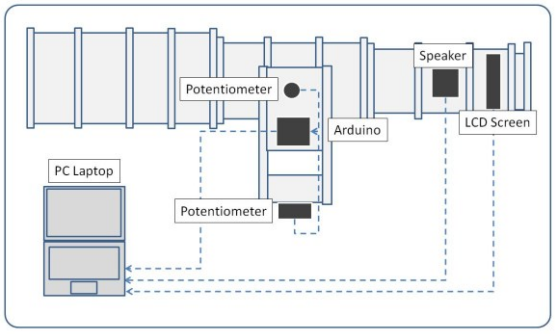


**Figure 2. The telescope's component parts.**

A thin polypropylene skin covered the device which was mounted on a modified stage lighting tripod. Details such as the time dial and eyepiece were adapted from junk parts, being respectively built from parts of a motorcycle clutch and a magnifying glass. Title plates on either side of the barrel were designed in 3DS Max and printed in ABS plastic using a Dimension 3D printer.

The telescope's tilt and yaw were measured by potentiometers in the tripod's pivots, as was the position of the time dial, connected to a PC laptop via an Arduino UNO. This laptop also provided video output: the vista could be seen on a small LCD display behind the lens of the eyepiece.

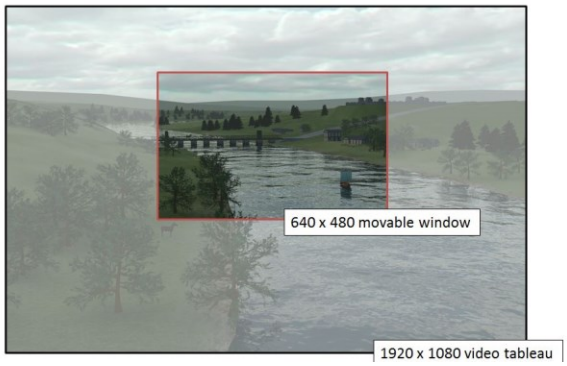


**Figure 3. Visitors see a cropped version of each image, which moves depending on the scope's position.**

This visual output consisted of 5 1080p HD video tableaux, each 1 minute long, of which the viewer saw a small cropped window. Max/MSP/Jitter was used to translate the movements of the telescope's pivots into cropping of the video, allowing the view to move with the telescope. Max was also used to fade between each video depending on the position of the time dial. The videos themselves were composed from archive photographs, green screen footage of the participants in period costume and 3D CGI animated elements made using 3DS Max, Photoshop and After Effects.

## DISCUSSION

The *Time Telescope* project was structured specifically to allow the young participants to engage with cultural heritage themes on their own terms, while acquiring a wide range of new skills including animation, engineering, rapid prototyping, sound design and exhibition curation. After an initial period of reticence, the participants all gained in confidence and began to initiate interesting discussions about the subjects discussed. The digital artist's role in each session was largely to advise on technical aspects of the work and to help keep the discussion on-topic during particularly exuberant conversations. Despite the complexity of some of the tasks involved (3D design of the buildings and landscapes in 3DS Max was found to particularly challenging), the participants engaged with each phase of the project with enthusiasm and were keen to demonstrate their own existing art skills: for example several were already capable Photoshop artists and were able to lead the montage and video matte creation phase of the work.

### Engagement with Heritage

Framing the project around a piece of interaction design was successful in supporting engagement with the cultural and architectural history of the city, with each phase of the telescope's design sparking discussions about the heritage of the area. Over the course of the project, the participants discussions became embodied in the telescope artefact: for example, the group decided that materials and forms chosen for the telescope should reflect the materials and forms of the bridges: this led first to a photography trip to examine

the structures of the bridges and eventually to the design of the steel and aluminium forms in the telescope's barrel. Likewise, the participants' discovery of reliefs of the god Tyne on the roofs of buildings on the quayside led to them working the figure's image into the panels on the side of the device.

The participants all reported acquiring new knowledge about their local area, but more importantly, several commented that the project had changed the way they thought about the city and increased their appreciation of their local heritage. One girl commented,

*"...it was really eye opening to see the culture that surrounds you every day but also the odd part you might miss. The little staple marks engrained in the everyday buildings we walk past and may not look at.." - Participant*

The group responded particularly well to the contact with the local history society and in some cases were themselves surprised at how involving the research became. One girl joked that she was now unable to visit local sites with her friends without recounting the history of the area.

"*I find myself telling the stories that I've been told when walking around, passing on the information to the next person who will then meet someone else in which they will be able to share it with." –Participant*

This engagement was strong enough that towards the end of the project, several of the participants began to volunteer at local heritage venues in order to continue their research.

### Acquisition of Skills

The variety of tasks involved in designing the telescope meant the participants were able to both develop existing technical skills and acquire completely new ones. Several members of the group gravitated towards particular disciplines, in some cases confounding their own expectations. One girl, who professed a hatred of electronics and programming at the beginning of the project, asked for advice afterwards in obtaining her own Max/MSP/Jitter license in order to begin making her own interactive art pieces. The only boy in the group (and its quietest member) developed an interest in 3D animation and became confident enough to take on the role of designing many of the buildings and props.

Many of the participants were studying for examinations while taking part in the project and several stated that the experience of building the telescope had allowed them to extend their skillset in a way that immediately benefitted their school or college work.

*"I wanted to broaden my skills and learn totally different skills in sculpture, photo editing, and 3D animation, and also to work on a project that combined art and history in a way that could influence future projects I do." - Participant*

Months after the project's end, one girl who subsequently applied for an art college course reported that she had cited the project during her interview as an example of digital art production that she felt had contributed substantially to her development as a young artist.

## CONCLUSION

Framing a heritage project for young people as an exercise in interaction design was successful in establishing a self-contained space for enquiry, which allowed self-directed, guided and group-directed learning. Asking the group to interpret the heritage of their local area through an interactive exhibit allowed them to break down a complex domain into manageable and stimulating tasks.

This was successful, firstly in imposing a natural schedule and structure to the project that required little maintenance by the digital artist leading the group and secondly in allowing the young participants to take ownership of the work through comprehensive participation in all phases of the design process. It is suggested that this approach could be used to increase engagement and investment in a wide variety of domains, from cultural heritage to mainstream education.

## ACKNOWLEDGEMENTS

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