



INITIAL PLAN:

THE STONE, THE MERMAID AND THE PAINTER



ABSTRACT

**PROVIDING A CUTTING-EDGE SOLUTION TO
TOURISM CHALLENGES FACED BY A REMOTE
HIGHLAND VILLAGE. USING AUGMENTED
REALITY TO PROMOTE ITS RICH HISTORIC
PROVENANCE.**

CM3203: INDIVIDUAL PROJECT

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AUGMENTED REALITY DEVELOPMENT PROJECT – THE STONE, THE MERMAID AND THE PAINTER.

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OVERVIEW

1. Project Description and Background

i I live in the village of Hilton of Cadboll in the Highlands of Scotland, which boast the standing place of the largest cross-slab standing stone found in 800 A.D. The stones are linked to both Christian and Pictish villages built to support the old village of 'Hilltown'. The stone itself (found in 16th Century and discovered in early 19th Century) has been removed to Edinburgh museum and hold pride of place in the entry to the Pictish and Early years level. However, the broken base of the stone is situated in a local community Hall. The site itself also hosts a very early chapel site which has not been excavated.

The site is very popular with tourists and visitors alike however, there is limited access to the site and the site has little or no information on arrival. My aim is to create an augmented reality tool that can be used via a mobile device to offer graphical/multimedia information to support the local Hilton Historical Trust. This would bring to life the current historical information about the site and location via the use of AR technology and allow for the placement of QR code styled signposts to encourage information gathering. The Historical Trust is looking for an ecological low impact solution to encourage younger audience and families to visit the site – alongside the tourist visits. There is no funding for a heritage site, or for personnel to man it - so augmenting a computer solution would be of benefit to this local community.

There are very few examples of this technical approach in tourism. Given the novelty of AR, historic organisations are yet to grasp the capabilities of this technology. Only a handful of Museums around the world use AR, so this project is a first in the UK in this industry.

The results of this project have the potential to answer whether AR is viable in remote locations to bring historic information to life by means of educational augmentation. It also lays the foundation for further research and entrepreneurial capabilities if successful.

2. High-Level Requirements

i The new system must include the following:

- Ability to allow users to interact with the signpost having downloaded the ZapWorks product
- Ability to connect to content via 4G and web enabled services
- Ability to incorporate rules of transmission that support GDPR and user online regulation
- Ability to gather, analyse and use anonymized data for tourism use
- Ability to deliver experience that blends with the geographical landscape
- Ease of use to support those who do not speak English

- Ease of user design reliant on universal navigation techniques, visually appealing
- Security feature – data collection or identity concealment whilst using AR app

3. Aims and Objectives

i *I intend to be very strict on the scope as the timescale is tight and productivity is key. The Augmented Reality showcase should generate at least one AR signpost. Each signpost will need research and discussion with local community groups and the research and materials gathered for display. The stone will be a complex challenge as it will involve 3D design prior to coding the augmentation. If this is achieved before the deadlines in the timetable, I will then attempt to augment the mermaid and the painter.*

It is anticipated this project will require the delivery of 3D imagery, multimedia video, narratives and historical photographs. Alongside this the signposts will need to achieve 360 ° augmentation, with the information blending in with the geographical surroundings. The implementation of this is complex and relies substantially on a well-located marker to augment from.

The technology chosen to deliver this project is called ZapWorks Studio and permission has been granted by this company to use their software for this project. ZapWorks is a cloud-based authoring system which allows you to build, publish and push the boundaries of creativity and storytelling. It is fully scriptable and allows for modularity and sharing of components. Objects in ZapWorks exist in a 3D space and therefore have a X, Y and Z values. This allows created 3D images to be moved around and explored based on a gyroscope-oriented 3D environment. The coding for this will be complex but should be achievable. I intend to explore API's and libraries supplied by ZapWorks to aid the mathematical side of the project.

There is a security requirement for my project, and this will be incorporated once coding has begun. This will either be an identity concealment tool using the app or relate to data collection and GDPR. Given the nature of this project it is too early to decide which pathway to choose. However, once implementation has started I should then know which is technologically viable.

Main objectives:

- Create 3D Image design of the stone
- Code the augmentation of the design so that the infographics will come to life
- create relationship between coding & markers
- Link the project to the app
- Integrate security aspect
- Addition language options if time permits

Tools:

- ZapWorks Studio
- Fusion360

How it will work:

- 1) A Zapcode marker will be created and placed on a weather resistant rigid structure for use with mobile devices
- 2) Visitors will download the ZapWorks AR app, be asked to agree to certain permissions (Data privacy aspect which will be touched on in final report) and then they will be able to scan the marker.
- 3) After scanning the marker the augmented reality models that I designed will come to life and the user will be able to interact with the AR interface and access the information.

Given the large workload for the augmentation it was clear that designing and implementing a reliable AR app too would be unachievable and unreliable. The ZapWorks app is favourable as it works on both Android and IOS and also links with the Studio tool.

The ultimate outcome may well be that this style of approach is overly complex and difficult to deliver to disparate community groups. Additionally, this is cutting edge software is expected to suffer from inherent bugs and issues as it will be used outside of its natural forum of use.

4. Implementation Plan

i *Research, Analysis and Data Collection, Development, Implementation, Testing, User Feedback, Roll out Pilot, Review Testing*

- Initial research will cover the interviews with the stakeholders and review their ideas and vision for the project. After review, a schedule and scope document will be created to offer for sign off by shareholders.
- Contact ZapWorks with final project plan as they have offered me tips and advice when using their software
- Analysis and data collection will include interviews with storytellers, image gathering, video editing and a review of potential target audience so that the design scope for user is understood. A review of the area geographically and the position of the signposts agreed and their graphical representation.
- Development phase will begin by assessing and creating the project folders and design of any 3D images using Fusion 360. Each project will have its own hierarchy and modular coding elements will be determined at this stage.
- Development of storyboards for each signpost – this will determine the narrative and flow of the system and ensure that the fonts/colours and navigate fit the system code and data.
- Data dictionary of terms used – for both users and developers – variable dictionary designed.
- User interface will be designed after the creation of each element for the signpost shown in pilot to the end user for review and sign-off.
- Ability for finding information about topic – visual interpretation, audio podcast, images, online form interaction and feedback.
- Spell checking and test of all narrative and written information
- Creation of user interface and navigation tools – with immediate online testing.
- Legal copyright and GDPR checks on all aspects of the sign for data collection
- System Testing
- System user testing
- Evaluation of success criteria – target one completed signpost – with 2 more to develop if time permits.

5. High-Level Timeline/Schedule

i *I started researching this project during my summer vacation, assessing what work would be involved and whether it was viable. Given its out of the box nature, it was necessary that I did research and also began learning how to code in Zapworks*.*

Below are prerequisite completed tasks:

3D creation of the stone using Fusion 360

Foundation webinar courses using ZapWorks Studio (as the coding language is a form of typescript)

Images taken of the chosen locations

Interviews with individuals to agree on scope.

**Still learning how to use typescript and the packages*

The below timeline has been translated from my own personal to-do list calendar on my phone.

NB - I intend to work over Easter recess.

| Week | Objectives | Deliverables | Write up | Milestones |
|----------------------------|---|--|---|--|
| Week 1 27-31 Jan | Adjust initial plan, add concrete objectives and create realistic implementation plan | Final initial plan | Finish timeline and adjust the scope | Finish initial report. |
| Week 2 3-7 Feb | Comparative research study of AR platforms ZapWorks and Google. Explore necessary API's for security feature and also libraries for XYZ coding Ethical forms completed ZapWorks training and exploring image tracking algorithms and implementation. | Complete ZapWorks session and make contacts for support Ethical forms sent Outline necessary tools and libraries | notes on how to implement the algorithm and hands on testing Write up comparative research | Commence research section of report. Green light for ethics |
| | Meeting with personal tutor 2/4/20 – focus: timeline and constraints | Sign off project plan | notes on how to approach the tasks and advice | Detailed plan of tech stages |
| Week 3 10-14 Feb | Interview with Trustee working party member to determine requirements user interface | Creation of storyboard for all signposts with data references and storage support online | Drawings and system flow/nav flow and data set flow | Draft of report Introduction, background and storyboards |
| | Start Building Program: Create project folders/ Add images and text/data Determine data variables and naming conventions Ensure version issues are determined | Data dictionary and variables information based on the Zappar environment | Data dictionary | Research understanding sufficient to support the start of project categorisation and hierarchy development |
| Week 4 17-21 Feb | Create coding nodes and Hierarchy and begin to work on the 3D development in Fusion and transfer to ZapWorks on completion Decide on security aspect to then be applied in week 8 Meet with supervisor | Create at least one 3D design for use in project | Online work & feedback | Knowledge of best way to implement XYZ object co-ordination gained and implemented |

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| Week 5 24-28 Jan (application of research from week 2) | Work on the XYZ co-ordination options to create the movement of the 3D images uploaded from Fusion360 | Gain the zoom and move options via the coding and create the narrative alongside | Online work | Project review meeting to ascertain targets and achievements |
| | Start writing research and technical sections of final report as it will be fresh in mind at the time. HCI mock-ups for report to aid design visualisation | Written up sections including background | notes on how to implement the algorithm and hands on testing | Step by step graphic mock-ups for interface design |

| Week | Objectives | Deliverables | Write up | Milestones |
|---|---|--|--|---|
| Week 6&7 A, B) 2-11 March C) 11-13 March | Build time 2.0: A) collating 3D model with the narrative as base. B) Render the two layers & Implement image tracking algorithm to the model. C) Make notes alongside and begin implementation parts of report | Notes and Feedback Functioning model with evident rendering and correct image tracking. | Notes, back up files and screenshot Important aspects for report. | Develop the user interface for each movement and navigation/create Zapcodes and build product for signs and placement |
| Week 8 16-20 March | User Testing and review – user manual creation – quick start Incorporate the security aspect Write up results Meeting with supervisor to discuss outcomes | User Tests feedback Functionable security aspect | Testing Documentation Quick start guide | Coherent output and functionality |
| Week 9 (Easter) 23-27 March | User interviews and product placement testing Write up conclusions and feedback | Completed conclusions and feedback | Notes and feedback forms | Have visitors try out the AR application |
| Week 10 30-4 April | signposts in place for 1 week to gather further feedback Write evaluation of project and future alterations. Meeting with supervisor | Successful use of signposts and valid feedback | Written notes for report | Obtain an answer regarding the signpost success |

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|-------------------------------------|--|---|--|---|
| Week 11&12 6-17 April | Add finishing touches to final report. Tie off loose ends. | Completed 1 st draft of report | | 1 st draft of final report completed |
| Week 13 20-24 April | Review early sections of report and complete glossary and appendices Supervisor review of first draft | Adjustments to report and | adding extra content to report | 1 st draft reviewed |
| Week 14 27- 1 May | Amend and add corrections to first draft, check everything works and is completed. Proof-read report Review submission needs | Completed report and submission | Note any missing aspects or proof-reading points. | Complete final report and submit |
| Week 15 4-8 May | Post submission meeting with supervisor to discuss the project Viva If delay on submission, correct before deadline of the 7th | Create Viva plan | Note how I intend to deliver it and advice from supervisor | Preparation completed for project Viva |

ETHICAL CONSIDERATION

The project itself can be considered a local community project and as such has GDPR and Copyright considerations. Additionally, information will be gathered for storytelling purposes and the content of this material will need consideration in terms of the primary source narrative. Essentially, most information displayed which is not factual will need to consider an online disclaimer for use by the general public. All images will require copyright agreement, this again will require research and communication with the relevant parties before use on the app.

The data collection element of the app – for logging on and a use needs to be anonymised, yet useful to the Trust client. This has yet to be determined but complete disclosure and informed consent will need to be identified on the application in the form of a consent tick box. The sign off all narratives by interested parties will be requisite before progression to development. Also, there is an ethical aspect to using of the ZapWorks tool and its app and this will be covered in the final report, although full permission has been granted to use all packages and libraries if needed. Also, I will apply for ethical approval from the COMPSCI school in week 2.