VRAwe

Virtual Reality to Elicit Awe

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1. Introduction

Emotions are effective indicators of one's thoughts and they also have a notable impact on one's behaviour; accordingly, the controlled elicitation of emotions plays a crucial role in numerous areas. Virtual Reality (VR) has been employed in recent studies where emotional elicitation is required [7, 15, 23]. VR is a cutting-edge technology that utilises computer-generated three-dimensional (3D) settings to generate a lifelike sensory encounter that can be operated by means of specialised equipment, including head-mounted displays and handheld controllers. Emotion-eliciting VR applications are used for various means. One popular use is exposure therapy whereby environments are designed to elicit a specific fear for people to overcome these fears. Psychotherapy is another area of use where the environment is designed to induce stress, relating to patients' specific past traumas to help them move past these. Real-world simulations of different educational and training purposes also make use of emotion-stimulating VR environments, where it is too dangerous to practise in real-life and where emotions may impact their actions and behaviour. This includes firefighter training and medical surgery. Other uses for emotion-elicitation in VR include studying human behaviour and decision-making, helping people with depression and improving a person's well-being and social skills.

VR has proved a more successful tool to elicit emotions compared to previously used two-dimensional (2D) displays owing to two clear advantages it possesses. Firstly, VR enhances the sense of presence, which refers to the realness of the artificial environment, a user feels. By allowing interaction and targeting multiple senses, VR increases the user's involvement and feeling of being at the scene. Secondly, it supports the manipulation of stimuli to elicit different emotions [5]. Researchers can study how changes in stimuli in the Virtual Environment (VE) affect the responses of users in real time. However, an outright effective VE to evoke Awe is yet to be developed.

This study focuses on the elicitation of Awe, an emotion seldom spoken about which has a powerful impact on our lives. Awe experiences are widely regarded as having positive effects. This includes recognizing the interconnectedness of all living beings and developing a sense of responsibility towards the wider community [24]. Awe binds individuals through charitable behaviour [25]. Awe is also correlated with positive health and welfare. It can help decrease the risk of heart disease and strokes [11]. Individuals go to great lengths in the search for experiences that are awe-inspiring. This project will serve as a pilot study to discover the features and designs which are most effective at awe elicitation.

2. Previous Work

Virtual reality (VR) is a relatively new technology that allows users to engage with 3D content in a way that mimics real-world interactions [14]. Recent research has suggested that VR is one of the best tools to elicit emotions due to the increased immersive ability of Virtual Reality Environments (VRE)

and the sense of "Presence" a user experiences when interacting with this technology [9, 13, 16]. “Presence” refers to the extent of realness that users perceive the environment. The use of emotions in VR can enhance the immersive experience of a virtual environment, benefiting entertainment applications, different training applications, studying human behaviour and decision-making, and medical treatments [14, 23, 17, 13, 26]. Inducing positive emotions such as relaxation and joy can have therapeutic uses to better a person's mental health and help people with depression, phobias, and trauma [14, 9].

The strength of the "presence" a user feels in the environment can determine how effective the VR application is at evoking a specific emotion [26]. Several models, such as the valence, arousal, and dominance spectrum, can be used to determine how emotions can be elicited by falling on certain positions of a spectrum [14, 26, 18]. However, there are gaps in research in the design and evaluation of effective VEs that evoke emotional responses and awe. These gaps include identifying techniques specifying different lighting, objects, sounds and interactions to include in the design of Virtual Environments to elicit specific emotions as well as the best methods to use when evaluating the emotions elicited in participants.

Awe is a complex emotion that elicits both positive and negative feelings in people [28]. It is commonly associated with strong feelings of wonder, connectedness, surprise, and astonishment [7, 16]. Awe is characterised by the vastness and the need for the accommodation of mental schemas, referring to something so difficult for a person to comprehend that it needs to be accommodated by expanding their frame of reference [5]. The feeling of awe has numerous benefits, including transforming one's worldview, perspective, and sense of self, increasing wellness and satisfaction with life, improving social interactions, expanding perception of time, and even protecting the immune system [16, 23, 7, 8]. Experiencing awe also leads to increased exploration, humility, and decreased aggression, as well as encouraging people to care better for the planet [16, 22]. However, many people are unable to encounter awe-eliciting experiences due to financial struggles or physical limitations [23].

Virtual Reality (VR) has the potential to make awe-eliciting experiences more accessible, as it is a portable device that is cheaper than travel and does not require much mobility [24]. Research into VR applications for eliciting the feeling of awe is ongoing, but there is uncertainty regarding the methodology for achieving awe in VREs and how different types of awe-elicitors may affect the benefits that awe can impart.

3. Problem Statement and Research Questions

Emotion elicitation in laboratory settings is a relatively new field and is very vaguely understood. One particular emotion that is very scarce in research is the feeling of awe. Awe is an extremely complex emotion, one that is hard to define and replicate. It is difficult to determine the exact features that elicit this feeling in a person, but it has been shown to play significant roles in our experiences.

Our project aims to design effective awe-eliciting environments due to its relatively unexplored territories and lack of implementation in VR applications as well as the potential benefits it may provide. The objective is to create three distinct VEs that can be used to elicit awe in users which can potentially be used as a basis for future designs of awe-eliciting applications.

The main research question for our unique environments is:

- Will the different VR environments all designed to incorporate different forms of awe elicitors be successful in the elicitation of awe in users and what features contribute the most to the elicitation of awe?

This will be assessed through means of biosensors, namely heart rate monitors, a skin conductance response tool and possibly a goose bump camera and self-assessment. A slower heart rate is an indicator of awe and a higher skin conductance response is related to emotion stimulation in humans. Goosebumps is also a clear indicator of awe and so identifying this physical reaction will support findings that awe was experienced. The self-assessment will be in the form of interviews and questionnaires that will obtain what the participants felt by asking questions and having the participants rate what they felt on a 7 point Likert scale.

Due to the nature of our project, in that all environments aim to elicit the feeling of awe, subsequent research questions include:

- Will the environments differ in success to elicit the feeling of awe?

A contingency question in the case that the environments do differ is:

- Which was the most successful environment and what particular features were responsible for the different outcomes?

Using the qualitative and quantitative data collected from the participants, we can compare the results obtained from each environment to one another to determine if the elicitation of awe differed in success between the environments. Real-time measurements of biosensors and motion-tracking of the users' interaction with the VR application, recording everything the user sees throughout the experiment, as well as the interviews will allow for features that elicited the greatest feeling of awe in the participants to be determined. The real-time measurements of the biosensors can be compared with the motion tracking to determine what the participants were experiencing when they had a physical reaction, most likely indicating the feeling of awe.

4. Method and procedure

4.1. Design Features

In this project, we will each design a different virtual environment using Unity. Our goal is to create awe-inspiring experiences for our candidates by highlighting the unique and breathtaking features of each environment. The three environments that we will be recreating are Petra in Jordan, a fantasy world with Northern Lights, and Huashan Mountain in China.

Petra is a historical city that boasts ancient architecture with immense size and intricate details. It is the only virtual environment of which we have a 3D scan, that we will use as the foundation to design a high quality virtual environment. The user will be able to explore the area by walking in between the high ground of Petra with sand flying in between their feet. We will create an option in the game like fast travel to a different location in the area for the user to explore the full extent of this virtual environment.

Our fantasy world is inspired by Mythical creatures and the Northern Lights Lighting will be a crucial factor in enhancing the user's experience to make the environment feel surreal. To create an awe-inspiring atmosphere, we plan to incorporate natural and supernatural phenomena such as the Northern Lights and mythical creatures. The mythical creatures are most likely going to be designed in the distance from the user. The reason why we want them to be far away is that it would be much harder to make the mythical creatures look realistic if the participant is close to them and also to prevent negative emotions such as fear. The mythical creatures will also be in 2D to further reduce the difficulty in constructing realistic 3D models.

Huashan Mountain is a beautiful natural environment that we aim to recreate in our virtual environment. We plan to achieve this by integrating high-quality sound features and high distant mountains.. We will incorporate ancient Chinese architecture as a cultural element in the VR environment based on Huashan Mountain. The user will be positioned on an altitudinous mountain. In addition, users will have the opportunity to enjoy the scenery by walking on stairs, allowing for a more

immersive experience as if they were truly present on the mountain.

4.2. Awe Inducing Factors

As part of this project, we will be creating three new virtual environments. These environmental ideas are new and may be subject to change as the project progresses. Our goal is to create environments that elicit feelings of awe in the user. To achieve this, we will emphasise different factors in each environment, such as sound, size, number and form of vastness.

Sound: To create a realistic and immersive experience, the sound will play a crucial role in our virtual environments [20,29]. We aim to implement a sound system that accurately reflects what the user would expect to hear in the real world. To achieve this, we will need to ensure that our sound system is highly directional, with high definition and a mix of different sound sources. For playing sounds from a source, we will utilise the Unity sound library. Additionally, we plan to incorporate sound feedback when interacting with different objects to enhance the overall sense of realism.

Size: Creating a sense of vastness in size is a key factor in inducing awe [3]. In our virtual environments, we aim to achieve this effect by incorporating incredibly large visuals, surpassing what humans can typically comprehend in a short amount of time. To achieve this, we will ensure that objects in our virtual environments are equal to or larger than their real-world counterparts. For example, a tree in the real world might be 20 m tall, but in our virtual world, we could expect a tree to be over 50m tall with a width of 5m. By emphasising these extreme sizes, we hope to create a truly awe-inspiring experience for our users.

Number: When there is an increase in the density of objects, users may experience some level of discomfort and a higher frequency of directional changes [12]. Duplicating objects can also make it harder for humans to process information quickly. However, a higher density of objects is often associated with an increase in overall size, which can create a sense of awe in users. To elicit this feeling, we will duplicate or place multiple similar large objects around the user, such as pillars, trees, birds to evoke a sense of higher power. It has been noted by Shiota, Keltner & Mossman (2007) that the concept of a higher power can evoke feelings of awe [24].

Vastness: Awe is characterised by vastness and need for accommodation of mental schemas. Each environment will incorporate a unique form of vastness to elicit awe, making each environment different with respect to awe-elicitors. Petra incorporates vastness in the form of tall walls and intricate details as the scale of the walls and the level of detail to the patterns on the walls should be something not many people have experienced. Its great height and complexity of patterns should expand a person's frame of reference. Huashan Mountain incorporates vastness in the form of great expanses when overlooking the view from the great height where the world appears endless and a person may realise how small they are in comparison inducing awe. The fantasy world's natural and supernatural phenomena should induce awe from witnessing something that is rare and something completely fictional that will appear to be real in the VR environment. Vastness is in the form of experiencing something of which the concept is so surreal it is hard for a person to grasp and comprehend what they are seeing.

4.3. System Design

4.3.1. Technical Fidelity

Throughout the course of the development, there will be features where it is normal but extremely complicated and expensive to implement.

To reduce eye strain, we will maintain a constant frame rate of 60 frames per second in our virtual environment. Research indicates that a consistent frame rate can provide a real-time experience for the human eye [10]. Inconsistent or low frame rates, on the other

hand, can cause nausea and sickness, leading to an emotional response based on technical issues rather than the experiment itself [21]. Therefore, we will ensure a stable frame rate to optimise the user's experience and minimise any negative effects.

The VR equipment can result in a delay between the user's real-world input and the VR output. For instance, there may be a 20ms delay between the user pressing a controller button to pick up an object and the object being picked up [27]. Even the fastest VR machines will experience this problem. High latency has been shown to negatively impact the elicitation of emotion in VR, according to research [22]. Although a 4G network would result in a network delay of approximately 20ms, which would not significantly affect the VR experience, a stable internet connection and low latency are still crucial when designing a virtual environment.

In virtual reality, "look but don't touch" is a common approach used by developers where they create objects that the player can see but not interact with. For instance, a door handle in VR may appear to be usable, but in reality, the door simply opens when the player approaches it. This is often due to the complexity and time-consuming nature of creating object interactions, which can impede the progress of a project. As a result, it is often more practical to limit interaction with objects rather than investing significant resources in developing complex object interactions.

4.3.2. Heuristic Evaluation

A modified version of the usability heuristics developed by Nielsen will be used, adjusted to a VR context by Sutcliffe & Gault [1]. This will ensure that each VE meets a high standard of usability to produce reliable results. The following will be evaluated:

- Compatibility with user's task and domain
- Natural expression of action
- Realistic feedback
- Close coordination of action and representation
- Navigation and orientation support
- Faithful viewpoints
- Sense of presence

4.4. Implementation strategy

The project will be developed in the Unity engine which simplifies the development process by providing models of structures required for the three designs.

The project will follow an agile design methodology, specifically an iterative approach. Low-fidelity prototypes of the three intended VEs will be created in the first iteration. Following phases of development will implement the prototypes and produce three testable VEs. These iterations will incorporate user experience and interaction feedback from computer graphics superiors to refine and improve the designs. The final few iterations will require the supervisor or an equivalent expert for final heuristic evaluation. Once the VEs have been finalised they will be ready for the user experiments.

4.5. User studies

The experimentation for this project will require 5-10 participants per VE. Participants will be UCT undergraduate psychology students recruited through the department of student affairs (DSA). The anticipated restricted age group of participants will reduce unexplained error variance which may be caused by underlying factors. As such, the results will be stronger and more reliable. Students with any prior connections to the researchers will not be considered eligible candidates, as this may cause bias in the results.

A VR tutorial will be compulsory at the beginning of each experiment. This will be a neutral environment allowing basic navigation and interaction and also form a baseline for heart rate and skin conductance response. Once complete the participant will be immersed into the awe-inspiring VE.

4.5.1 Deception

The awe-evocative nature of all the VEs will be obscured from participants to keep their responses authentic. By concealing the purpose of the experiment, the Hawthorne effect is avoided. Participants have been known to change their behaviour when testing outcomes are known [4]. The project will comply with research ethics standards when deceiving participants, namely the American Psychological Association's principles [2]. Firstly, the deception is justified because it will reduce the risk of skewed results. Secondly, the research does not expect to cause physical pain or emotional distress. Lastly, the masking will be disclosed to participants in a debriefing post-experiment. Participants may then choose whether to discard their results or not.

4.5.2 Assessment

Measurement of a participant's responses will come in the form of both objective monitoring during the virtual experience and subjective questionnaires. This will provide the researchers with a diverse dataset to perform statistical analysis.

Objective measures: The three VEs will all focus on measuring changes in heart rate (HR) and skin conductance response (SCR) using the VU-AMS device. Electrodes will be attached to the participant's chest and hand for HR and SCR respectively. A measurement of each participant's HR and SCR will be taken in the neutral tutorial environment to provide a baseline. SCR is known to increase with awe [6]. Goosebumps will be measured by placing a small camera on the participant. Awe is known to give individuals goosebumps [23]. Motion tracking will also allow real-time measurement of these three responses to be matched with specific features in the VEs.

Subjective responses: post-immersion, participants will be required to complete the ITC-Sense of Presence Inventory (ITC-SOPI) to assess different dimensions of presence. This is a well-validated questionnaire consisting of 42 questions, each on a 7-point Likert scale. A second questionnaire will be completed by participants both prior to the tutorial and after the awe-conductive VE. It will have a single item Likert measure of awe, and seven other distinct emotions - anger, joy, sadness, pride, amusement, fear and disgust. Each emotion will be rated on a 7-point Likert scale (1 = nothing; 7 = very high). The changes in these subjective responses will be used to test for an awe-effect.

The data will then be used for statistical analysis. If required, the data will first be normalised. A parametric statistical analysis can then be performed to test for presence and awe-elicitation. The restricted number of participants means the analysis will be limited; however, the research is predominantly a pilot study simply testing for an awe-effect.

5. Ethical, Professional, and Legal Issues

Ethical issues are of utmost importance in any research problems involving human participants. The participants who are conducting this experiment may experience unwanted emotions from the VR application, either by the awe elicitors or unintentional design flaws. They may also experience symptoms such as motion sickness, headaches, dizziness and blurry vision from the virtual reality environment [19].

To address the ethical concerns mentioned above, we will begin by excluding individuals who are vulnerable to anxiety from participating in the experiment. Before experimenting, we will request all participants to sign a consent form, permitting us to collect confidential information such as their heart rate (The consent form can be found in appendix C). We will also clearly explain the rights that participants must protect their privacy and confidentiality. Participants will be informed that they may withdraw from the experiment at any time without any consequences or refuse to answer any questions with which they are uncomfortable.

As researchers, we must conduct ourselves in a manner that consists of the highest ethical and

professional standards. This includes treating people with respect and ensuring that the participants understand the nature, purpose, and side effects before the experiment. We must conduct the research in a transparent and unbiased manner.

We aim to benefit the field of psychology and prioritise minimising risks. We will interpret the results of this experiment accurately and report alternative interpretations. The intellectual property of this experiment will belong to Zenan Shang, Ben Brent, Erin Heath, and the University of Cape Town. Our final report will belong to the developers and will be free and open source for future researchers and developers.

6. Anticipated Outcome

6.1. Research Environment

We will be inducing awe using the following scenes.

Scene 1: Petra - we anticipate that the participant will explore a Petra environment, wandering around the ancient architecture and sand flying around them. The user should experience a sense of wonder and awe due to the unfamiliar surroundings and realistic sand physics. The intricate detail and high walls are also expected to be successful elicitors of awe.

Scene 2: Mountains - this scene will be based off the Huashan mountain in China. Participants will walk atop a mountain on a relatively flat path. We will implement cultural architecture, tall mountains, birds flying and chirping in the distance, which we believe will induce awe from the enormity and beauty of the surroundings.

Scene 3: Fantasy World - the participants will have the opportunity to explore the world with beautiful Northern Lights glaring at the laminar dam where mythical creatures, most likely dragons, are resting alongside it. We are hoping awe will be evoked in the user through natural phenomena and the beauty of something that is out of this world. There is potential to add other supernatural features to this environment.

6.2. Expected Impact

The three distinct environments designed should be able to successfully elicit the feeling of awe in the users. The outcomes of each environment should be able to further support future designs and studies regarding Virtual Reality Environments to elicit awe and could be used to study the effects that experiencing awe has on a person.

6.3. System

Our final code will consist of multiple file types including the 3D models, animation and unity file. They will be runnable on the HTC Vive hardware. Each environment will have their own controls for interaction and relevant awe features to trigger awe emotions. The VEs will adhere to the technical benchmarks and heuristic qualities outlined in section 4.3.

6.3. Key Success Factors

The success of our study will be based upon three factors:

- Appropriate and timely ethics clearance.
- Creation of VEs that do not harm the participants.
- Statistically significant indications of the elicitation of awe from experiments conducted professionally and correctly.

7. Project Plan

7.1. Risk and Risk Management Strategies

See Appendix A for a risk table.

7.2. Timeline

See Appendix B for a Gantt Chart.

7.3. Resources Required

- Development
    - Unity engine, used for creating the virtual environment.
    - VR equipment used for testing and conducting experiments.

    - High-end computers that can render the virtual environment.
    - 3D scan of Petra
    - Assets from Unity Asset Store.
- Experiment:
    - 5-10 participants for each VE user experiment.
    - Tracking system to record the player movement and visuals.
    - Empty room for testing the VEs and conducting the experiments.
    - VU-AMS device to measure HR and SCR.
    - Small camera to measure goosebumps.
- General
    - Supervisors for HE and general advice.
    - Psychology department for project collaboration.
- Questionnaires
    - Presence questionnaire
    - Emotion questionnaire
    - Exclusion Questionnaires
    - Emotion measurement using heart sensors.

7.4. Deliverables

Key deliverables include:

- Project proposal
- Ethic application
- Proposal presentation
- Project progress demonstration
- Draft of project paper
- Project final paper
- Project final code
- Poster
- Website

7.5. Milestones

Every 2 days we will be having a scrum meeting to make sure everyone is on the same page. And once a week we will have a meeting with the supervisor to check if we are on the right track.

7.6. Work Allocation

The project entails designing three virtual reality environments, with each environment assigned to a specific team member: Zenan Shang will be responsible for Petra, Ben Brent for Huashan Mountain, and Erin Heath for the fantasy world. The only area of common, but still individually performed work will be conducting user experiments and performing statistical analysis.

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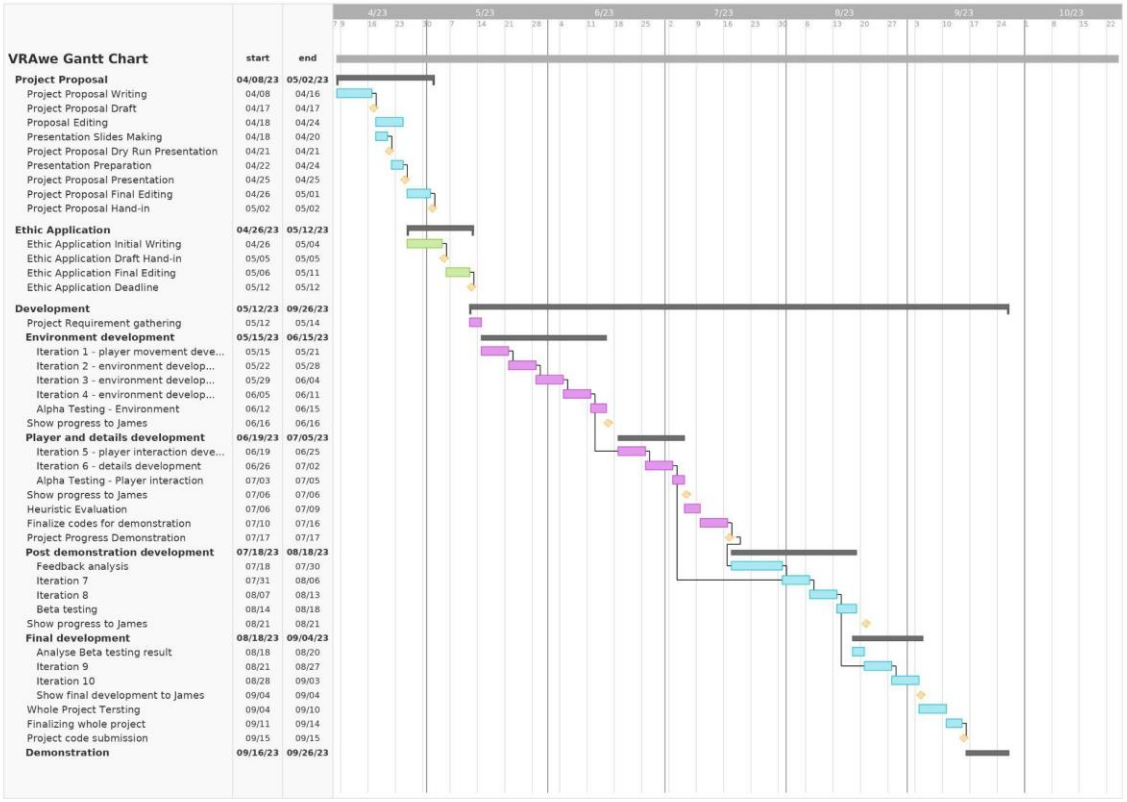
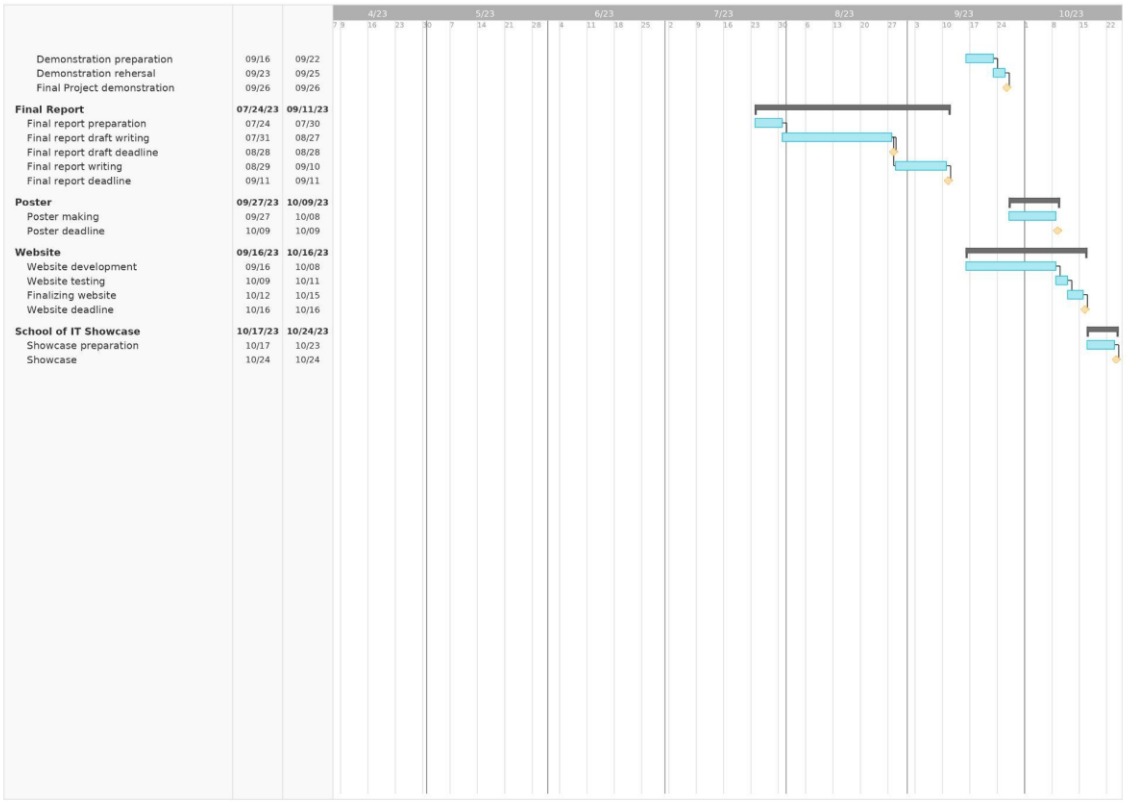
Appendix A: (Risk Analysis)

Risk	**Consequence**	**Probability**	**Impact**	**Mitigation**	**Monitoring**	**Management**
Chosen environment is too complex	The environment may not be designed on time.	Medium	High	Plan ahead to ensure that enough time is available to complete the application.	Check that the progression of the application follows the scheduled times.	Simplify the environment as much as possible for it to be completed while still maintaining its integrity.
Load shedding	Disruption of project development.	High	Low	All team members have Eskom se Push.	Check the load shedding schedule for our blocks daily.	Relocate to an unaffected block if an internet connection or electricity is required.
Ethics clearance is delayed	User participation cannot occur and so no research will be done.	Low	High	Hand in our ethics clearance form on the same day as our project proposal.	Reply promptly to the ethics department.	Ensure our VEs are ready for experimentation on our scheduled date so that experiments are performed as soon as clearance is permitted.
Issues with technological equipment (i.e. VR headsets, laptops, etc.)	This may include loss of data, inability to properly code or test applications with the VR equipment which will take more time to complete.	Low	High	Take proper care of equipment and save code using online storage spaces.	Check that there are no issues with VR equipment and laptops when using it.	Take equipment to be fixed, replace it or find alternate equipment to use if something happens. Use code saved online if needed.
Unknown mental issues of a participant that are triggered by the VE.	The particular result cannot be used and the participant may experience trauma.	Low	Medium	Thorough screening and briefing of participants prior to the experiment.	Monitor participants during experimentation for any unusual behaviour.	Stop the procedure if anything unusual happens.

Appendix B: (Gantt Chart)



VRAwe Gantt Chart	start	end
Project Proposal	**04/08/23**	**05/02/23**
Project Proposal Writing	04/08	04/16
Project Proposal Draft	04/17	04/17
Proposal Editing	04/18	04/24
Presentation Slides Making	04/18	04/20
Project Proposal Dry Run Presentation	04/21	04/21
Presentation Preparation	04/22	04/24
Project Proposal Presentation	04/25	04/25
Project Proposal Final Editing	04/26	05/01
Project Proposal Hand-in	05/02	05/02
Ethic Application	**04/26/23**	**05/12/23**
Ethic Application Initial Writing	04/26	05/04
Ethic Application Draft Hand-in	05/05	05/05
Ethic Application Final Editing	05/06	05/11
Ethic Application Deadline	05/12	05/12
Development	**05/12/23**	**09/26/23**
Project Requirement gathering	05/12	05/14
Environment development	**05/15/23**	**06/15/23**
Iteration 1 - player movement deve...	05/15	05/21
Iteration 2 - environment develop...	05/22	05/28
Iteration 3 - environment develop...	05/29	06/04
Iteration 4 - environment develop...	06/05	06/11
Alpha Testing - Environment	06/12	06/15
Show progress to James	06/16	06/16
Player and details development	**06/19/23**	**07/05/23**
Iteration 5 - player interaction deve...	06/19	06/25
Iteration 6 - details development	06/26	07/02
Alpha Testing - Player interaction	07/03	07/05
Show progress to James	07/06	07/06
Heuristic Evaluation	07/06	07/09
Finalize codes for demonstration	07/10	07/16
Project Progress Demonstration	07/17	07/17
Post demonstration development	**07/18/23**	**08/18/23**
Feedback analysis	07/18	07/30
Iteration 7	07/31	08/06
Iteration 8	08/07	08/13
Beta testing	08/14	08/18
Show progress to James	08/21	08/21
Final development	**08/18/23**	**09/04/23**
Analyse Beta testing result	08/18	08/20
Iteration 9	08/21	08/27
Iteration 10	08/28	09/03
Show final development to James	09/04	09/04
Whole Project Tersting	09/04	09/10
Finalizing whole project	09/11	09/14
Project code submission	09/15	09/15
Demonstration	**09/16/23**	**09/26/23**



Demonstration preparation	09/16	09/22
Demonstration rehersal	09/23	09/25
Final Project demonstration	09/26	09/26
Final Report	**07/24/23**	**09/11/23**
Final report preparation	07/24	07/30
Final report draft writing	07/31	08/27
Final report draft deadline	08/28	08/28
Final report writing	08/29	09/10
Final report deadline	09/11	09/11
Poster	**09/27/23**	**10/09/23**
Poster making	09/27	10/08
Poster deadline	10/09	10/09
Website	**09/16/23**	**10/16/23**
Website development	09/16	10/08
Website testing	10/09	10/11
Finalizing website	10/12	10/15
Website deadline	10/16	10/16
School of IT Showcase	**10/17/23**	**10/24/23**
Showcase preparation	10/17	10/23
Showcase	10/24	10/24

Appendix C: (Consent form)

VIRTUAL REALITY EXPERIMENT CONSENT FORM

Title of Study: VRAwe

Researcher: Zenan Shang, Erin Heath, Ben Brent

Introduction:
You are invited to participate in a research study examining the effects of virtual reality on human emotions. The study involves the use of virtual reality equipment, which includes a headset and a computer. You will be asked to enter a virtual environment and respond to various stimuli while wearing the headset. The purpose of this study is to better understand the emotional impact of virtual reality and to explore its potential benefits.

Risks and Benefits:
There are no known risks associated with participating in this study, although some individuals may experience dizziness, headaches, or motion sickness as a result of using the virtual reality equipment. Participants may benefit from a better understanding of the emotional impact of virtual reality, and their participation in this study may contribute to the development of new therapeutic interventions.

Confidentiality:
All personal information collected during the study will be kept strictly confidential. Your data will be assigned a unique identifier to protect your identity. The data will be used for research purposes only and will be stored in a secure location.

Voluntary Participation:
Participation in this study is completely voluntary, and you have the right to withdraw at any time without penalty. If you choose to withdraw from the study, any data collected up until that point will be destroyed. You also have the right to ask any questions you may have before, during, or after the study.

Contact Information:
If you have any questions or concerns about the study, you may contact the Zenan Shang through email: shnzen001@myuct.ac.za

Consent:
I have read and understood the above information and agree to participate in this study. I understand that I have the right to withdraw at any time without penalty. I agree to allow the researcher to collect and use my data for research purposes.

Participant's Signature: _____

Date: _____