Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach

By

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ABSTRACT

Because of the rapid advancement of technology and the impact of COVID-19, the trend of users' and companies' preferences for working and studying remotely has shifted dramatically today. As a result, the use of remote access and telecommunication technologies has skyrocketed, with numerous societal benefits. Asa result, the digital transformation is affecting and gradually replacing traditional business and management models. especially for museums that had faced a massive decline in visitors due to the pandemic. Therefore, this project is conducted to help Lembah Bujang Archaeological Museum undergo digitalization by studying the usageof multimedia technology to assist users in learning, creating an interactive 3D environment-based Virtual Museum application that is more educative and interesting for an exploratory approach, and identifying its effectiveness to act as an assisting tool in the education field. In addition, there will be a total of 5 scopes while designingthe system, which are the Virtual Tour, Gallery, Screen Capture, History Corridors, and Floor and Map Navigation modules. As for the methodology, the Addie model will be used throughout the whole project because it is a very effective tool to facilitatethe analyze, design, develop, implement, and evaluate process and can help deliver the outcome at a higher standard. To conclude, there is a wide variety of tools needed to develop the project, which are the hardware and different types of software that are essential and important, including the text, graphic, audio, video, animation, and authoring editing software.

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS

3D   3 Dimensional

AI   Artificial Intelligence

CT Scan   Computed Tomography Scan

TV   Television

Chapter 1 Introduction

Chapter 1 : Project Background

1.1. Introduction

This is a project to create a creative edutainment virtual museum application in Malaysia Lembah Bujang Archaeological Museum for Exploratory Approach by creating a 3D environment using several tools and software to build and modelling.

1.2. Background

The fast progress and evolution of technology have resulted in substantial changes in many industries, especially in the business field. To keep up with the rate of technological development, the old business model, which depended on physical premises and face-to-face contacts, has forced to be restructure, and adapt towards the rapid change. However, some part of the sector in Malaysia such as museums sector, are still relying on the traditional business model because of several factors such as lack of funds and had been severely impacted by the changing technological world.

The museums sectors especially in our nation has been significantly impacted by technology advancement is major due to the fact that our museum is still only highly dependent on just the historical structures , artifacts, and culture to draw visitor and tourist to generate revenue and sustain themselves as a non-profit organization. However, with the appearance of new and advance technologies such as Augmented and Virtual Reality, museum sectors are currently experiencing extensive rivalry from online and digital platform that offer a similar experience but with additional approach that provide more interactive and richer present of multimedia element towards the user. Hence, this had increased the demand on museum curator and management to discover new method to compete and survive in today's environment.

Chapter 1 Introduction

Therefore , this project will carry out by working closely with local museum which will be the of Bujang Valley Museum on planning and creating a project while identify the audience needs to create a well-design Virtual Museum application that can provide visitors with an immersive and fascinating experience of the museum's collections and historical artifacts. Whereby the visitors will be able to interact with exhibitions at their own leisure to learn about the history details and significance of each historical event and building, by implementing more interactive connections of multimedia content it will be able to help user to gain more enhanced learning and understanding towards history subjects and manners.

Hence this project is developed and aim to help our local museum to create a digital museum platform that is not only simple to use and accessible to a diversity of audience, but it is also being designed to provide a rich and immersive learning environment. This will assist the museum in attracting more visitors and generating funds for the museum's long-term viability and act as a role model for other Malaysia museum to embrace the similar technology and improve their offerings and services. Ultimately, the success of this initiative will contribute to the effort of preserve and promote Malaysia historical culture for our future generation.

Chapter 1 Introduction

1.3. Problem Statement and Motivation

Declining on Visitor for Museum.

Due to present to advance technologies and present of rich media todays, traditional museum is becoming less and less preferable as a visiting spot and place to gain knowledge on historical item and events for students and other researcher. And one of the reasons that occurs is that the way of presentation of traditional museum are way plain, less attractive, and non-interactive that will less likely interested by anyone in today's world. This is because boring style of presentation can limit people's capability of developing creativity, critical thinking, and imagination skills. Which is a serious issue that should be fully address because in todays because in today highly competitive environment of business world creativity is very essential skill that must needed to compete and survive becausewith the rising of AI technologies more and more workforce and jobs had been replaced with new jobs that required more critical thinking and creativity skills forpeople to obtain [1].

Many Existing 3D application are still lacking and not user friendly.

Although, there are several existing virtual museums had been developed for digitalization but the most of them are still lacking and still have a lot of spaces for improvement especially the interface design that are still vague and lack of interactivity elements. Moreover, some virtual museum that being develop had put in less effort to make it interesting and just only wanted to rush and deployit with the only one purpose of transforming the traditional assets of traditional into digital format. And as times goes on, these projects will remain ineffective because it is remaining the same unattractive style of presentation which will get quickly forgotten and ignored by any person.

Chapter 1 Introduction

Storage Woes of Physical Storage Space

Additionally, another major issue faced by traditional museums is the problem of "Storage Woes," which emphasizes the issue of lack of space for exhibition, depreciation of building condition, and the threat of natural disaster [2]. Therefore, any action of renovating and expanding will become a huge risk and struggle for many of the museum parties because it requires a lot of extra resource especially on money and workforce just to implement the precaution while transferring the historical artifacts and constructing or renovate the building to ensure it can be sustained against various risk and disaster. However, with the virtual environment technology this issue will solved easily, and it also have the abilities to store and expanded unlimitedly on hardware or cloud storage.

Therefore**,** this proposal is being carried out to plan and designed to build and build a well-designed application that is capable to improve the user's learning experience through increased interaction, attractive presentation of rich media, and flexibility on using and controls. Besides, the application will go through a setof testing and gather user review upon launching of prototype and fixing it before final deliver. Therefore, the problem can be identified early and improving it to satisfied user requirements and needs.

1.4. Objective

The objective of this project is :

To study the usage of multimedia technology to assist users in learning.
This is being researched because it can assist the author in determining which type of multimedia element is most commonly used and preferred by the user, thereby gaining the most attraction, or does it have to be a combination of all elements to achieve these goals.

To develop an interactive based application on Lembah Bujang Museum.
By providing an interesting and interactive based system on educating field it is undoubtedly that it can encourage the passion of students and teenager to learn because it involves thinking process while having interaction that will stimulatecreative thinking

Chapter 1 Introduction

To study the effectiveness of the developed system as an assisting tool in educations field.

Conduct an observation and research on how effective the application on helpingstudents to gain knowledge and how is the focus and thinking process of them during exploring the various function, animation, audio, and video presentation that have being implemented.

1.5. Scope
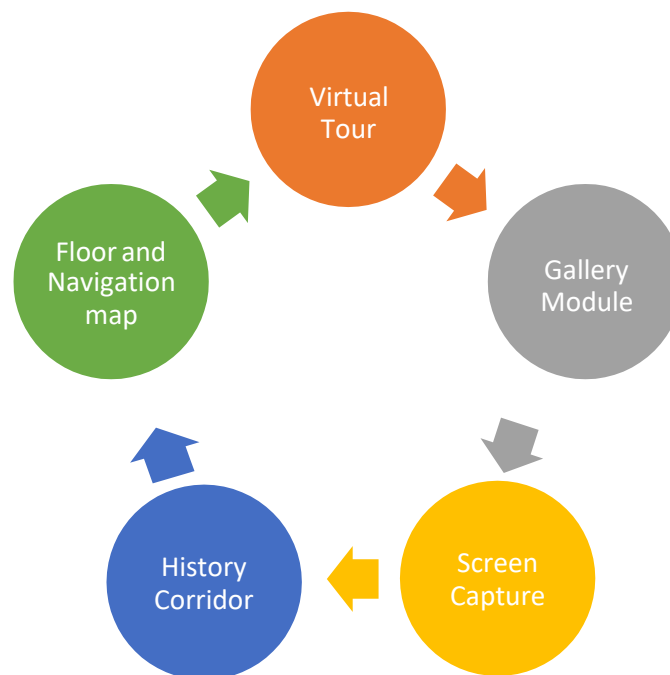
Figure 1.5 Scope Diagram

1.5.1 Virtual Tour Module

This is the module that focus on recreating the existing object. , ruins and galleries into 3D digital environment that can let user have the freedom of movement within the application and exploring the area they are interested with more flexibilities of view perspective and interaction.

1.5.2 Gallery Module

This is a module that show several highlights of the popular item and spots that often interested by others and ensure that user can navigate much quicker without wasting a lot of time searching blindly just to get to their desire location within the museum.

1.5.3 Screen Capture Module

The module that allows user to zoom in or out and capture their interesting finding or moments to share it with friends and develop more close relation by exchanging their opinions for further exploration.

1.5.4 History Corridor Module

This is the corridor that includes various present of rich media on the historical moments, item and ruins that have an important role in the history and presenting it with the help of audio, media, and video animation.

1.5.5 Floor and Map Navigation

Help user have a way to teleport and navigate faster with map that have labeled pin location that can be toggle on or off.

Chapter 1 Introduction

1.6. Contribution and Significant

The proposed system could provide a wide variety of contributions in the areas of cost savings, (history, art, and culture preservation), encouraging innovation, and education. By using the system, it can let more users access the exhibits they desire through any smart device without having to go through the hassle of spending a lot of money and time just to visit them physically. Furthermore, the system provides a rich and multimedia element for users to interact with and explore within the system, resulting in a more entertaining experience for the user. The system not only provides benefits to the visitor and user, but also helps the museum curator and management teams preserve more historical heritage and artefacts without having to worry about physical space for display and expansion. Moreover, by storing it digitally within the system, it enables the museum management to make changes, whether it is for shifting or replacing the artifacts, which able to helps them to be more flexible and efficient.

1.7. Target Audience

The targeted audience of the purpose system is focusing on the students and the curator of museum whereby the system is built to helps students in effective learning and to solve the problem faced by museum on space and resources.

First of all, in order to achieve the objective of solving the storage woes of the physical storage space in the museum, this virtual museum system is being introduced to solve some of the issues related to this problem. Due to the limited space of a physical museum, it is hard for the museum curator to provide a suitable location to all items and artifacts. Besides, it is also challenging for museums to obtain a large amount of financial support to expand their businesses and hall, especially for those nonprofit museums, which can result some historical item being left erode inside a storage warehouse and lead to more financial cost on maintenance and restoration. Therefore, the purpose of system is not just providing a solution on storage woes it also helps to reduce the financial burden of the curator.

As for the target audience of students, the virtual museum system also aims to propose a system that enable the student to increase their learning effectiveness and better learning experiences with the help of the rich media that was integrated within the system such as audio, video, images, text, and animation .

Chapter 2 : Literature Review

2.1 Definition of multimedia

In the explanation of the definition, multimedia is the combination of numerous types of media elements such as text, pictures, video, and audio and combining them into a single presentation or package [3] to create a rich and engaging user experience. It can be broadly classified into 2 categories which are the linear multimedia and interactive (non-linear) multimedia.

2.1.1 Linear Multimedia

Linear multimedia is a sort of multimedia that is intended to run logically and sequentially. Its elements have a distinct beginning and ending, that clearly distinguishing it from the interactive multimedia which its behavior is relies on human interaction. Linear multimedia, as compared to interactive multimedia, contains no interactive elements, and serves only the goal of providing material to the audience with little distraction [4]. There will be no expectation of audience interaction in linear multimedia because of its default nature. Some of the examples that may represent the linear multimedia can be the PowerPoint presentation, a video, a storyline ,TV shows etc.

2.1.2 Interactive Multimedia

The definition provided for interactive multimedia will be diametrically opposed to the definition provided for linear multimedia. This is because the purpose of interactive multimedia is to engage and interact with the audience in order to produce a more diverse user experience than linear multimedia can [5]. People will have access to more information and will take action to interact with the multimedia if they are given several alternatives depending on their unique interests. Here are some of the examples that may be categorized as interactive multimedia , such as a website, a search engine, social networking, video games and other modern technologies.

Chapter 2 Literature Review

2.2 Interactive Multimedia issues

When providing material that incorporates the usage of multimedia components, it is important to keep several considerations in mind before deploying the project. The considerations might include the sort of message to be given, human resources, digital and material assets, and levels of involvements.

Although interactive multimedia is considered superior to linear multimedia, however it is not appropriate for implementation in all scenarios. For instance, the example case on distribution of educational institution announcements, lectures, and practical notes, are less suitable for translation into Interactive Multimedia. This is because the other technique not only delivers the most cost-effective message, but it also does not distract the audience's attention away from the main topic. Therefore, by knowing the advantages, disadvantages, and limitation of interactive multimedia can help the developer to conduct better decision when planning and designing on a project.

Benefits

One of the key advantages of interactive media is that it may make technology more intuitive and easier to integrate into our daily lives [6]. In today's world, instruction manuals are rarely utilized or accessed since emerging technology is more focused on simplicity of use and allowing the user to comprehend the operation of multimedia products through the idea of learning by doing. By experimenting with the system, the user understands how to navigate oneself after locating their desired information in just small amount of time.

Limitations

In terms of limitations, the use of interactive media might be intrusive. This is because it requires some computer access and/or knowledge from the user, which might be problematic for the elderly [4]. Furthermore, if the interface, including the interactive multimedia, is not properly organized, it could result in an irritating and unenjoyable experience for the user.

Chapter 2 Literature Review

2.3 Application of Multimedia

<u>Multimedia in Education</u>

In today's technology the educational field does not maintain its traditional method on transferring and sharing knowledge for education through books and verbal presentation anymore. Many game companies had successfully work together with education institution to created educational games that are able to develop the innovations ideas on kids and enhance their flexibility on problem solving and other scenario. Besides, with the help of multimedia students can develop more interest to study because it can provide more rich and interactive interaction that the student will not lose interest and focus more easily as it provides visualization and entertaining presentation that cannot being experienced from the traditional method.

<u>Multimedia in Business</u>

In the business world, multimedia had impacted a lot on the business transformation and successful oppose a huge contribution on the rapid growth of business in terms of strategies, technologies, and culture. This is because the present of multimedia element have become an important asset for daily operations for all business firm today especially for small and medium enterprise that enable them open up the door for more opportunity on business expansion and reaching out for a larger scope or even global stage. The uses cases of multimedia in business world can be seen from the use of PowerPoint for business presentation, the balance sheet , email and so on.

<u>Multimedia in Medical Field</u>

Multimedia also plays a significant role inside me medical field because it makes a huge difference when doctors and medical professionals are provided a display that can present accurate and detailed visualizations of body details and it had made a huge difference in the way doctors are able to identify symptoms and medical cases in their patients in today's world. The multimedia on CT scans, X-ray images, real-time monitoring systems, and other multimedia tools, allow doctors to obtain detailed and accurate information about the patient's condition. Thus, this enables them to provide an optimal solution for the patient's medical needs, whether is by providing the suitable medication prescribing or surgery operation suggestion treatment.

Chapter 2 Literature Review

2.4 Multimedia in area of History

In recent years, the use of multimedia has grown importance in the study of history. The involvement of several types of multimedia elements such as text, images, audio, and video can assist the learner, researcher, or historian to grasp more understanding and visualization on the previous historical events, individuals, artifacts, and historical ruins. One of the uses of multimedia in historical lesson is that it can be used to increasethe motivation of students to learn more about the history, and it also helps to improve the learning style of student that trains them to be more independent on finding materials of studies which can boost their creative thinking and problem solving indirectly [7]. In addition, multimedia may also be utilized to portray historical facts and associate events in innovative and entertaining ways .In this example, the use of videos can enable the series of key events being presented as a chronological overviewfor learner on grabbing more in-depth information such as the key individual, timeframe, and events in the particular studied history content [3].

2.5 Review on Similar Applications

2.5.1 Review on 360 Virtual Tour
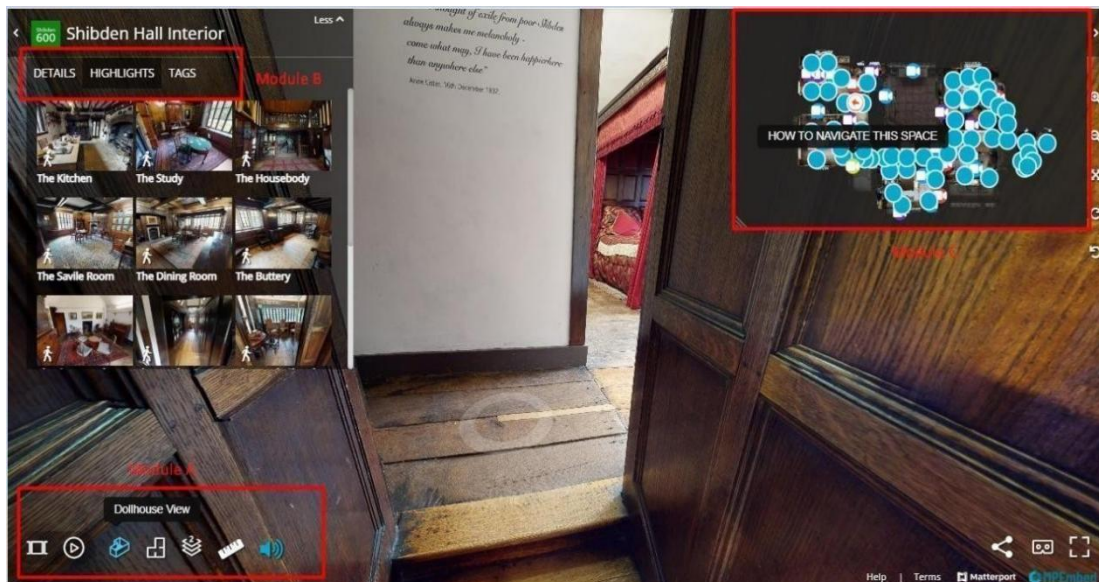
Figure 2.1 Shibden Hall Interior

Strength

      This is a well design web-based 3D virtual tour application on Shibden Hall. The application not only contain several interesting features, but it is also designed to have clear and user-friendly interface which can be seen by Module A and B which the name of the button will appear upon hover. This is very good interface design that not only simple and clean it also allow user to hide the module with the drop-down arrow button for more clear view of surrounding. Beside in the Module B, it can be seen that the application also provided a tab that allow user to see review some of the interesting highlight which are most interested and visited byothers. The Module C is a well label map that allow user to fast travel to any desire location in just a simple click without getting lost.

Weaknesses

      However, there is a few limitations and disadvantages of this virtual museum is that it required user to have a good internet bandwidth because it is a web-based application that implanted with a lot of media element such as video, audio, and text store in the cloud. Therefore, if the user has lower than average connection speed it will be less convenient and pleasant for them to use it because most of the element, they interact will be stuck in load.

Chapter 2 Literature Review

2.5.2 Review on National Museum of Natural History Virtual Tours
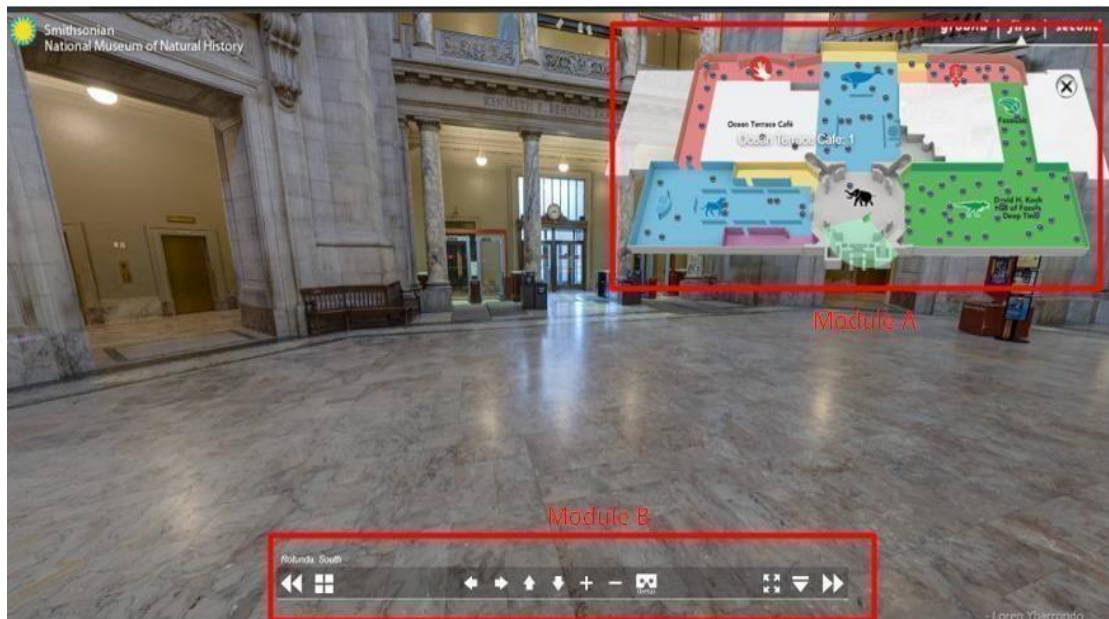
Figure 2.2 National Museum of Natural History

Strength

This is a virtual museum tour page for Natural History Museum in London. Which strength of making it accessible on anytime and doesn't require user to book for a time on visiting or tour. Besides, it also contains the function of Module A it can help user quickly navigate through location and floor with the provided map on the top right. Not only that the map location is pinned with individual name that allow user to identify their location and navigate with less issue.

Weaknesses

However, there is a few limitations and disadvantages of this virtual museum is that the loading speed of accessing the page are far slower and the image rendering is start from very blurry quality which can discouraged user before really exploring it. Beside the user interface of Module B are very lacking in labeling does not even have any names or description on them which can make it very hard to understand by novice on its function. Lastly, the whole application is very lacking in other media such as audio and video that can bored out the user in a short period of time.

2.5.3 Review on Muzium Negara Application

Figure 2.3 User-Interface of
 Muzium Negara App

Figure 2.4 3D-model of the museum

Strength

   Muzium Negara Application is a mobile application that act as an assisting tool to enhance user experience when visiting the museum that allow them to scan the QR code available within the museum by interact with the Module A. After that, the application willgenerate the representative 2D and 3D multimedia content through Augmented Reality (AR) technologies.

Weaknesses

   However, this application that is being implemented is more to act as an information counter and additional tools that does not consist of a lot of details of main historical content within the museum and not only that function is very dependent on having customer to visit the museum physically to understand and fully experience its function ability.

Chapter 2 Literature Review

2.5.4 Review on Cyark
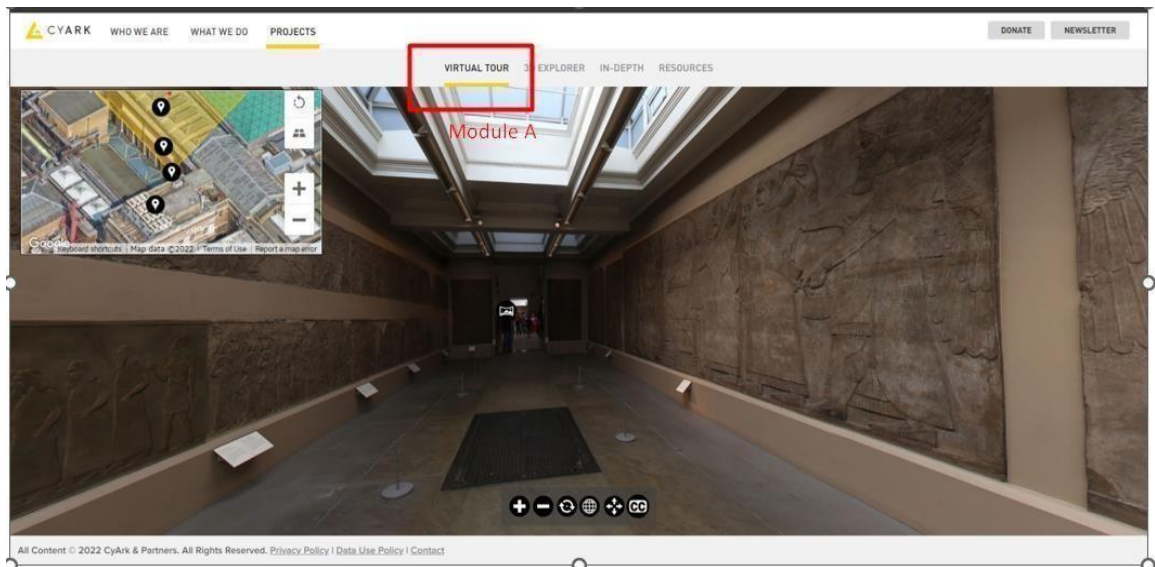
Figure 2.5 Virtual Tour of
British Museum
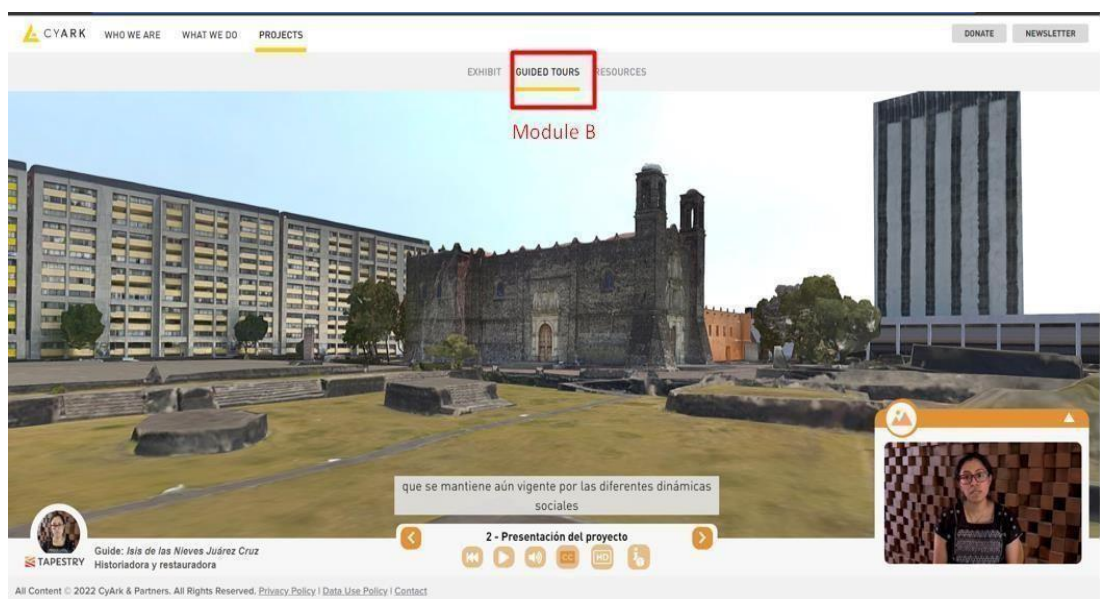
Figure 2.6 Guided Tour of
Mexico City Heritage

Strength

Cyark is a web-based application with 3D recording and rendering for the sole the purpose of preserving and bringing immersive experiences that help to inspire imagination and innovation of audiences.

Chapter 2 Literature Review

The application had 2 type of tour style which are being determined as the Module A and Module B. For the Module A it is more focus towards giving the sense of exploration that allow user to freely move around and explore more in-depth of the surrounding. On the other hand, Module B have lesser exploration area, but it is focusing more ongiving storytelling presentation with rich present of audio and video by experiences workers and people that can provide more insight that cannot be obtained from books and label.

Weaknesses

However, this application has several problems despite having a lot of different feature and rich presence of media elements. Firstly, the Module A and Module B are separate features and could be exist within the same project and it limited the benefits given of each Module provided. Beside the movement control with the engine powered is veryrestricted that resulting can reducing the fun of experiencing and discourage user with the desire to more freely on exploring

2.5.5 Review on Shapespark
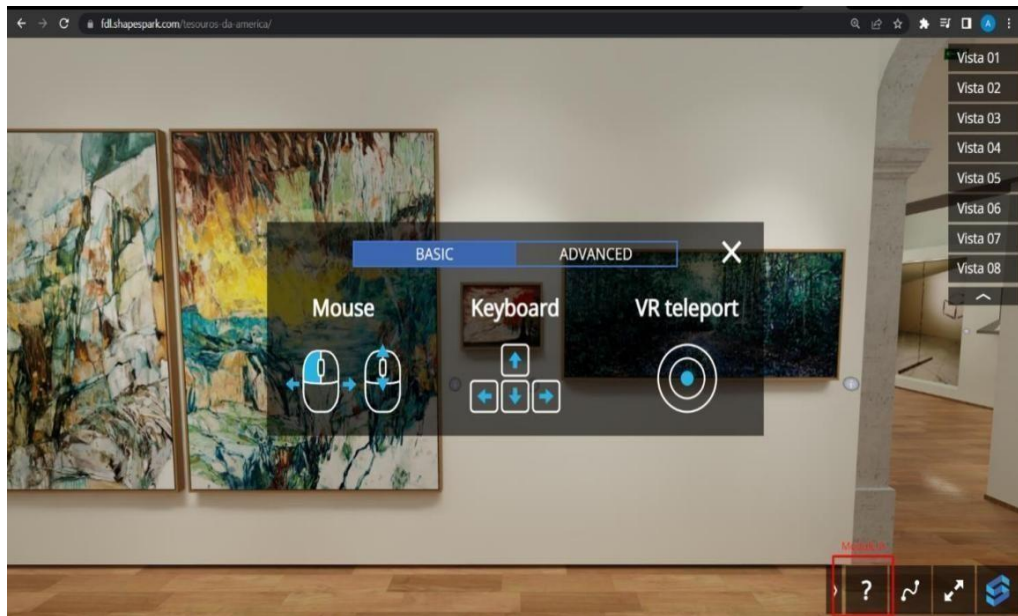
Figure 2.7 **Tesouros da América** Museum 1
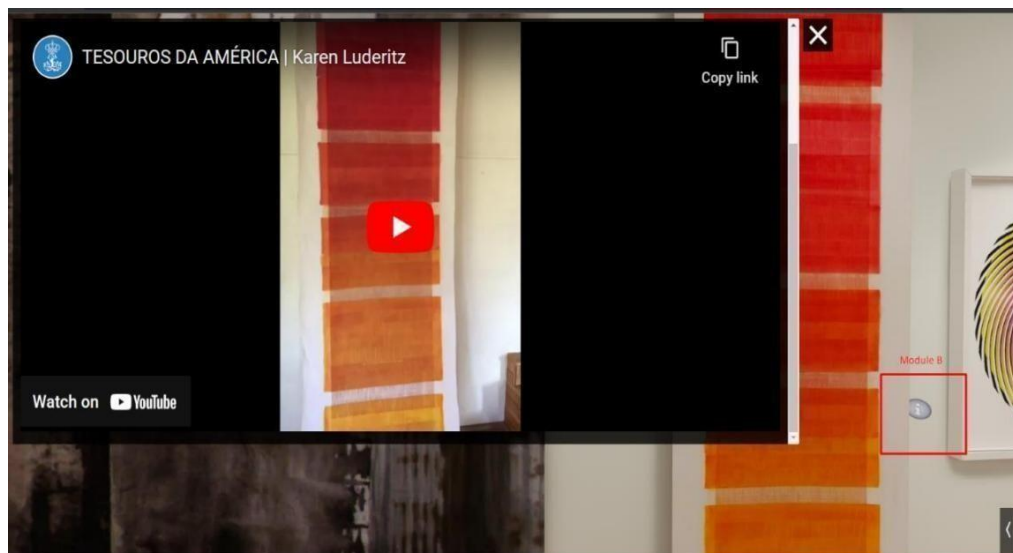
Figure 2.8 **Tesouros da América** Museum 2

Strength

Shapespark is great web-based tools that help designer, architects, and other user to create realistic visualization projects for real-estate , building and modeling. The application had a great built-in system that can simulate realistic global illumination where the object.

contains lightning and shadow. Beside the movement system of Module, A are more capable of achieving full free movement compared to most of the current available virtual museum in the market, but it was also highly compatible for various devices example, computer. ,mobile devices, and Virtual Reality (VR) equipment.

Weaknesses

Although, the application contains of high-performance system and design quality but there is also some lacking within the program. Firstly, it can be seen that the pop-up window is too big and non-resizable when interact with the Module B, which it can be distracting and bring unpleasant viewing experience for some users. Beside the application does not obtain any map to indicate where the user is located and hard to identify the correct way to go if they had a desire location

Chapter 2 Literature Review

2.5.6 Summary of the Similar Application (Comparison Table)

Comparison Tables

Table 2.1 Comparison Table of Multimedia Element

Application	Multimedia Elements						
	Text	**Graphic**	**Audio**	**Video**	**Animation**		**Augmented Reality (AR)**
					2D	**3D**	
360 Virtual Tour [3]	✓	✓	✓	✓	✓	✕	✕
National Museum of Natural History Virtual Tours [4]	✓	✓	✕	✕	✓	✕	✕
Muzium Negara Application [5]	✓	✓	✕	✕	✕	✕	✓
Cyark [6]	✓	✓	✓	✓	✓	✓	✕
Shapespark [7]	✓	✓	✓	✓	✓	✕	✕
Virtual Museum Application for Lembah Bujang	✓	✓	✓	✓	✓	✓	✓

Chapter 2 Literature Review

Table 2.2 Comparison Table of User Interface Design

Application	User Interface Design				
	Font	**Label**	**Navigation**	**Simplicity**	**Interactivity**
360 Virtual Tour [3]	3	5	4	3	5
National Museum of Natural History Virtual Tours [4]	2	3	4	4	3
Muzium Negara Application [5]	4	3	1	3	2
Cyark [6]	4	2	5	3	4
Shapespark [7]	3	2	3	4	4
Virtual Museum Application for Lembah Bujang	4	5	4	5	5

1 - Bad   2 - Poor   3 - Average   4 – Good   5 –Excellent

2.6 Exploratory Learning Approach

For this project, the author will be using Exploratory Learning approach which its purpose is to train and encourages learners acquiring the knowledges by explore and experimenting to discover relationship with less focusing on traditional and plain teaching method in schools or any learning facility.

2.7 User Requirement Gathering

2.7.1 Survey Questionnaire

It is very important to understand the requirements and expectations of the target audience while creating and planning for any project. Therefore, one of the most effective and popular data collection technique that can be use is the questionnaire. By asking precise questions, we can obtain insight into the user's preferences and make knowledgeable judgements regarding the virtual museum's design and operation. To ensure the questionnaire provide the data and insight that are meaningful to the project , the 5W1H framework has been used before setting up the question. Which the main focus is on what is the main objective and gains from this questionnaire , who are the suitable targeted audience on this project, when is the time that respondent will use multimedia technology on studies, why they are interested in history and multimedia technology, where they will access the information and technology from and how can the project help them on gaining more interest and explore more about the history with the help of technologies.

2.7.2 Data collection and analysis
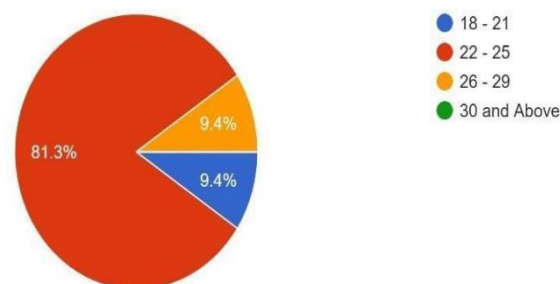
Figure 2.7.1 Age of Respondents

Based on the figure This is a demographic question that falls under section A along with 3 other sections. According to the pie chart the majority age range of

respondent is fall under 22-25 with 81.3% are within this age range. The age range of 18 – 21 and 16 - 29 have almost the same number of respondents with the difference of 1 person with 4 to 3. However, there is not any respondent are from the age group of 30 and above. As a result, we can see that the respondents that around the age of 22-25 have more interest in the studies on the association of technologies in history learning field.

2) Gender
32 responses

34.4%

Male
Female

65.6%
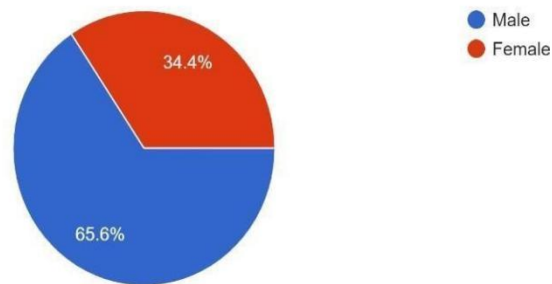
Figure 2.7.2 Gender of Respondents

This is a data set that have been categorized as "Male" and "Female which from this pie chart shows that the result of Male participating in this survey and it had 65.6% of population compared to female with only 34.4% with the difference of 31.2% which are almost double in the range of differences. Therefore, this can be a sign of showing that there is more male respondent are interested in the field of studies.

Chapter 2 Literature Review

3) Ethnicity
32 responses
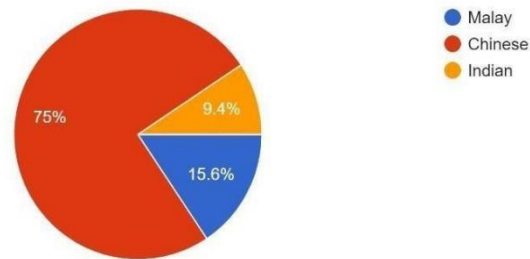
Figure 2.7.3 Ethnicity of Respondents

According to the pie chart, the bulk of the sample collected (around 24 people) identify as Chinese, followed by 5 Malay and 3 Indian. The cause for this distribution might be caused by a variety of factors, one of which could be the location of the target population being questioned. This is because the questionnaires handed out are focused on the population of Kampar district near area of the University Tunku Abdul Rahman, whereby the overall population of Chinese residents in this area are the highest among other ethnic groups.

4) Which Faculty are you from?
32 responses
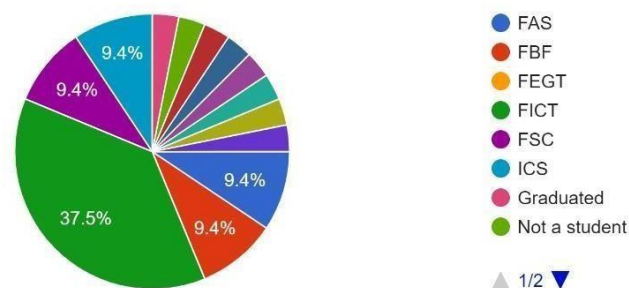
Figure 2.7.4 Faculty of Respondents

The result gathered from this pie chart had variety of question due to some of the respondent may not be a part of the same university or even some of the respondents are already graduated and work as a full-time worker. When focusing on the respondent within the same university it can be found that majorityrespondent from

the FICT faculty is the highest among the among respondent with 37.5%. Followed by the 4 faculty with the same amount of respondent which are the faculty of ICS, FSC, FBF and FAS with respectively 9.4% each. The majority respondents are mostly from the FICT faculty is mainly cause by the facts that the of the area of this survey topic are involving with some in-depth technological terms that may not be interested or understandable by students from other faculty.

5) Which of the following historical event that happen in Malaysia history interest you the most?
32 responses

- The founding of Malacca Sultanate in year 1400
- The occupation of Japanese during World War 2 in year 1941-1945
- 13th May incident that happen between Malay and Chinese that lead to state of emergency in year 1998
- General Election (GE-14) that result in the winning of Pakatan Harapan in the majority seats in parliament and the fir…

31.3%   18.8%

21.9%   28.1%
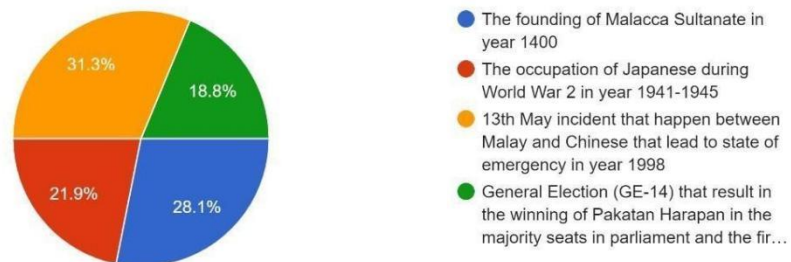
Figure 2.7.5 Interested Historical Event of Respondents.

Now this is the first question of section B which the subtopic of research on more about on the perception on Malaysia history of respondent. This most interested historical event that happen the be highest is the event of 13th of May incident that happened the outrage of Malay and Chinese that lead to the state of emergency in year 1998. Which this is the main riot that change Malaysian perspective and form a better bond and sense of unity in current society.

6) Which of the following historical monument that you have personally visited before?

32 responses
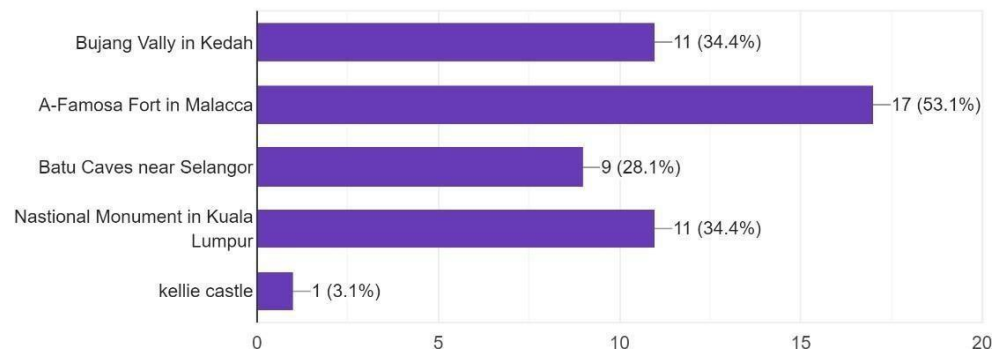
Figure 2.7.6 Visited Historical Monument of Respondents.

According to the bar chart it can be seen majority of is the most common historical monument that had visited among most of the respondent is the A-Famosa Fort in Melaka. The Nasional Monument and the Bujang Valley Museum are the second highest representative in this chart. Followed by Batu Caves and lastly the Kellie's Castle which are in Perak. The reason behind A – Famosa fort is the highest selection is mostly because of the popularity of its unique European architectural structure that are the oldest remains in Asia. Beside it is also located beside the St. Paul's Hill& Church that is popular among the tourist attractions available.

7) What do you think of Malaysia's history in comparison to other Southeast Asian countries?

32 responses
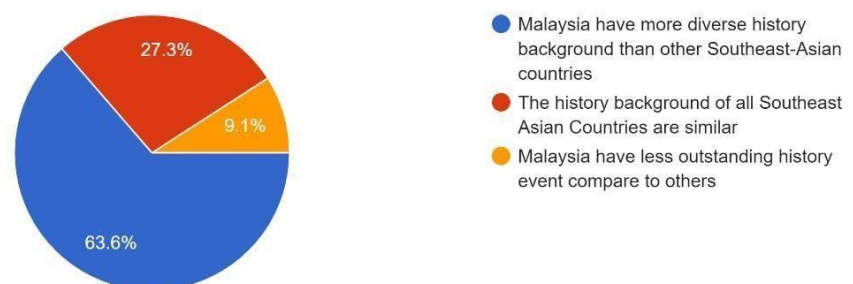
Figure 2.7.7 View on Different Southeast Asia Countries History of Respondents.

Chapter 2 Literature Review

This is an opinion views of Malaysian towards the feel of historical available in our country compared to the other southeast Asia countries such as Indonesia, Cambodia Brunei, and others. According to data Majority of respondents are agree on the point that Malaysia have more present of rich history background compare with other Southeast Asia countries with 63.6% supportive answer. Followed by the population of 27.3% of respondent that think the majority history background of all these counties are mostly similar and lastly only minority of person think our Malaysia had lessor outstanding background compares to other.

8) In your opinion , what is the biggest challenge faced by Malaysia traditional museum in efforts to preserve and restore historical heritage?

32 responses

- Lack in human resources and funding
- Impact of modernization that emphasize more on building construction instead of historical site
- Lack of public awareness on the importance of historical heritage for future generation and sociaty.
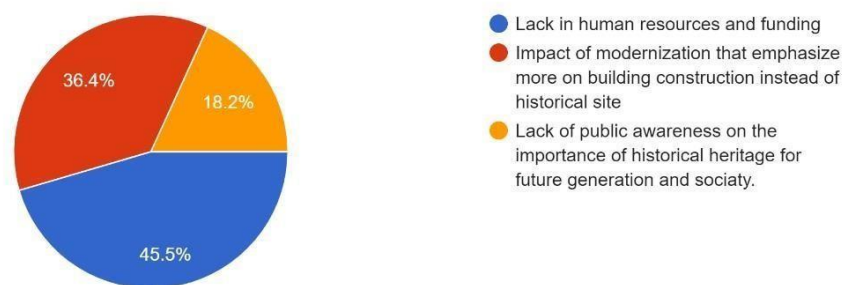
Figure 2.7.8 View on Challenge of Traditional Museum in Preserve and Restore of Respondents.

According to the pie chart, respondents believe that the most difficult factor in restoring and preserving historical heritage is a lack of physical resources and funding, with a 45.5% support rate, followed by the impact of modernization, which causes a focus on modern buildings other than the historical site, at 36.4%, and finally, a lack of public awareness of the importance of preserving for future generations, at 18.2%. This is mainly because most of the museums available in Malaysia are non-profit organizations, which makes it hard for them to provide and expand on the exhibitions that can provide more variety for attractions. Therefore, the lack of resources makes them unable to afford changes, which is one of the most challenging factors when comparing them with other profitable museums.

9) Do you believe it is crucial to protect historical buildings and objects?
32 responses
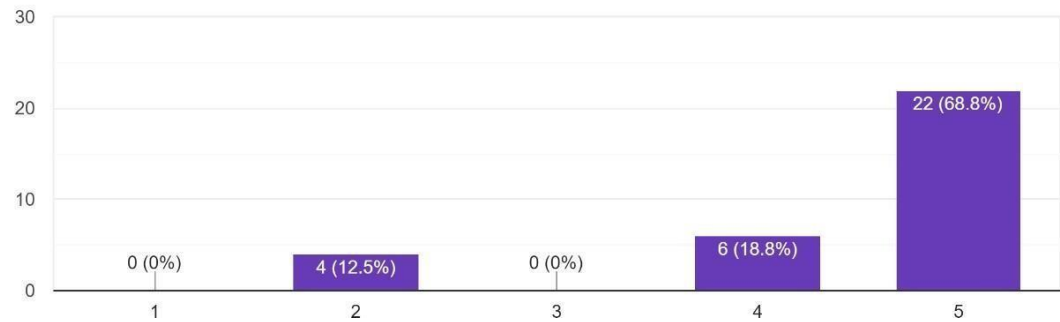
Figure 2.7.9 View on Importance of Protecting Historical Heritage of
Respondents.

This is a bar char that represents the total answer that was received in the range of strongly disagree to strongly agree, with a choice of 1 to 5. In the end, we can observe that the majority of the respondents (more than half) strongly agree with 22 choices, which corresponds to 68.8%. Following that, a couple of the six responders agreed and just four disagreed with the question. The reasons for disagreement might range from a lack of interest in history to a dislike of acknowledging history.

10) Do you agree that every Malaysian should be aware and learn about our country's history?
32 responses
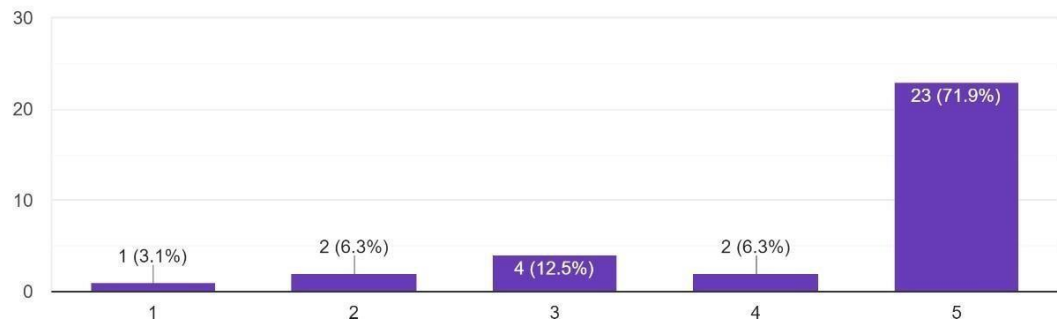
Figure 2.7.10 Acceptance of Respondents on Promoting Historical Awareness

This is also a histogram that represents the scalability of selection from strongly disagreeing to strongly agreeing. Based on the data collected, most respondents (23 out of 32) strongly agree that every Malaysian should be aware of the history of our own country. Although this data shows some variability, the average score still reaches 4.53, which indicates a positive sign of agreement among all the respondents. Thus, the data suggest that, as Malaysia, it is important to acquire some knowledge and understanding of nation history so that we can gain insight from past events and improve from them to avoid mistakes and become better people.

Figure 2.7.11 Opinion of Respondent on Online Learning

Chapter 2 Literature Review

Now move on to Section C, where the subtopic that will be the focus of this section is the use of computers in learning. According to the short answer provided by the respondent, it appears that most of them had firsthand experience with an online learning environment. The reason that leads to this scenario can be categorized into a range of aspects, which can be from personal curiosity about the online learning environment to the outbreak of the COVID-19 pandemic in 2019. After analyzing all the responses, a few respondents state they are unable to concentrate because of various distractions that can easily occur while learning online, whereby they often seek entertainment instead of focusing on their studies when browsing the internet. On the other hand, some proportions of respondents considered it could help students be more effective in learning, as they were able to have more flexibility and less stress in their time schedule planning and could review the recorded lectures easily for revision later at anytime and anywhere. In conclusion, based on all the comments, it shows that different opinions may depend on individual circumstances and choices, thus online learning can be a mixed experience.

12) Which are the type online resources and material that you will preferred while research and studies on history?

32 responses
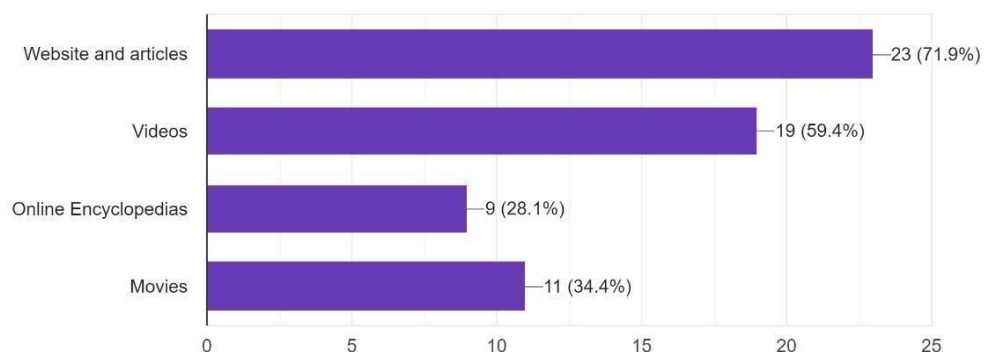
Figure 2.7.12 Opinion of Respondent on Research Material

This is a multiple-choice question that asks respondents to choose two or more options for what online resources and materials they believe are the most preferred ways to gather and discover historical knowledge and information. According to the results, websites and articles were the most preferred sort of online resource for history.

research and study, with 23 out of 30 participants choosing this choice. Videos and movies are also popular among the selection, with 19 and 11 people opting for them, respectively. And lastly, the online encyclopedia is the least desired form of resource, with just five individuals making this choice. The cause of the result may be considered from various factors on the scale of details, visualization, and information provided from the sources of material.

13) What is your biggest barrier on accessing online resource when using computer technologies for research and learning?
32 responses
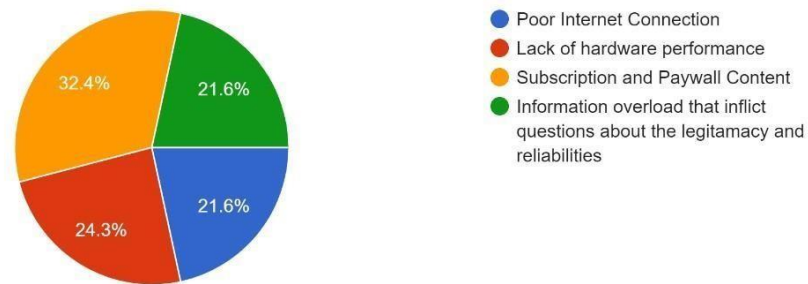
Figure 2.7.13 Opinion of Respondent on Barrier of Acquiring Online Resource

This is a question that focuses on asking the respondents what their biggest barriers are when trying to access online research when learning or researching a certain topic. According to the statistics, the most often recognizable problem that has the highest encounter is the barrier on the subscription and paywall content, for which this option has been selected by 32.4% of respondents, and the barrier of poor internet connection and information overload have the same amount of respondents, both at 21.6%, and lastly, this option is the second highest encounter issue among the other barrier, which is the lack of performance, with a score of 24.3%.

14) What kinds of virtual computer learning environments you think will work the best for learning history?

32 responses

● Online classes or webinars
● Quiz and flashcards platform
● Collaborative learning tools
● Virtual simulation or games
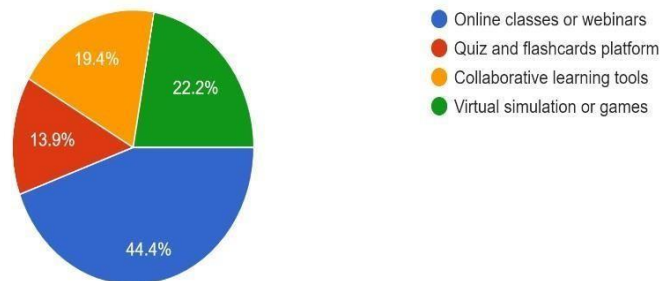
Figure 2.7.14 Opinion of Respondent on Different type of Online Learning Environment

According to the statistics in the pie charts, most respondents (44.4%) consider online classes or webinars to be the most effective approach to learning history in a virtual computer learning environment. The virtual simulations or games were the second most popular choice among respondents, with 22.2% picking them. Other alternatives, such as collaborative learning tools and quiz and flashcard platforms, get 9.4% and 13.9% of responses, respectively. The majority of respondents clearly prefer online classes or webinars, showing that they prefer more organized and engaging learning settings.

15) When there's a new online learning technology or software being introduced, how do you adapt yourself to become familiar with its various functions?

31 responses

● Exploring and experimenting it by ourself
● Ask helps from others
● Refer to online manuals or tutorials
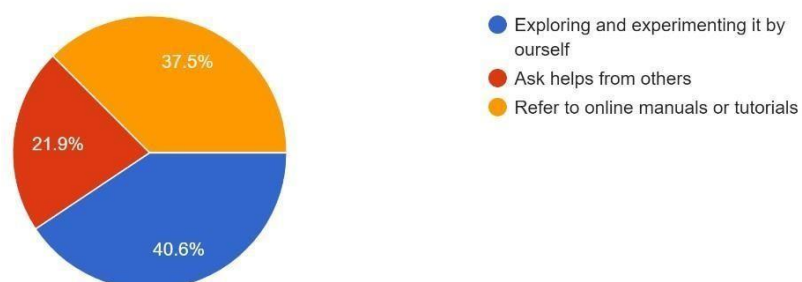
Figure 2.7.15 Ways of How Respondent Adapt to The Changes of Technology

This is a question to ask on how respondent will react and adapt towards the new

online learning technology and according to the data it can be see that the majority will prefer to explore the software and system by themselves with 40.6% of response supporting this answer. A small proportion of respondent which are 37.5% choose to refer to the online manuals and tutorials video when facing any issue or troubleshooting. And the least preferrable way is the wayof ask helps from others with 21.9%. The option of exploring and experimenting on themselves is probably because of the fell more ease and secure to learn the software through trial and error which allows them to get know with the smaller details of the system and make better personalization and customization in the setting.

16) What are some of the future trends in technologies that you think might become widely replace or enhance traditional education?
32 responses
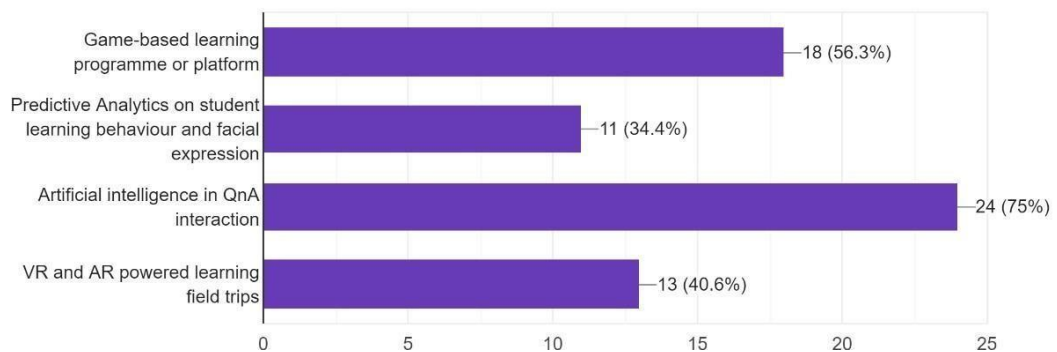
Figure 2.7.16 Opinion of Respondent on Future Technology Trends

This bar chart is a statistical data that shows the most popular technology trend which has the potential to replace or enhance traditional education. Among all the other dataset, the artificial intelligence in Q&A interaction received the highest score, which it was picked up to 24 times and score a 75% within the entire data. The second-most popular trend was a game-based learning program or platform, which received 18 responses that are equivalent to 56.3%, followed by the VR and AR-driven learning field trip, which received 13 responses which is 40.6%, and finally, predictive analytics on student learning behavior and facial expression, that only received 11 votes out of 32 respondents. The major factors that may cause this scenario are probably the sudden appearance of advanced AI technologies such as ChatGPT, MidJourney, Copilot, in the

market that had created a huge impact on not just the technology field but providing the change of views on technologies for all individual as well.
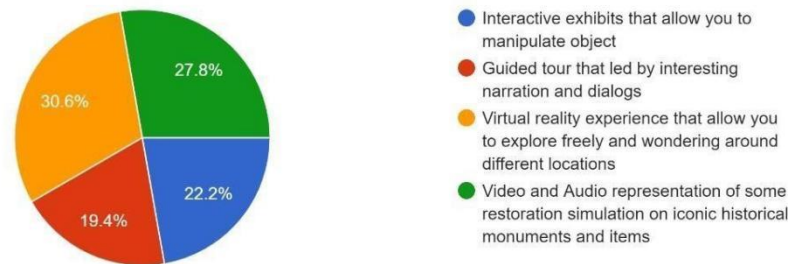
Figure 2.7.17 Option for Respondent to Select on Preferred Way to Learn and Gather Information

This is the final section of the questionnaire, which the goals of these questions are to collect user feedback and requirements for the Virtual Museum modules. For this question, it is design to gather basic ideals of what the most desirable function for users to access information via the virtual museum, as well as addingsome rich multimedia elements with some level of interactivity that can create an enjoyable environment for users to experience. Based on the pie chart above the most selected option with the result of 30.6% among all user is indicating that function of virtual reality experience that allow user to explore freely around the virtual space are more desirable ways for user to obtain the details , information, and knowledge through the virtual environment. The second highest option out ofthe others is the present of video and audio elements that able to recreate or restoreon certain iconic historical monument with 27.8% of total selection. After that it will be the interactive exhibits that allow to manipulate with the 3D object and access to the info board with 22.2% and finally the guided tour with only 19.4%.

18) Which of the following benefits you might get the most by capturing and sharing picture of the historical monuments and various views of the virtual museum?

31 responses

- Generate discussion topic and form more close relationship with relative and friends
- Can be stored and use as references for deeper research and discovery
- Helping others by providing visual tips and guide on navigation or performing some specific action.

Figure 2.7.18 Opinion of Respondent on Capture and Sharing Picture About the Virtual Museum

From this pie chart show that the overall data on the opinion of respondents on the benefits can provide from the Screen Capture module on taking and sharing pictures on interesting and memorable moment. After analyzing the response, the highest option that had been selected by the respondent is the option of generating a discussion topic, with 52.9 % of supports. The second highest option that had been picked out is the benefits of storing the pictures for other purposes, which had around 26.5 % of respondents select it. And the last option of the benefits of using it as a guide to help friends or others navigate to their respective locations orperform some action, with 20.6 % of the vote. The reason that the option on generating topic scored the highest among respondents is mostly because by sharing the same interesting topic together with friends can help people to build closer relationships and gain trust with their family, relatives, and friends.

19) In your opinion, which are the type of background music should be used that would provide the least interference for exploring and learning within the virtual environment?
31 responses
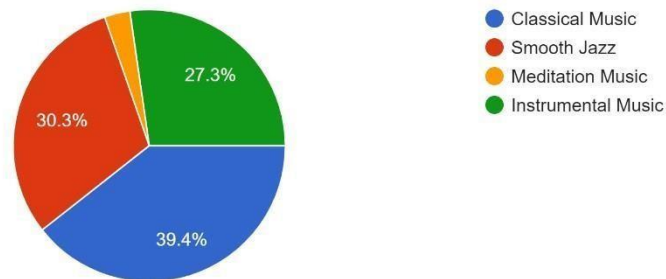
Figure 2.7.19 Opinion of Respondent on Suitable Background Music

This is a pie chart represent the overall data collected to find which are the most preferred background music for music. As it can be seen that the classical music received the highest vote compares to other and the music selection with 39.4% of respondents agree with the choice. From the data the Smooth Jazz were also frequently selected by respondent with 30.3% which just fell shortly behind instrumental music. The third highest option among the four selection is the instrumental music with 27.3% and last is the meditation music. Based on the result it can be said that the most suitable type of music to be added is the Classical Music as for finding in several research it could help to reduces stress and increase dopamine secretion on helping brain to absorb information more easily.

19) In your opinion, which are the type of background music should be used that would provide the least interference for exploring and learning within the virtual environment?
31 responses
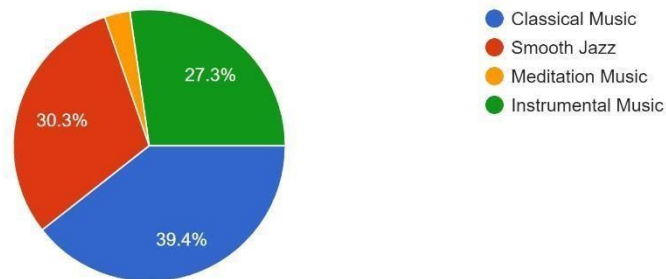
Figure 2.7.20 Opinion of Respondent on Most Important Media Element

According to this bar chart, the purpose of this multiple-choice question is to know which media will be the most important and can provide the most benefits for presentations to stand out and attract attention. After analyzing the data, it can be seen most of the respondents think the video element is quite important, with 29 selections, which is incredible high compared to other media elements. Audio had been selected as the next most popular medium with 20 votes. This is mainly because the video must be on par and work together, as the video provides visualization and the audio provides context, which enable the user to get a better understanding of the presented information. Then the third highest medium is the graphic within the virtual museum, with 17 picks, followed by the text element with 16 and lastly animation with 13 responses. According to the data, most of the media elements are still important and relevant to the system. However, the result can be utilized and help make the decision on which media to give more focus on and which should be lesser in order to increase the efficiency and performance of the system.

21) Which of the following aspect of user interface design is more preferable by you?
31 responses
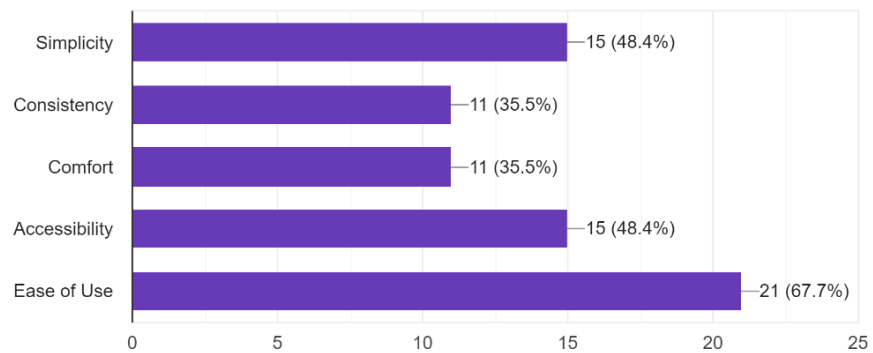
Figure 2.7.21 Suggestion of User on Aspect of User Interface

This is the multiple-choice question that requires the user to prove more than one selection, which can contribute to building a well-designed user interface that is unique as well as fitting towards the requirements of users and curators. Based on the data gathered, it can be observed that the respondents prioritize the ease of use of the functions, which have a total of 21 selections. Following by Simplicity and Accessibility, which the two options happened to have the same score of 15 picks, as well as the same situation faced by the options of consistency and comfort with 11 votes respectively. As a result, we are able to notice that users place a higher value on interfaces that are simple to use and take little to no effort to operate and navigate.

22) Do you think a proper navigation method very matters while exploring a virtual museum?

32 responses
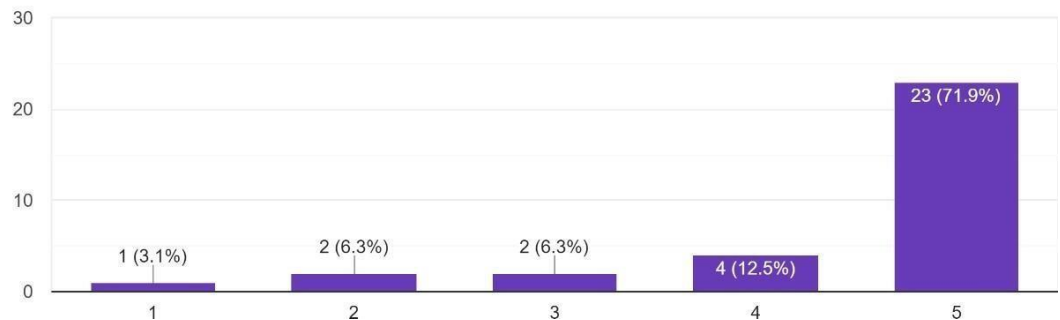
Figure 2.7.22 Opinion of Respondents on Presence of Navigation Method

According to the data in the bar, most respondents, with an average rating of 4.8 out of 5, strongly agree that effective navigation methods are crucial when travelling inside the virtual museum. As it can be seen, the user wished to be able to easily navigate across the virtual museum, therefore having clear and user-friendly navigation is a vital component of virtual museum design. The two people who differed might have had difficulty navigating or had different perspectives about what constitutes competent navigation. Overall, the high average rating demonstrates the significance of a well-designed navigation system in providing a fantastic user experience and encouraging people to return to the virtual museum on a frequent basis. Although there is present of few respondents that disagree on the use of navigation method as they might face issue of having trouble to understand on how to operate it or just simply have different or better opinion regards to the question.
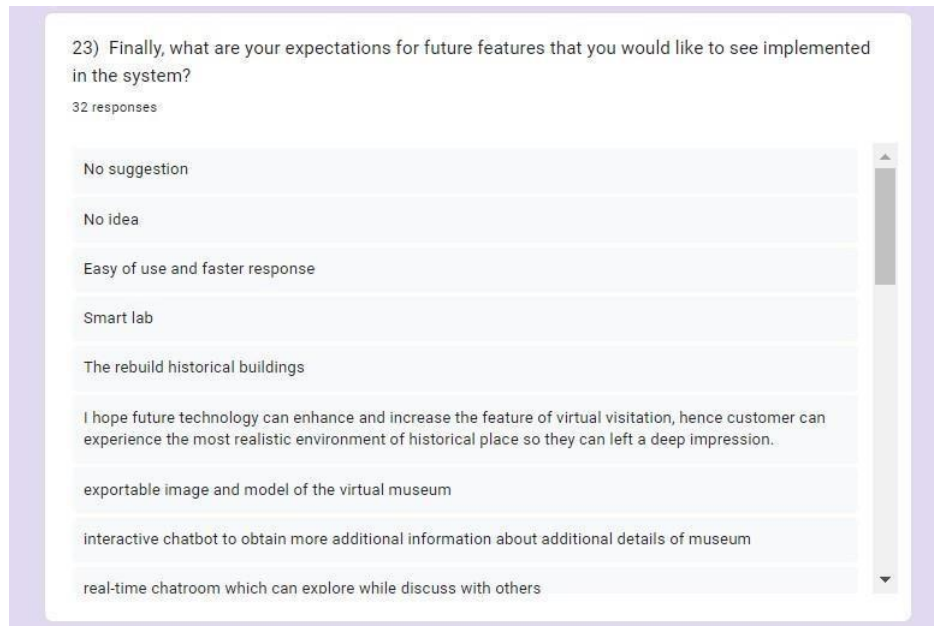
Figure 2.7.23 Overall Suggestion and Suggestion of Respondents

This is the last question, and it is in the formof open-ended question that allow to gather more ideas and suggestions from respondents on better improvement. Based the feedback gathered, there are a few common suggestions for improvements to the system that consumers would like to see that can be added or implement into the system. For instance, many respondents would like to see improvements in term of ease of use, response times, and internet connectivity. In addition, respondent had also provided some suggestion ideas of adding the integration of smart labs, 3D animation, virtual reality element, minigames and interactive chatbots that can enhance more engaging and immersive exploring experience.

Besides, respondent is also looking for other unique external features that allow some additional customization options to increase their privacy such as login system and various export capabilities. Other than that, some user also suggested that the system can have more integration across other learning platform so that they can retrieve and manage the information they needed that are located within the system more efficiently.

As conclusion, these suggestions shows that the respondent are requesting a more user-friendly and immersive experience that allows them to personalize their learning and interact with historical learning material through the system in a more engaging and satisfaction way.

Chapter 2 Literature Review

2.7.3 Discussions

From the result and data gather of 32 questionnaire response it can be see that , the majority of respondent are fall under the age group of 22-25 years old with the percentage of 81.3%. Which from this result it fits the objective of this project whereby the targeted audience are on university student and allows to observe and record the outcome more easily by identifying on how the virtual museum application had actually helps them to achieve better studies in terms of efficiency and effectiveness. Besides ,majority of university students that participate in this survey are also student from FICT faculty which they are highly knowledgeable on technology, and they are able to provide more ideas, insight, and accurate feedback on how to make improvement or develop new features for the system.

Next is the opinion of current society towards the unique cultures and historical heritage of our nation. From the result of question 7 to question 10 it can be seeing that majority of respondent still cares and vary about out importance of our own Malaysia history as without them we will not be able to have achieve the development in terms of multi culture relationship, well and fair legal system, different kind of foods and so on.

Finally, the interactive AI chatbot is also a feature in question number 16 that the user would like to see being implemented for the future system as it has the highest vote, among others. This result occurs might be due to the sudden growth of use and reliability on ChatGpt had become popular people around the world which it is not only limited to people from technology field it also brings a lot of advantages and impacts towards the society.

3.1 Overview

In this part, before the process of developing the system begins, a set of system requirements is set and recorded, which will help to filter out the most useful tools needed to build the system. Which the software and hardware requirements will be taken into consideration for development. Then a set of functions will be standardized by using the ADDIE model, which helps identify the most effective and efficient system design by following the 5 phases, which will start with analysis, design, development, implementation, and evaluation. And lastly, the system flow and storyboard will be created for the system, as it can help to better understand the overall flow with the visualization of diagrams.

3.2 Technology Involved.

3.2.1   Software Requirement

Table 3.2.1 Text Editing Software

Name	Description
Microsoft Word	A licensed software by Microsoft that is a word application. that enables user to create simple and comprehensive. documents.
Notepad	Also, a word processing software that simple purpose of storing data and act as a draft without complex format and design.

Table 3.2.2 Graphic Editing Software

Name	Description
Canva	Software that is easy and efficient to use with its massive collection of sample references, template, and element, existing. within its database.
Microsoft Paint	Build in system tools that can used to perform simple

	graphical design and editing towards some image like drawing. shape, changing color and deleting.
Remove.bg	Online based AI powered tools that auto remove any image. background color, aspect, and irrelevant object which the result will be used as an asset to create 3D model.

Table 3.2.3 Audio Editing Software

Name	Features
Sound Forge	Audio editing software that able to record in perform high quality record, restoration as well as modifying with variety. of effects
Audacity	Open source and cross-platform audio software that is more. easier to use and have several useful features that can perform. multi-track editing.

Table 3.2.4 Video Editing Software

Name	Features
Adobe Premiere	Powerful editing tools that widely used among professional because of its massive number of effects, color tools, transition that able to boost the quality of video.
CyberLink PowerDirector 365	Ease to use and provide simple and clear interface that contains essential editing features from trimming, joining to some simple effects.

Table 3.2.5 Animation Editing
Software

Name	Features
Blender	An open-source video animation software that can support in creating 2D and 3D animation, rendering ,simulation and so on.

OpenToonz	Free and open-source tools that help to create 2d animation. video that are packed with many features like, weather, condition effects, motion twining and tracking.

Table 3.2.6 Authoring Software

Name	Features
Unity3D	Integrated development environment that allows user to create physics ,movement and rendering with drag and drop elements.

3.2.2 Hardware Requirement

The hardware involved in this project is a laptop which it was use in the process of modelling 3D model for the sample collected for Lembah Bujang Museum. Besides, it is also use for coding for the movement and viewing simulation of user while navigating inside the 3D environment.

Table 3.2.7 Specifications of laptop

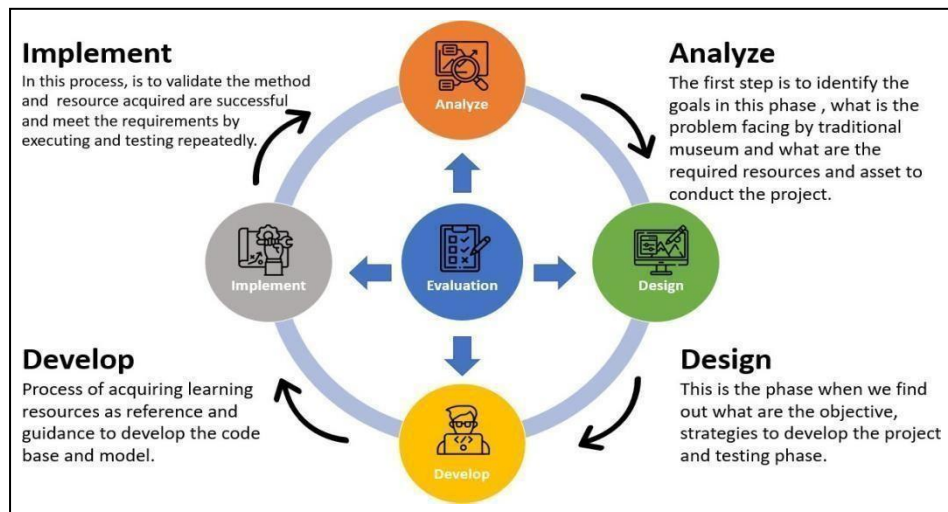| Description	Specifications
Model	HP Pavilion Laptop 15-cs2000 series
Processor	Intel(R) Core(TM) i5-8265U
Operating System	Windows 10
Graphic	NVIDIA GeForce MX250 GDDR5 (2GB)
Memory	(8GB) DDR4 RAM
Storage	SAMSUNG MZVLB512HAJQ-000H1 (512GB) SSD

3.3 ADDIE model [8]

Figure 3.3.1 New Addie Model

3.3.1 Analyze

This is the phase to be known as the "Goal-Setting Stage," whereby the author mainly focusses on identifying and getting know of the target audience [8] .A quality analysis not only able to help in achieving goals and objectives but it willalso clearly address the issue faced by targeted audience and what can be done to solve and meet their expectations. Moreover, by determine the issue the author will be able to pinpoint the best tools and skills to use which can help to reduce the risk of encounter problem and time loss in the future.

Output:

The author had successfully identified the targeted audience which are represented by traditional museum and what is the problem facing and why it should be taken seriously to create a solution to solve the issue.

3.3.2 Design

In this phase, all the information gathers in Analyze will be review and use as reference to help in making decision on why kind of tools, program, and software to use in order to create the desired system [9]. This is also the phase that can help to defining the project objective , scope and required skills that are essentials to complete the project.

Output:

In the end of this phase, author will be able to obtain a project outline ,concept of design and the workflow of project.

3.3.3 Develop

The state of starting on actual creating the methodology used in the project. Which the author will make used of the data collected in the previous 2 stage to conduct the coding and modelling process that will depends on the decision making and learning material that obtained for using the editing and authoring software withanything other software that also related for creating the end-product for the project.Another major task that will perform this stage is consistently modification on the module to meets the scopes states to ensure it is effective and executable[9].

Output:

Product prototype will be created, and it will be tested according to a list of measurements will be taken and record to perform the process of fixing and retrying until qualified result is obtained.

3.3.4 Implement

Important phase of working with target audience and tester to obtain their review and using experiences by providing an executable prototype and keep close track and contact with them to identify whether which aspect and module that should be modified and refinement so it can be enhance the performance and end- result of delivered products[8].

Output:

Author will be able to gain acknowledgment and ideas for furtherimprovement from the aftermath of test data and result.

3.3.5 Evaluation

Phase of checking and revised back all of the information gathered to identify anyaspect that had been left out which should be improve or modified within the application. Besides, authors will also have to meet and survey towards their target audience to ensure all the objective and requirements has been fulfilled beforedelivering of final products.

Output:

At the end of the phase, author can use the overall detailed information data from the project and implementing it with some modification on the beginning of another new future ideas and projects.

Chapter 3 Methodology and System Design

3.4 System Flow Diagram

3.4.1 System Flow Design Overview

This is the system flow chart describe the overview of the entire Lembah Bujang Virtual Museum. The flow diagram as figure 3.4 show the program includes a splash screen that appears upon launching the program, followed by the main menu screen. After that, the user can select from five modules which will be represented by different buttons and images to trigger the corresponding module. The corresponding module are the Virtual Tour module, Guide Tour module, History Corridor (gallery)module and lastly the screenshot module. In addition , there is also a button that allow user to quit or close the program after finishing using it . Inside each module there will be some features implemented to enhance the user learning experience and help user access to more info with easy maneuverable controls and GUI.
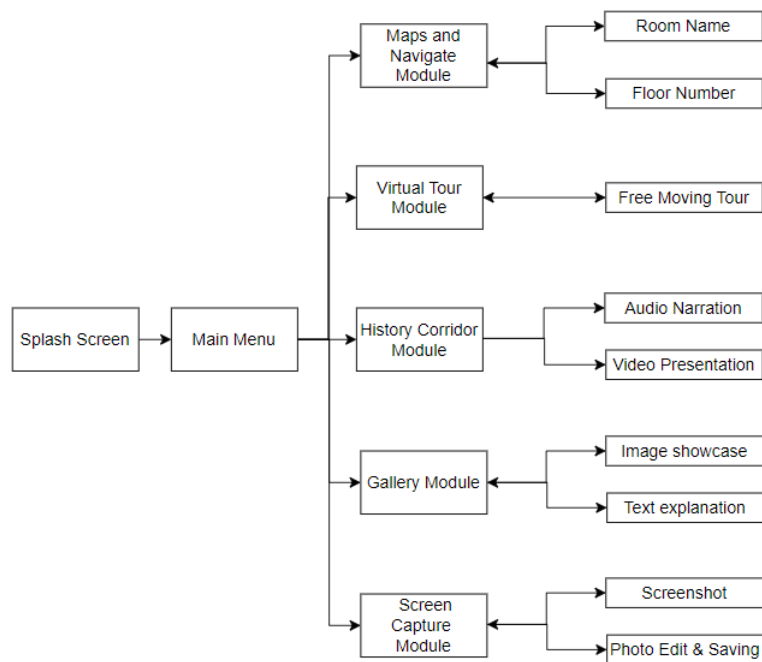

Figure 3.4 Flow Diagram of proposed module

Chapter 3 Methodology and System Design

Maps and Navigation Module

Inside the first module of The Maps and Navigate module it will be included with two additional submodules that enable users to find and explore different rooms and floor that are being created and imported into the application. This function is very convenient especially for individuals who are unfamiliar with the museum's layout and design since it will allow visitors to simply travel among the various rooms and find their way around in ease with proper navigation. In addition, popular rooms and scenes that are frequently visited will be highlighted on the map. This provides suggestions to users on which rooms and exhibits they should not miss. These highlighted rooms could be the most visited or the most historically significant exhibits. Furthermore, the Maps and Navigate feature will also provide additional information about each room and exhibit. Users can access this information by clicking on the display room or exhibit on the map. This feature enables visitors to learn more about the history and significance of each exhibit and have a more immersive and informative experience at the museum.

Virtual Tour

This module is one of the main core features that can represent and present the whole view of the entirety of the museum. Therefore, this module will allow user to walk around freely with keyboard and mouse control inside a virtual environment that recreate the views and surrounding of the museum. Purpose of this module is design is to provide user with an immersive and interactive experience that simulate the physical museum environment and allow them to explore the exhibits in more comfort manners without the disturbance of other factor which it can be done easily through any of their smart devices.

History Corridor Module

The history corridor module is typically designed as a linear pathway, enabling viewers to navigate among various recorded historical timeframes and events. To create an immersive experience, the module incorporates a variety of rich multimedia elements such as 3D models, video, audio, and images. Not only does this help users to gain a deeper understanding and establish a connection with the historical content, but it also provides an opportunity for users with 3D motion sickness to experience the content without discomfort.

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Gallery Module

In this module, user can navigate through different object and view of the artwork or artifacts on display. They can zoom and move around the 3D model to get more visual details and different angle of particular artifacts such as the (Terracotta sitting Buddha, Ganesha statue, ancient currency, ceramic etc.). Additionally, the Gallery module also allow user to capture and create their own virtual exhibition ,allowing them to curate their own collections and share with their families and friends.

Screen Capture Module

The main purpose of this module is to help user express their experience by taking and sharing the photo or videos of their favorite exhibitions or galleries with friends and family. This can help to gain awareness and encourage a population of visitors to explore the physical and virtual museum. Beside captured image and video can also being utilize by educator such as teacher or researchers when providing studies materials to help gaining interest of students into learning about some history and understanding its value.

Chapter 3 Methodology and System Design

3.5 Storyboarding Design

Storyboard No 1

Topic Main Menu
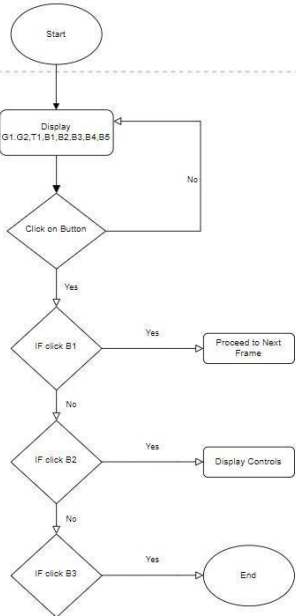
A: (Audio) , B: (Button) , G: (Graphic) , T: (Text)

Figure 3.5.1 Storyboard of Start Menu

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Table 3.5.1 Flow Diagram and Description of Start Menu

Instruction for Multimedia Element Placement and Button	Flowchart for Multimedia Elements and Buttons
A1: Audio element serve as background music. **A2**: Audio element serve as sound effect. **B1**: Act as confirmation button to proceed next frame. **B2**: Button for display pop-up **B3**: Button to quit program. **B4**: Button to mute the sound effect. **B5**: Button to mute the background music. **G1:** Graphic element serve as background image for start menu. **G1:** Graphic element serve as image for logo. **T1:** Text element serves as title of system	

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Storyboard No 2

Topic Sub-Menu

A: (Audio) , B: (Button) , G: (Graphic) , T: (Text)

Figure 3.5.1 Storyboard of Sub-Menu

Chapter 3 Methodology and System Design

Table 3.5.2 Flow Diagram and Description of Sub-Menu

Instruction for Multimedia Element Placement and Button	Flowchart for Multimedia Elements and Buttons
A1: Audio element serve as background music. **A2**: Audio element serve as sound effect. **B1**: Act as confirmation button to proceed to next frame (Virtual Tour Module) **B2**: Act as confirmation button to proceed to next frame (Guide Tour Module) **B3**: Graphic element serve as buttonthat allow to proceed to next frame (Gallery Module) **B4**: Graphic element serve as buttonthat allow to proceed to next frame (Screenshot Module) **B5**: Act as confirmation button to exit the sub-menu and return to start menu. **G1**: Graphic serves as background images T1: Text serves as sub-menu title.	

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Storyboard No 3

Topic : Guided Tour Module

A: (Audio) , An: (Animation) , B: (Button) , G: (Graphic) , T: (Text)

Figure 3.5.1 Storyboard of Guided Tour Module

Table 3.5.3 Flow Diagram and Description of Guided-Tour Module

Instruction for Multimedia Element Placement and Button	Flowchart for Multimedia Elements and Buttons
A1: Audio element serve as background music. **A2**: Audio element serve as the talking and explanation audio ofthe guide. An1: Animation serve as the transition between text in the text box area. **B1**: Function as confirmation button to return to the previous explanation section. **B2**: Function as confirmation button to Play and Pause theaudio, video, and animation. **B3**: Function as confirmation button to skip to the next explanation section. **B4:** Function as button to turn off the explanation audio. **B5:** Function as button to return to the sub menu. **G1**: Graphic serves as image display when the guided tour start **G2**: Graphic serves as image display when the guided tour start T1:Text function as title that show up forof subject explanation.	

Chapter 3 Methodology and System Design

Topic : Virtual Tour Module

A: (Audio) , An: (Animation) , B: (Button) , G: (Graphic) , T: (Text)

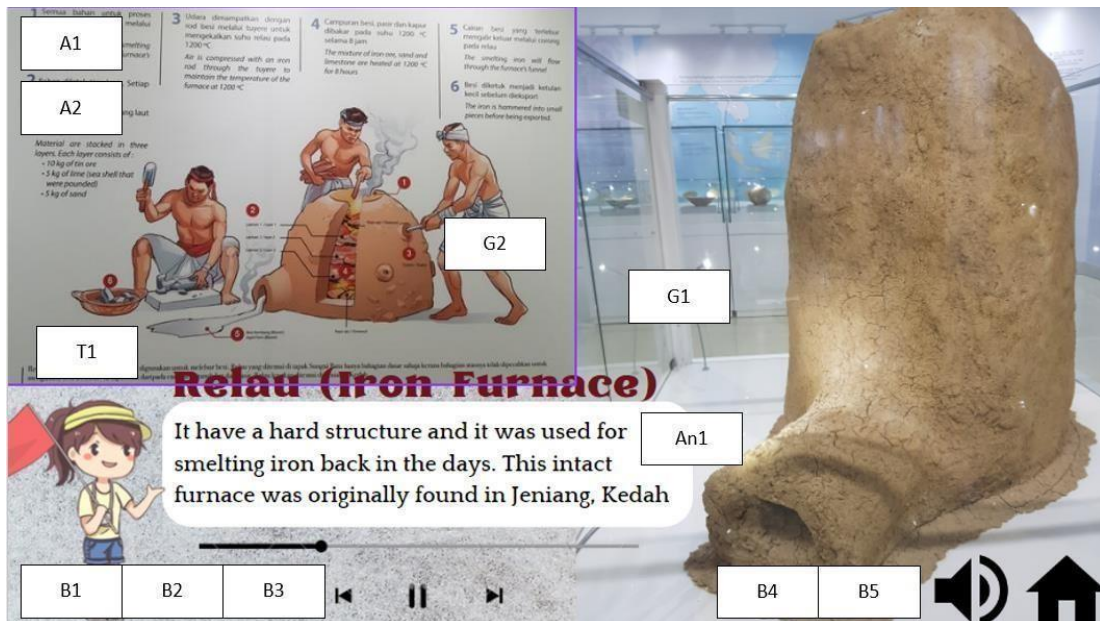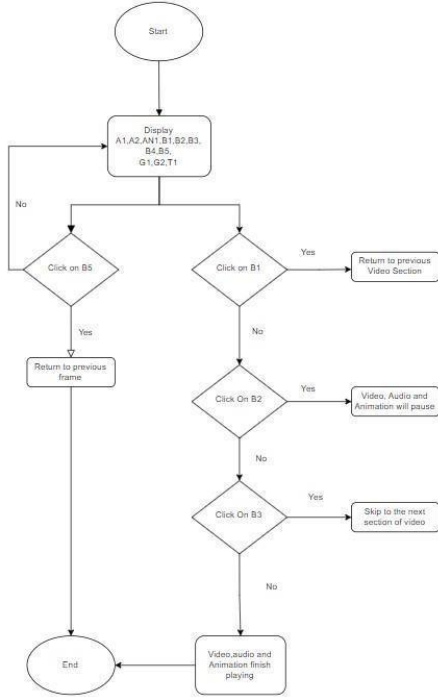**Figure 3.5.1 Storyboard of Virtual Tour Module**

Chapter 3 Methodology and System Design

Table 3.5.4 Flow Diagram and Description of Virtual-Tour Module

Instruction for Multimedia Element Placement and Button	Flowchart for Multimedia Elements and Buttons
A1: Audio element serve as background music. **A2**: Audio element serve as the sound effect of walking step. An1: Animation serve as the movement of camera andcharacter. **B1**: Function as button to turn off the background music. **B2**: Function as button to turn off the sound effect. **B3**: Function as button to return to the sub menu. **B4:** Function as display pop-up on movement controls **G1**: Graphic serves as 3D object image and building.	

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Topic: Virtual Tour Module Control Information
A: (Audio) , An: (Animation) , B: (Button) , G: (Graphic) , T: (Text)
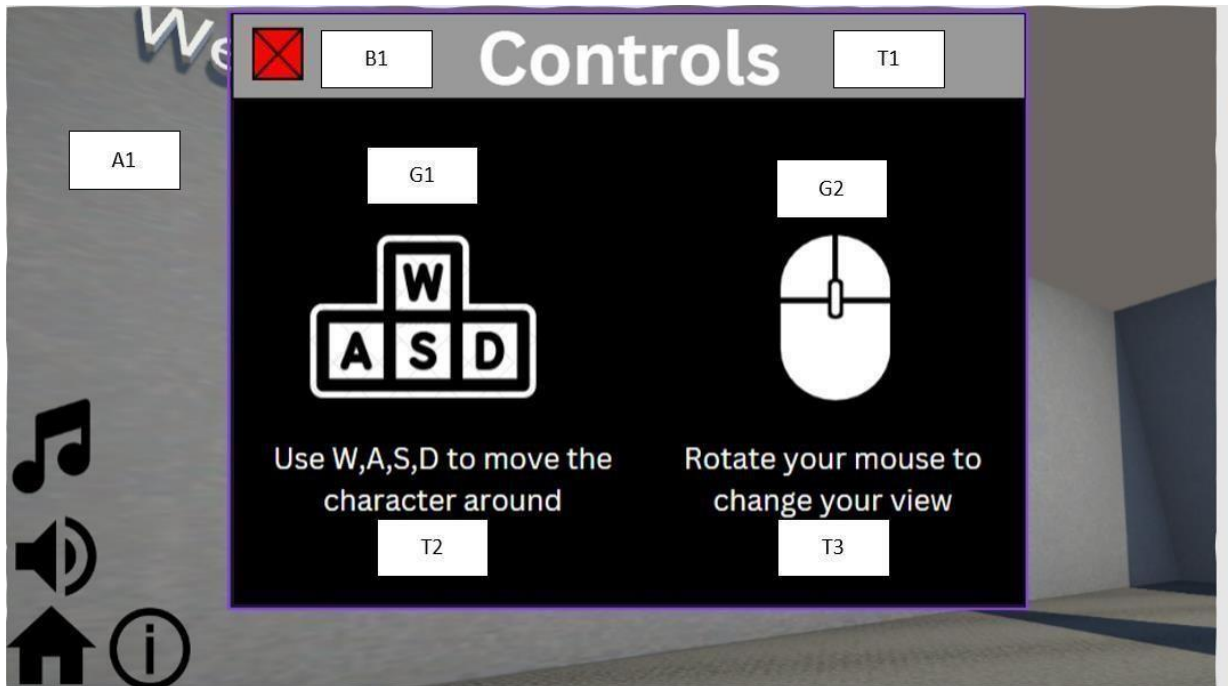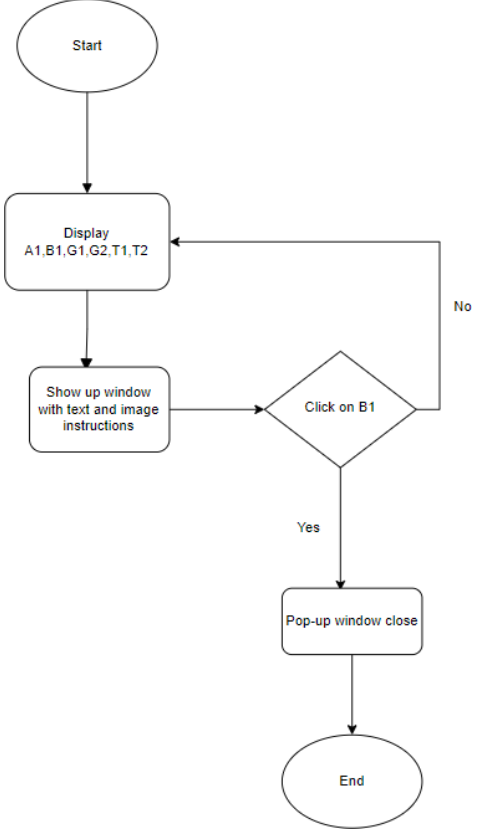
Figure 3.5.1 Storyboard of Virtual Tour Module Control Information

Table 3.5.5 Flow Diagram and Description of Virtual-Tour Module

Instruction for Multimedia Element Placement and Button	Flowchart for Multimedia Elements and Buttons
A1: Audio element serve as background music. **B1**: Function as button to turn off thepop-up window. **G1**: Act as image serve as player movement control key. **G2**: Function as image serve as mousecontrol on view. T1: Function as text to provide moredetail instruction. T2: Function as text to provide moredetail instruction.	

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Chapter 3 Methodology and System Design

3.6 Project Planning

3.6.1 Project 1
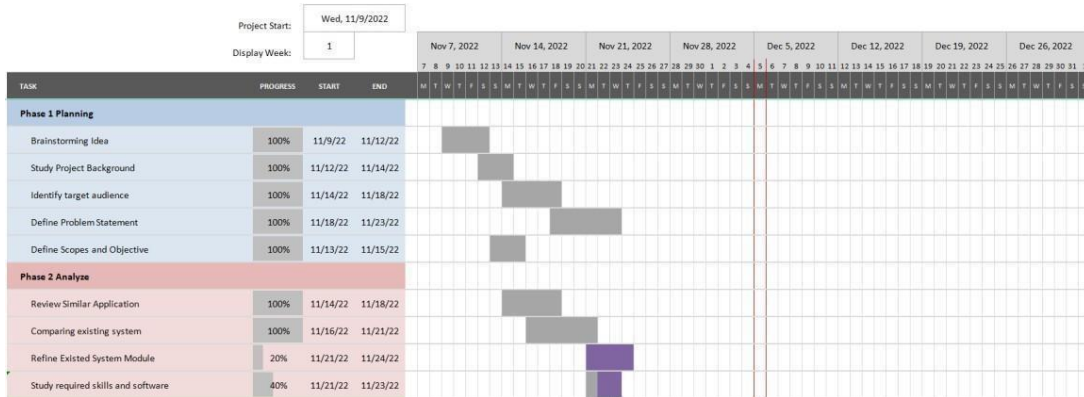
Figure 4.2 Gantt chart 1

3.6.1 Project 2
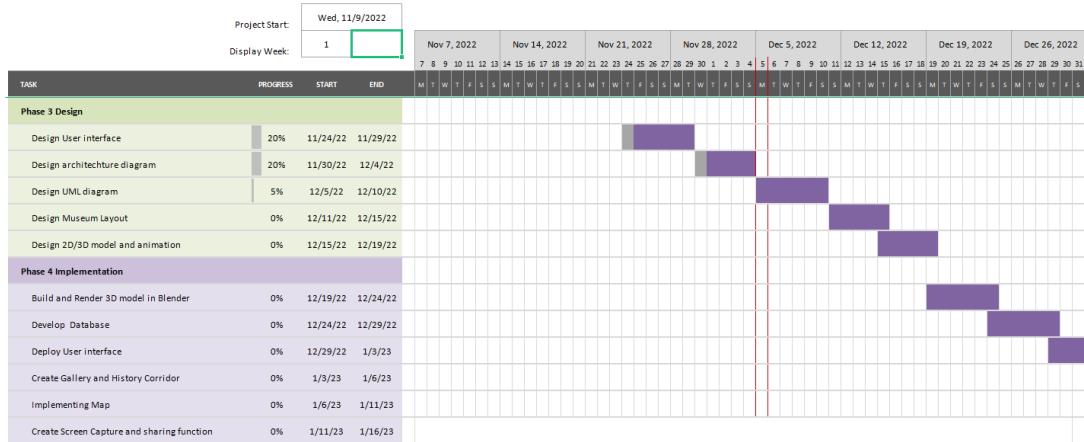
Figure 4.3 Gantt chart 2
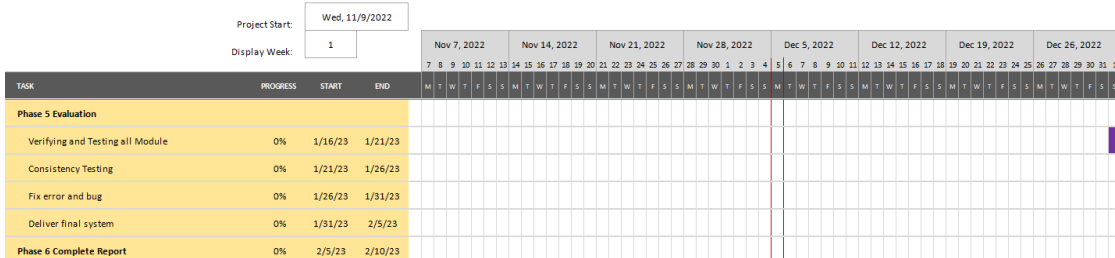
Figure 4.4 Gantt chart 2 (continue)

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Chapter 4 Development

4.1 Overview

This is the part on overall report for the development process of the creative edutainment virtual museum for Lembah Bujang. There are several process and tools have been taken as consideration before the start of the development process. Before able to done anything the very first step is to identify and download then install the requirement software to create the virtual environment which is the essential tools has to been used on this project is the Blender for creating the 3D models and objects, Unity Real-Time Development Platform and Visual Studio Code for creating the application with menu that implementing event handling and response, the movement system , the screenshot method and so on, Next is the Sound Forge is for the background music ,guided tour audio , and sound effect editing and lastly is the Canva and Blenderfor the create the design of menu and 3D objects.
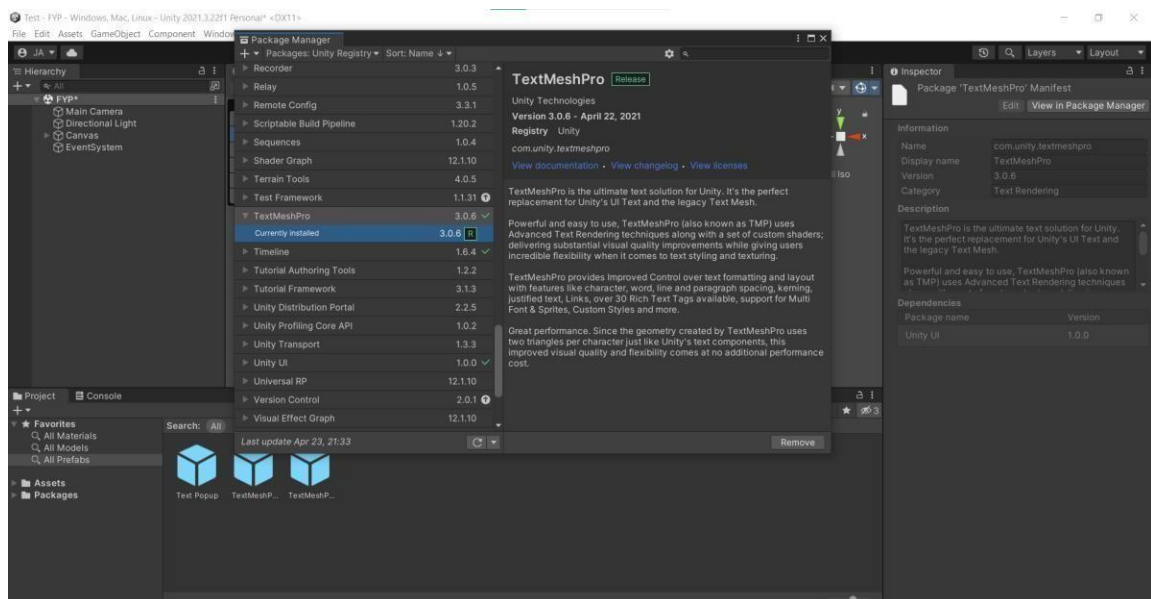
Figure 4.1.1 Package Installation

Upon launching the Unity hub , the Unity built-in 3D renderer will be selected and created for the project. There are some packages and assets that are very essential and need to be installed and imported into the development tools before creating anything, such as TextMashPro for creating text inside the virtual museum and menu and ProBuilder to create the layout and shaping of the building and 3D environment. After a successful install and import of the package, it is now time to import the assets needed to create the virtual museum environments, such as the menu background

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design, textures, sounds, music, buildings, 3D-objects, pictures, and so on .
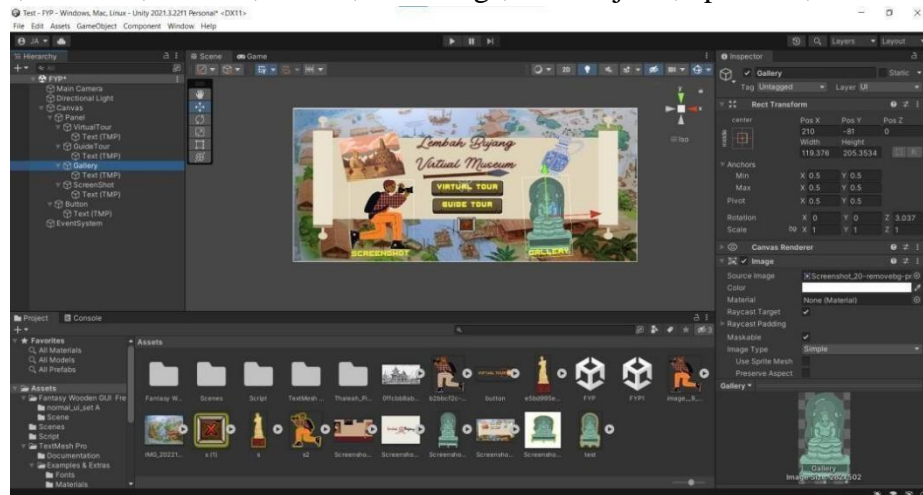
Figure 4.1.2 Prototype of Sub-Menu Interface

Now this is the Prototype of the Sub-menu interface. To make the interface more interactive and attractive some animation and hover effect are added into the button which when the user selects, click, or interact with the button it will trigger the button to have glow effect and animation. Beside some background music and sound effect was also added to the button to make it felt more interesting and attractive for the user. Within this menu the 4 functions that are plan inside are scope are represented with 2 button and 2 images which will be the Virtual Tour Module, Guided Tour Module, as button Gallery Module and the Screenshot Module will be the interactable images. As for the Map and Navigation Module, it will be implemented inside the virtual Tour module.
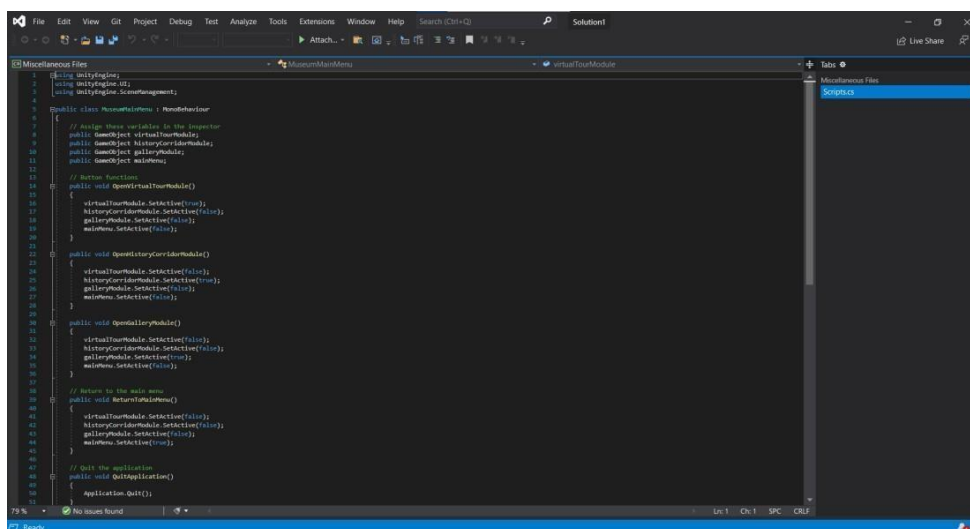
Figure 4.1.3 Prototype of Menu Script

This was a C# script that was written into the menu in order to let the user to

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enter the specific module when click on the button.
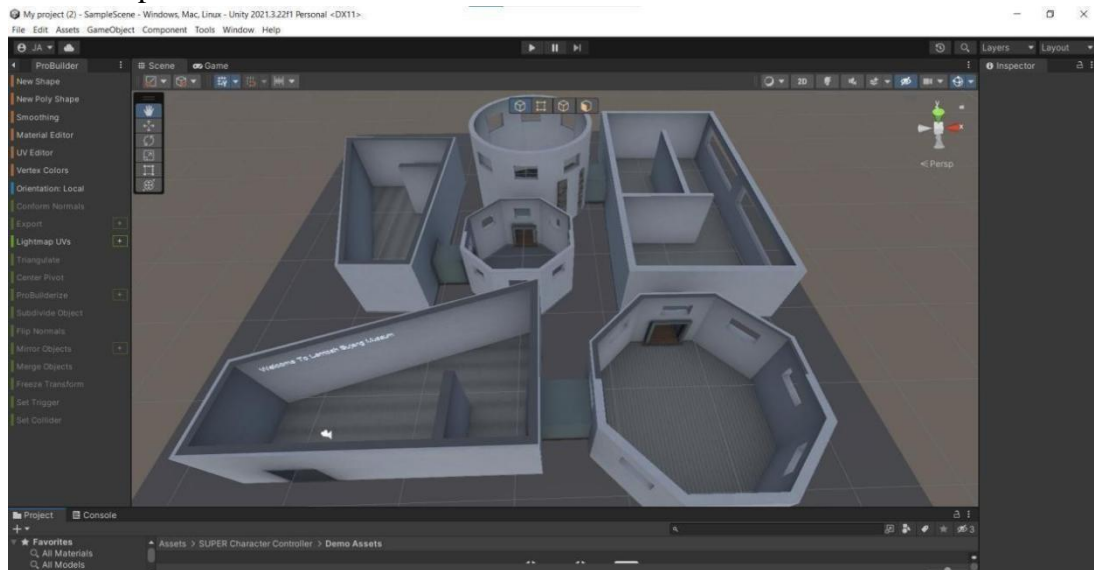
Figure 4.1.4 Prototype of Virtual Tour Museum Layout

This is the overall prototype design on the first layer for the Virtual Museum that was created with the help of Blender and ProBuilder. Whereby this will be exhibition hall to place the painting ,some informative history wallpaper, quotes that will be place within these sections. Beside some smaller 3D artifacts will also be placed inside a glass cabinet within this area such as the ceramic vases, pot, and places.
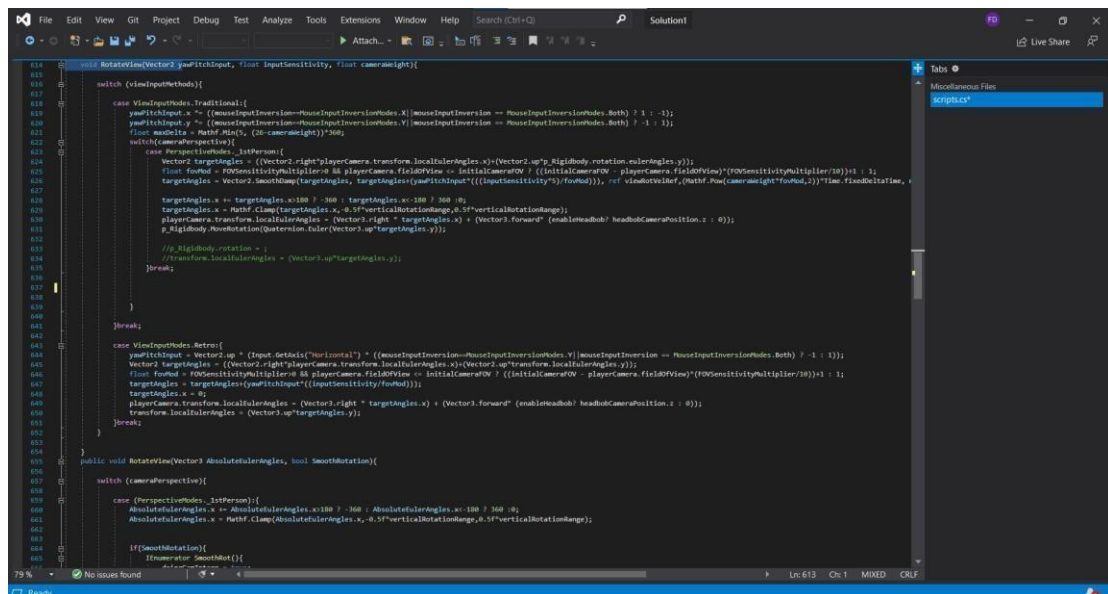
Figure 4.1.5 Prototype First Person Camera View and Movement Script

This will be the C# script that is being implemented into the prototype of virtual tour module that let user able to control the camera angle view with mouse movement and

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the camera character body movement with W,A,S,D keyboard input.
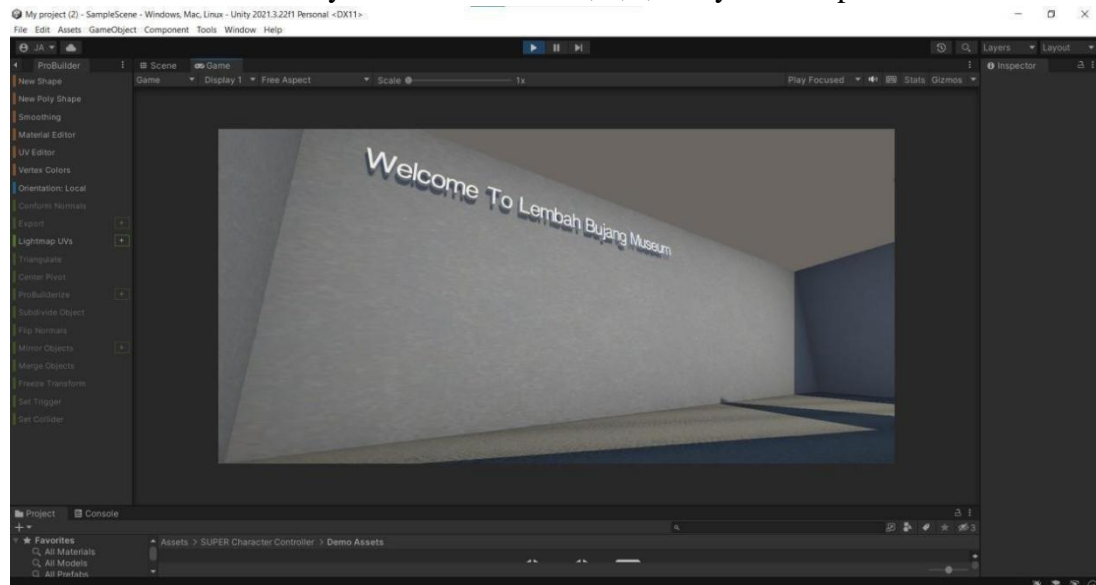
Figure 4.1.6 First Person View Camera Implementation and Movement Test
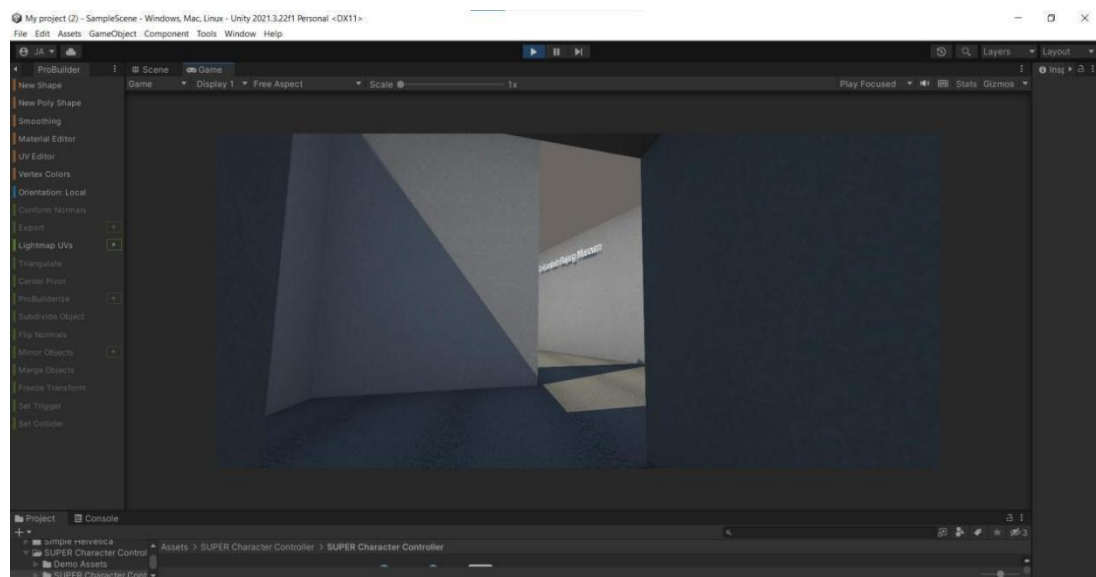
Figure 4.1.7 Prototype for Character Movement

This is the result after testing and running the camera and movement scripts. As it can be seen from figure 4.05 the user will be spawn in this particular room of the museum section and greeted with a welcome message. Whereby here will be the information center that represent the real museum upon finishing the project . As for now it still remains its prototype of development. The user was also able to walk around the whole museum with the Keyboard Controls of W,A,S,D. As a result, from figure 4.06 the camera was able to move from its position to another position of the room.

Chapter 4 Development
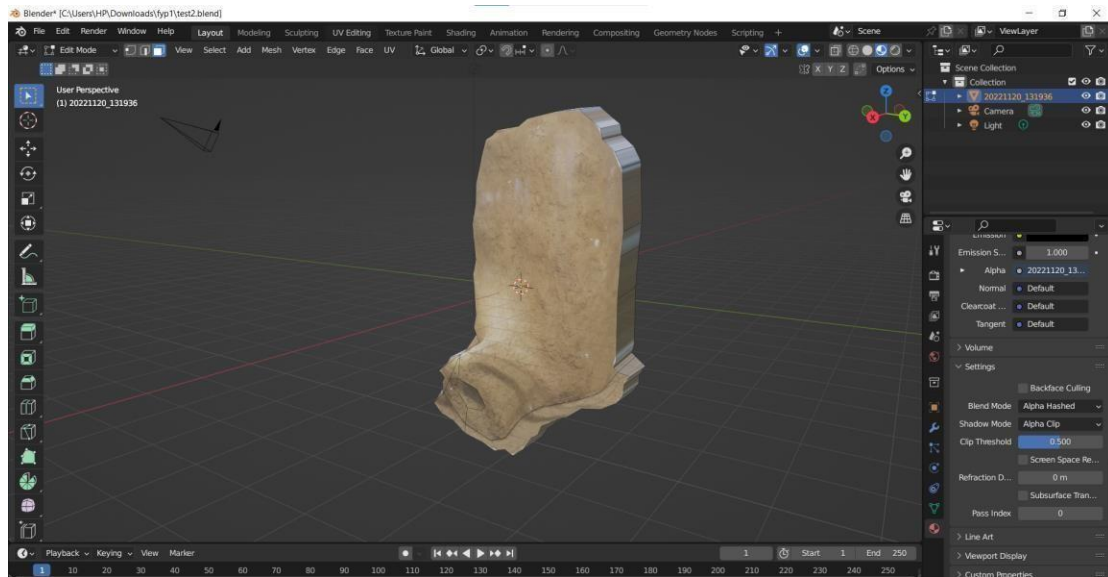
Figure 4.1.8 Prototype of 3D Artifact Model

This is the 3D object model prototype of the iron furnace that is located within the museum gallery 2 by using blender to mesh and smoothen out the surfaces.
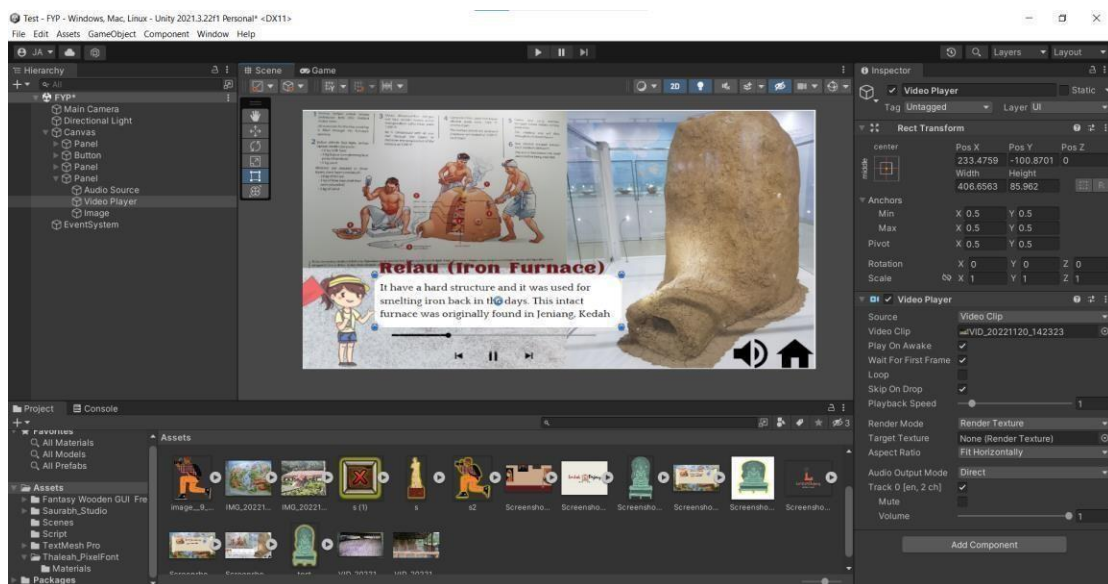
Figure 4.1.9 Prototype of Guided Tour

Set up the required button, animation , audio , and video clips that is mentioned in the section of storyboard design which this is a fully automatic tour with a detail explanation and rich presentation of multimedia element on specific popular, exhibition highlights and item of the museum.

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4.2.1 Virtual Tour Module
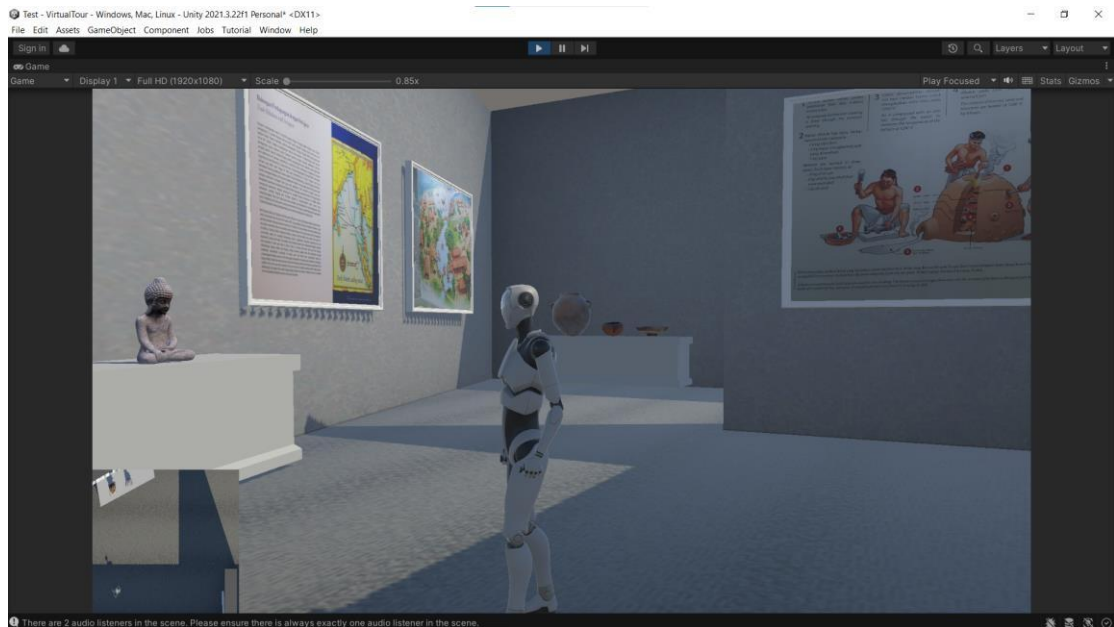
Figure 4.2.1 Output of Movable Character

The first initial starting point of creating this module is to design the foundation on building a meticulous design and rendering of the 3D environment. The initial phase is mostly focusing on designing the museum's architecture, layout, and exhibit placement. It is important to focus on the aesthetic of visual representation of the physical museum such that it can bring the feeling of realism and engagement with users.

Moving on is the phase of involving the development of characters controls system which enable users to travel and navigate around the virtual museum with keyboard and mouse inputs. Several scrips had been developed, deployed, and tested to ensure the code is running with no errors and can recognize the input without any issues. Besides by providing a bug free control are quite importance for the aim of this phase because it will help to ensure the system can provide the users a seamless and intuitive user experience.

With the virtual environment and characters control developed, now the museum's artifacts , galleries and history background will be undergoing the 3D transformation. The 3D model will be created thorough the help of blender, and it will be place precisely in their respective exhibit's hall.

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4.2.2 Guided Tour Module
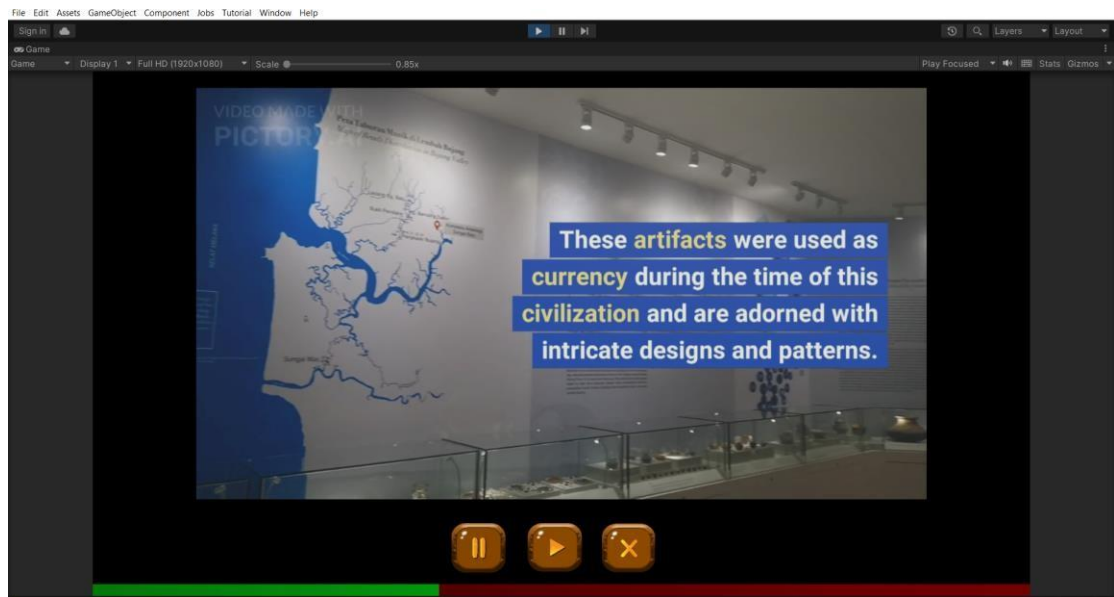
Figure 4.2.2 Output of Guided Tour Module

The development of the Guided Tour Module encompassed several critical components, primarily focusing on the seamless integration of multimedia elements, educational content compilation, and the design of an interactive interface to enhance user engagement.

One of the main aspects of creating this module is to involve the integration of rich multimedia elements into the virtual museum experience. When designing for this module the creation of captivating videos and audio explanations, are being entailed with several process of scripting, recording, and post-production editing.

Besides, to ensure user engagement and customization an interactive video player interface is a also being develop to place the multimedia elements. This interface enables users the choice of selecting guide tour options, allowing them to fast of back track according to their interests and preferences. This component of the Guided Tour Module reflects a user-centric approach, where user interaction and choice are prioritized to ensure a fulfilling and immersive museum experience.

The goal of this module is to transform the compilation and structuring of historical and contextual information into informative narration that closely reflects the subject matter and ensure the accuracy, depth, and educational value of the content. This phase underscored the commitment to delivering a guided tour experience that not only engages users visually but also

enriches their understanding of the museum's exhibits and their historical significance.

4.2.3 History Corridor Module
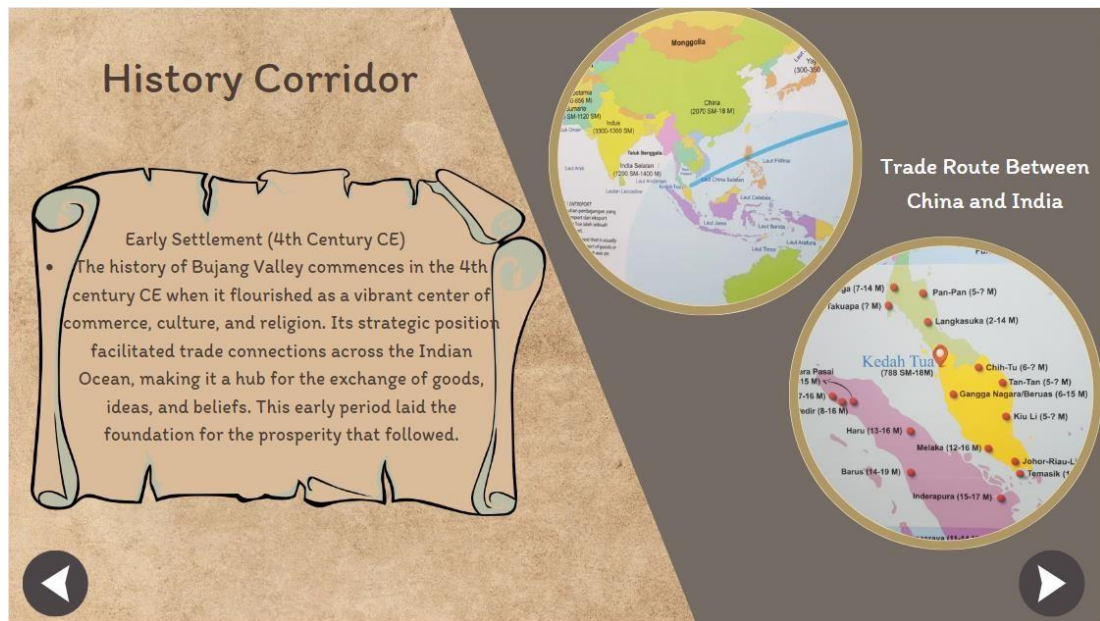
Figure 4.2.3 Output of History Corridor Module

The History Corridor module represents a digital rendition of a historical timeline, intended to deliver a sequential presentation of significant historical events and milestones. The construction process entails initial scope definition, where the specific historical timeline is chosen. Subsequently, meticulous research is conducted to procure accurate historical data, images, and multimedia content pertinent to the selected timeline. This data is systematically arranged in chronological order, serving as the foundation for the development of a visually immersive virtual environment through 3D modeling software. Within this virtual realm, interactive components, including clickable markers, are integrated, and the necessary script implementation facilitates user-friendly navigation.

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4.2.4 Maps and Navigation Module
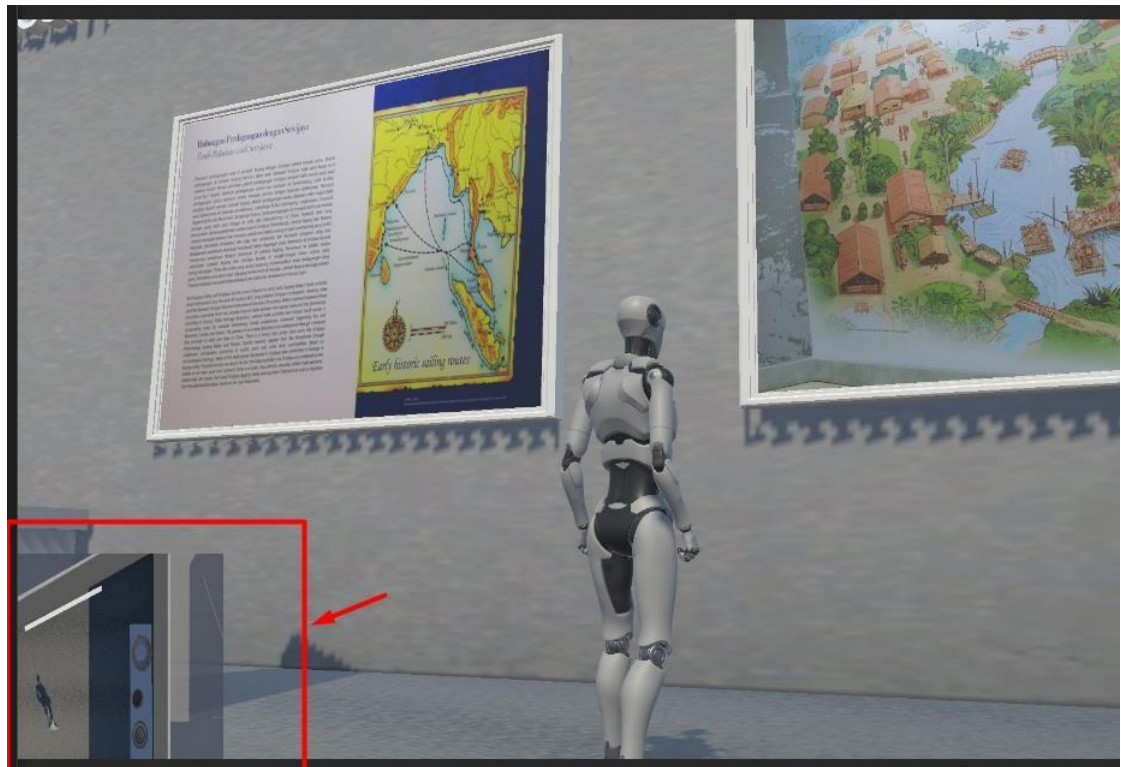
Figure 4.2.4 Output of Maps & Navigation Module

The initial aspect of this module involved the construction of a dynamic mini map. This process requires the coding of a real-time map rendering system, which it have to be capable of continuously updating as users explore the virtual space. The primary objective was to provide users with a clear and accurate overview of the museum's layout and the precise locations of its exhibits. Achieving this level of real-time map rendering required a substantial investment of technical expertise to ensure seamless operation and an informative visual representation.

The second crucial aspect of the Map & Navigation Module centered around location identification features. This encompassed the implementation of elements such as location markers. To ensure the accuracy and responsiveness of these features, extensive programming and designing efforts were undertaken to ensure this module was able to provide users with the ability to pinpoint their location within the virtual museum accurately and to easily identify specific exhibit areas.

4.2.5 Screen Capture Module
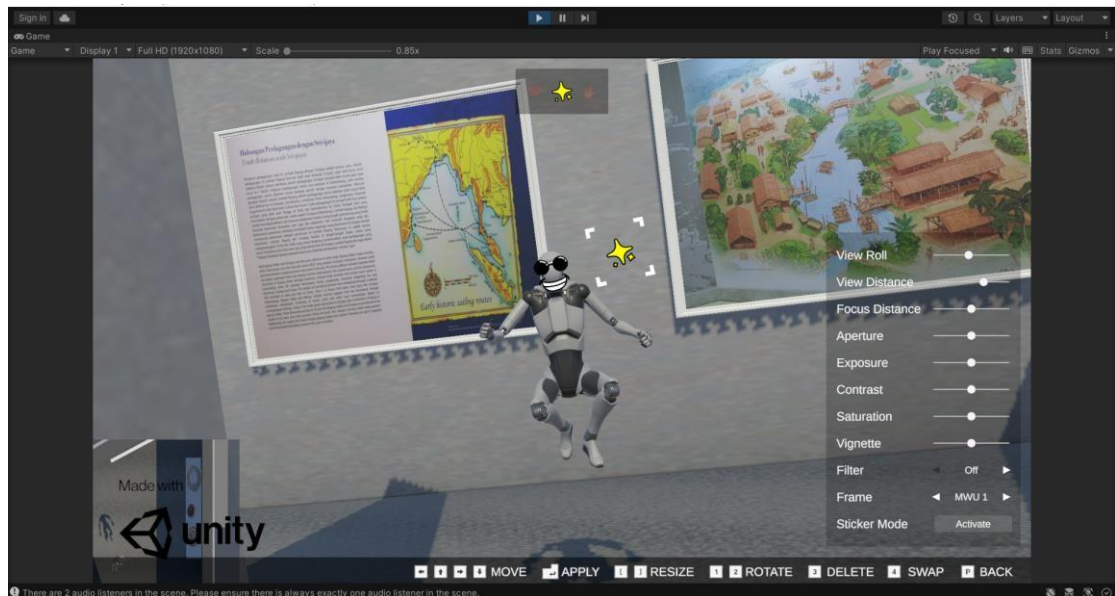
Figure 4.2.5 Output of Screen Capture Module

The Screen Capture module is a notable addition to the virtual museum experience. This module seamlessly integrates with Unity's Photo Mode, providing users with the capability to adjust screen capture settings and capture screenshots effortlessly by pressing the F10 key it can trigger the Unity's recorder package and save the taken screenshot in user Picture directory.

This functionality places users in control of their virtual museum interactions, allowing them to personalize their captured moments and share unique perspectives. Whether the aim is to capture sweeping panoramas, zoom in on intricate details, or spotlight specific exhibits, the Screen Capture module empowers users to curate their visual journey through the museum. It introduces an exciting dimension to exploration, enabling users to not only engage with the museum's offerings but also to document and share their personal discoveries with others.

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Chapter 5 Testing, Result & Discussion

5.1 Overview

In this section of the project report, a comprehensive overview of the testing phase for the Lembah Bujang virtual museum app will be conducted. The testing process served as a critical guideline in evaluating the app's usability, functionality and performance. Thus, to properly evaluate the system, the outline of methodologies employed, result obtained, and a thoughtful discussion have been properly stated in this part of the project. By collecting and examine the user feedbacks, the goal is to provide a holistic assessment of the virtual museum app's readiness for deployment and potential areas for future enhancements.

5.2 Method of Testing

To evaluate the virtual museum app's usability and user satisfaction, a set of questionnaires-based approach was employed. The questionnaire consisted of a series of questions designed to assess user experiences, with a particular focus on two established usability metrics: the System Usability Scale (SUS).

The System Usability Scale (SUS) section in the questionnaire serves as a globally recognized tool for assessing the subjective usability of software and applications. Ten different questions will be implemented whereby, users are prompted to evaluate them on a scale ranging from 1 to 5, with 1 representing strong disagreement and 5 indicating strong agreement. These questions have been meticulously designed to offer a comprehensive evaluation of various aspects of the virtual museum app's usability, including ease of use, learnability, and efficiency. The scores assigned to each question are subsequently transformed into a consolidated usability score for the app.

Chapter 5 Testing, Result& Discussion

5.3 Testing Analysis

9) I felt very confident u	10) I needed to learn a l	SUS Raw Score	SUS Final Score
5	1	32	80
5	5	30	75
5	1	35	87.5
4	2	32	80
3	1	29	72.5
4	1	27	67.5
4	2	27	67.5
4	2	25	62.5
4	1	33	82.5
5	1	29	72.5
5	1	31	77.5
4	3	28	70
4	4	24	60
4	2	27	67.5
5	5	29	72.5
5	5	26	65
4	4	26	65
4	4	29	72.5
4	1	31	77.5
4	2	27	67.5
5	4	26	65
5	2	29	72.5
5	4	31	77.5
4	2	30	75
5	4	26	65
4	4	29	72.5
5	4	30	75
5	5	30	75
4	4	32	80
4	4	31	77.5
4	4	31	77.5
	Average	29.09677419	72.74193548

Figure 5.3.1 Result of SUS Score

Based on the data collected from the google form, the System Usability calculation metrics is decided to be conducted to evaluate the overall user experience (UX) for the virtual museum system. The SUS, renowned in the field of usability assessment, serves as a quantitative tool to gauge how users perceive the overall usability of our immersive museum experience. By comparing the ten questions provided for in the questionnaire , several crucial aspects have been considered such as the ease of navigation, learnability, and overall satisfaction for users when using the virtual museum application.

After conducting the SUS calculations, the average score derived from the 31 collected data from respondent shows that the final SUS had achieved approximates about 72.74. This score stands as a vital indicator of user sentiment towards the virtual museum system. A higher SUS score corresponds to better perceived usability of the virtual museum system, signifying a more user-friendly and intuitive experience. Therefore, this score not only reflects the current state of usability but also serves as a guideline, that able to guide the ways and path for future enhancements on overall user experience and usability.

Chapter 5 Testing, Result& Discussion
5.4 Result and Discussion
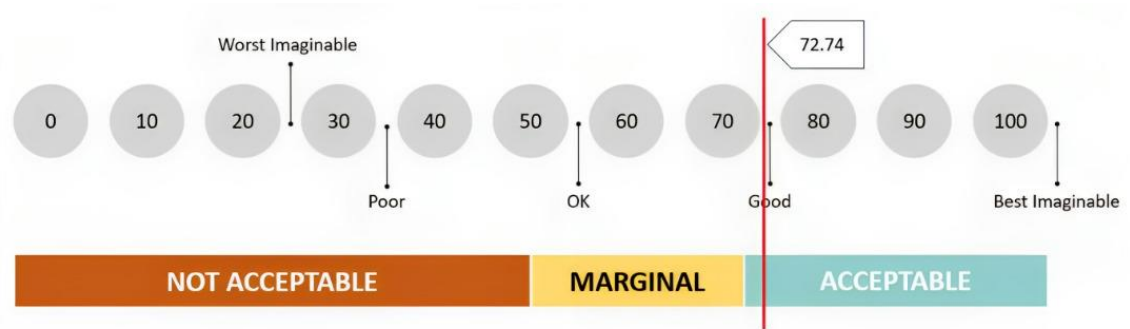
Figure 5.4.1 SUS Measuring Scale

From the SUS evaluation results it have shown that the Lembah Bujang virtual museum application have achieved a fairly favorable score of 72.74 which is above average. However, there is much more detail that can be uncovered when future investigation and analysis is done on the dataset. After evaluating the score with the measuring scale in Figure 5.4.1 the system usability is fall under the good and acceptable range.

The wide range of individual SUS scores, spanning from 60 to 87.5 underscores the diverse perspectives within our user base. This diversity highlights the importance of addressing the varying needs and expectations of users and it can provide the motivation to identify which area and underlying problem that can be improved to achieve smaller range of score and higher average scores.

After a deep dive into the dataset, it can be discovered that there are some areas that requires additional attention. By comparing each individual question total score, it can be sees that Question 1 "I think that I would like to use this system frequently have score the highest among other 9 questions which can shows that user generally express their interest in using the virtual museum frequently. However, there is also another issue that have to be addressed after finding the maximum and minimum individual scores. Which there is also area that have to be improved which from the dataset the Question 2 "I found the system unnecessary complex" gained the lowest among other means there is some sort of simplification and user-friendliness should be improved and apply in future improvements.

In conclusion, even thou the evaluation score indicates that the Lembah Bujang Museum had successfully score an above average score, it also needs to be reminded that there is also much space and opportunities for improvement, especially in terms of complexity.

Chapter 6 Conclusion

6.1 Summary

To conclude the findings of this project, after compiling all the parts , research data and all the prototypes. The purpose of this conclusion is made to identify whether the purpose solution and function are related to the main three problem statements which are the issue on the storage woes , declining visitor due to lack of presentation , and finally the problem of other purposed system that existing within the market are still complicated and not user-friendly for curator and users. Beside the purpose system are not just focusing on the problem solving, the objective of this project is also focusing on provide a better and advance system that is also effective as a learning tool in educational field, an interactive based application, and tools that able to identify the effectiveness of multimedia element in learning field.

6.2 Research Findings

Based on the extensive research and insightful testing that have been conducted. After analyzing and review on the tested results, there are several key discoveries that significantly contribute to the goals of this project.

Through meticulous design and relentless optimization efforts, the virtual museum app has emerged as a potent solution to the longstanding issue of storage constraints for physical museum. This achievement is marked by its remarkable ability to efficiently manage and render 3D objects, even on personal computers with more modest hardware configurations. By pushing the boundaries of storage efficiency, the app has not only improved the storage woes, but it had also opened up new horizons for immersive digital museum experiences and surpassing the limitations of traditional storage-bound approaches.

One of the most compelling revelations from the purpose of this project is to emphasize on the power of interactive and immersive presentation methods which are integrated into the virtual museum app. Thus, the app will have the potential to engage visitors in a way that traditional museums often struggle with. By making museum presentations more exciting and engaging, our app can help combat declining visitor numbers and addressing the alarming issue of declining visitor numbers for physical museum in today's society.

Chapter 6 Conclusion

The virtual museum app also offers a user-friendly interface and easy navigation, making it a promising solution to the complexity of existing museum systems. It aims to redefine the museum experience by providing both curators and users with an easy and seamless journey through art and history. Besides it also able to make user fell the knowledge acquire through the virtual museum app are accessible, engaging and immensely rewarding.

6.3 Problem Encounter and Solution

Here are some of the problems faced during the development process, as one of the major issues that I encounter is lacking in personal computer hardware performance. This is being said because when dealing with rendering 3D object it will take me quite a lot of time without powerful GPU which it can load and process up to few hours without able to do anything else. Hence the renting and borrowing of high-end computer from peers, relative and university lab are needed when it comes to modellingthe 3D-objects Besides another issue when it comes to 3D model and objects, when trying to build the Maps and Navigation module. The problem encounter is the problemof unable to acquire the accurate and exact floor plan of the museum. Which this is crucial when designing the exhibition hall layout, without knowing the structure of eachhall it is hard to allocate the museum artifacts and sorting the 3D model accordingly. Therefore , it requires to use the tools online floor plan creator with Smart Draw whendesign and create a new layout for the building and museum structure.

Chapter 6 Conclusion

6.4 Knowledge Gained

Throughout the entire course and development of this project, a wealth of valuable insights, knowledge, and experiences have been acquired, forming a strong foundation for future endeavors in the realms of 3D modeling, virtual museum design, and interactive app development.

One of the most invaluable types of knowledge acquired revolves around 3D modeling techniques and expertise. Navigating the high technical software such as Blender has helped to gain the experience and knowledge of creating lifelike 3D objects, environments, and artifacts. 3D modeling extends to understanding lighting, texturing, and object manipulation, vital skills that can drive and help to craft a visually stunning and ecstatic virtual museum environment.

Another valuable insight and knowledge gained from this project is the potential and capabilities of Unity's platform in terms of creating an interactive and immersive virtual museum experience. Unity platforms offer a wide variety of versatile toolkit, that able to offer a real- time rendering, physics simulation, and dynamic interactions features to explore and develop. By learning the convenient features available in its asset libraries and packages it enables to help sole development project much achievable and resources friendly. Not only that, but unity platforms had also been around for 18 years therefore there are many online resources and forums that enable to help us learn and gain more understanding when trying to develop the modules.

The project also had help to gain more understanding on user interface design and the importance of user-centered design and iterative development. Feedback and regular testing with user have been successfully helping to refine the app's usability and overall user experience. This approach not only help to improve the functionality of the virtual museum app but it also able to help us gain understanding of market user preferences and expectation in context of virtual reality technology exploration.

Chapter 6 Conclusion

6.5 Limitations

While observing and receiving some user feedbacks it is imperative that some problems and limitations have been found and emerged during the testing and evaluation process.

Firstly, the project requires a certain degree of hardware dependency particularly when its regards to GPU , RAM and CPU performance. While these are the important component to enable the application to render 3D object efficiently and create an immersive experience for users. Therefore, it may pose a challenge for user with less powerful computer system. This could also lead to degree of affection towards the overall user experience ,immersion as well as facing errors and bugs when exploring withing the virtual museum environment.

Besides, it is hard to obtain the physical museum floor plan and made the creation of accurate and up-to-date building structures of the museum challenging. This limitation could have implied some accuracy of the app's navigation and the precise placement of of virtual artifacts and the museum digital layout. As a result, there may be some of the areas where the virtual representation deviates from the original structure and layout of the physical museum.

Lastly, it is also essential to acknowledge that for many currently existing digital technologies and applications, the virtual museum app may possess a slight learning curve for new user to get a hand of. New users may initially encounter challenges as they familiarize themselves with the app's navigation and interactive features. Although efforts have been made to streamline the user interface and make it as intuitive as possible, some users may require a brief adjustment period before fully familiar with the app's capabilities.

Chapter 6 Conclusion

6.6 Future Enhancement

In order to refine and improve the virtual museum app, some ideas have been written down that can be implemented in future updates, First and foremost is the main issue that regards to the hardware optimization, meticulously to come up with a strategy to enhance the app's performance across a broad spectrum of hardware configurations. By doing so, it can ensure more accessibilities ,and achieve higher user base and improve overall immersive museum experiences.

The next approach for enhancement would be adding new features into the app's which can be the implementation of Augmented Reality (AR) technology. The use of AR can help and provide user more interactive museum realm, where they can feel more immersive experiences and lessen the boundaries between the digital and physical museum touring feelings.

User-centricity is also another topic that could be work on and improve on the design philosophy. By maintaining an open channel for user feedback, we intend to gather valuable insights that will bring iterative enhancements on the application user interface so that the can provide more user-friendliness and ensuring an immersive and frustration-free exploration.

Lastly, is the expansion of the virtual museum collection to deploy a broader and more diverse collections especially more 3D model of artifacts, exhibits, historical buildings and so on. This expansion can allow user to explore and learn more about our local history and get interested in the topics in the most engaging and informative approach available in the educational field.

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Appendix

Survey on User Requirement and Expectation

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Appendix

Creative Edutainment Virtual Museum Application Integrated In Educational Field

ydfong1015@gmail.com Switch accounts

✉ Not shared

☁

* Indicates required question

Section A: Demographic Data

1) What is your Age? *

○ 18 - 21

○ 22 - 25

○ 26 - 29

○ 30 and Above

2) Gender *

○ Male

○ Female

○ Other: _____

3) Ethnicity *

○ Malay

○ Chinese

○ Indian

○ Other: _____

4) Which Faculty are you from? *

○ FAS

○ FBF

○ FEGT

○ FICT

○ FSC

○ ICS

○ Other: _____

Back   Next   Clear form

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Appendix

Section B: Perception on Malaysia History

5) Which of the following historical event that happen in Malaysia history interest you the most?

○ The founding of Malacca Sultanate in year 1400

○ The occupation of Japanese during World War 2 in year 1941-1945

○ 13th May incident that happen between Malay and Chinese that lead to state of emergency in year 1998

○ General Election (GE-14) that result in the winning of Pakatan Harapan in the majority seats in parliament and the first change of government in year 2018

6) Which of the following historical monument that you have personally visited before?
(Multiple Choice)

☐ Bujang Vally in Kedah

☐ A-Famosa Fort in Malacca

☐ Batu Caves near Selangor

☐ Nastional Monument in Kuala Lumpur

☐ Other: _____

7) What do you think of Malaysia's history in comparison to other Southeast Asian countries?

○ Malaysia have more diverse history background than other Southeast-Asian countries

○ The history background of all Southeast Asian Countries are similar

○ Malaysia have less outstanding history event compare to others

Appendix

8) In your opinion , what is the biggest challenge faced by Malaysia traditional museum in efforts to preserve and restore historical heritage?

○ Lack in human resources and funding

○ Impact of modernization that emphasize more on building construction instead of historical site

○ Lack of public awareness on the importance of historical heritage for future generation and sociaty.

9) Do you believe it is crucial to protect historical buildings and objects?

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

10) Do you agree that every Malaysian should be aware and learn about our country's history?

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Back   Next   Clear form

Appendix

Section C Usage of computer in learning

11) Have u personally experiences any online learning environment before? And *
how does you feel about it?

Your answer

12) Which are the type online resources and material that you will preferred while
research and studies on history?
(Multiple Choice)

- [ ] Website and articles
- [ ] Videos
- [ ] Online Encyclopedias
- [ ] Movies
- [ ] Other: _____

13) What is your biggest barrier on accessing online resource when using
computer technologies for research and learning?

- ( ) Poor Internet Connection
- ( ) Lack of hardware performance
- ( ) Subscription and Paywall Content
- ( ) Information overload that inflict questions about the legitamacy and reliabilities

Section C Usage of computer in learning

Appendix

14) What kinds of virtual computer learning environments you think will work the best for learning history?

○ Online classes or webinars

○ Quiz and flashcards platform

○ Collaborative learning tools

○ Virtual simulation or games

15) When there's a new online learning technology or software being introduced, how do you adapt yourself to become familiar with its various functions?

○ Exploring and experimenting it by ourself

○ Ask helps from others

○ Refer to online manuals or tutorials

○ Other: _____

16) What are some of the future trends in technologies that you think might *
become widely replace or enhance traditional education?
(Multiple Choice)

☐ Game-based learning programme or platform

☐ Predictive Analytics on student learning behaviour and facial expression

☐ Artificial intelligence in QnA interaction

☐ VR and AR powered learning field trips

☐ Other: _____

Back   Next   Clear form

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Appendix

Section D: Opinion on Virtual Museum modules

17) Which of the function that you prefer the most in the ways of obtaining information and knowledge through virtual museum?

○ Interactive exhibits that allow you to manipulate object

○ Guided tour that led by interesting narration and dialogs

○ Virtual reality experience that allow you to explore freely and wondering around different locations

○ Video and Audio representation of some restoration simulation on iconic historical monuments and items

○ Other: _____

18) Which of the following benefits you might get the most by capturing and sharing picture of the historical monuments and various views of the virtual museum?

○ Generate discussion topic and form more close relationship with relative and friends

○ Can be stored and use as references for deeper research and discovery

○ Helping others by providing visual tips and guide on navigation or performing some specific action.

19) In your opinion, which are the type of background music should be used that would provide the least interference for exploring and learning within the virtual environment?

○ Classical Music

○ Smooth Jazz

○ Meditation Music

○ Instrumental Music

Appendix

20) Which are the media element that you think matters a lot through virtual museum presentation?
(Multiple Choice)

☐ Text

☐ Graphic

☐ Audio

☐ Video

☐ Animation

21) Which of the following aspect of user interface design is more preferable by you?
(Select 2 Choices)

☐ Simplicity

☐ Consistency

☐ Comfort

☐ Accessibility

☐ Ease of Use

22) Do you think a proper navigation method very matters while exploring a virtual museum?

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

23) Finally, what are your expectations for future features that you would like to see implemented in the system? *

Your answer

Back   Submit   Clear form

System Usability Score Questionaire

Lembah Bujang Virtual Museum Usability Evaluation Form

Dear Participants,

I am Fong Yin Dee, a final year undergraduate student who is currently pursuing Bachelor of Business Information System (Honours) at University Tunku Abdul Rahman (UTAR) Kampar Campus. Currently, i am conducting a survey for my final year project (FYP) with the title of
"**Creative Edutainment Virtual Museum Application Integrated In Educational Field**". This survey form has been created to evaluate the overall performance of the system i had developed in terms of its usability, user-friendliness, and product quality.

This survey consists of four (4) sections and may roughly take you around 5 -10 minutes to complete. All the responses will be kept completely PRIVATE AND CONFIDENTIAL which used solely for academic purposes only.

Much appreciate for your helps in participating in this survey. if you have any question regarding to this questionnaire, please email me at ydfong10@1utar.my

Once again , much appreciate for the contribution on time and efforts to conduct and answer in this studies.

Best regards,
Fong Yin Dee

Email *

Short-answer text

After section 1   Go to section 2 (Section A: Demographic Data)

Appendix

Section A: Demographic Data

Description (optional)

1) What is your Age? *

○ 18 - 21

○ 22 - 25

○ 26 - 29

○ 30 and Above

2) Gender *

○ Male

○ Female

○ Other...

3) Ethnicity *

○ Malay

○ Chinese

○ Indian

○ Other...

4) Which Faculty are you from? *

○ FAS

○ FBF

○ FEGT

○ FICT

○ FSC

○ ICS

○ Other...

Section A: Demographic Data

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Appendix

Section B: System Usability Scale (SUS) questionnaire

Description (optional)

1) I think that I would like to use this system frequently. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

2) I found the system unnecessarily complex. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

3) I thought the system was easy to use. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

4) I think that I would need the support of a technical person to be able to use this system. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Section 3 of 4

5) I found the various functions in this system were well integrated. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

6) I thought there was too much inconsistency in this system. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

7) I would imagine that most people would learn to use this system very quickly.

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

8) I found the system very inconvenience to use. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

9) I felt very confident using the system. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

10) I needed to learn a lot of things before I could get going with this system. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

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Poster

Poster

Bachelor of Information Systems (Honours) Business Information Systems
Faculty of Information and Communication Technology (Kampar Campus), UTAR

Weekly Log

FINAL YEAR PROJECT WEEKLY REPORT
(Project II)

Trimester, Year: Y3S2	Study week no.: 3
Student Name & ID: Fong Yin Dee 20ACB06522	
Supervisor:	
Project Title: Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach	

1. WORK DONE

First Meeting for FYP2 and discuss about what to do for the following week.

2. WORK TO BE DONE

Complete the Virtual Module including the character control , pause menu, and 3D artifact model with their respective placement in the exhibition hall

3. PROBLEMS ENCOUNTERED

No problem encounters.

4. SELF EVALUATION OF THE PROGRESS

-Although is the first meeting I dint progress much trough out the whole week

_____
Supervisor's signature

_____
Student's signature

Bachelor of Information Systems (Honours) Business Information Systems
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Weekly Log

FINAL YEAR PROJECT WEEKLY REPORT
(Project II)

Trimester, Year: Y3S2	Study week no.: 4
Student Name & ID: Fong Yin Dee 20ACB06522	
Supervisor:	
Project Title: Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach	

1. WORK DONE

Movable Character control system and initialize the prototype of screenshot module

2. WORK TO BE DONE

Screenshot moduel, pause menu , 3d module and other module such as mini map and history corridor module after the meeting discussion

3. PROBLEMS ENCOUNTERED

Encounter some health issues.

4. SELF EVALUATION OF THE PROGRESS

Progress completes with few days delay.

_____
Supervisor's signature

_____
Student's signature

Bachelor of Information Systems (Honours) Business Information Systems
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Weekly Log

FINAL YEAR PROJECT WEEKLY REPORT
(Project II)

Trimester, Year: Y3S2	**Study week no.: 5**
Student Name & ID: Fong Yin Dee 20ACB06522	
Supervisor:	
Project Title: Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach	

1. WORK DONE
[Please write the details of the work done in the last fortnight.]

Completed the Pause menu for virtual tour and mini map module.

2. WORK TO BE DONE

Guided Tour and History corridor module

3. PROBLEMS ENCOUNTERED

No problem encounters.

4. SELF EVALUATION OF THE PROGRESS

Complete the task given within timeframe.

_____
Supervisor's signature

_____
Student's signature

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FINAL YEAR PROJECT WEEKLY REPORT
(Project II)

Trimester, Year: Y3S2	Study week no.: 6
Student Name & ID: Fong Yin Dee 20ACB06522	
Supervisor:	
Project Title: Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach	

1. WORK DONE
[Please write the details of the work done in the last fortnight.]

Complete the video, audio record and editing for the Guided tour model

2. WORK TO BE DONE

History Corridor Module

3. PROBLEMS ENCOUNTERED

Less respondent on questionnaire than expected.

4. SELF EVALUATION OF THE PROGRESS
Progress slowly but complete within timeframe

_____
Supervisor's signature

_____
Student's signature

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FINAL YEAR PROJECT WEEKLY REPORT
(Project II)

Trimester, Year: Y3S2	Study week no.: 7
Student Name & ID: Fong Yin Dee 20ACB06522	
Supervisor:	
Project Title: Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach	

1. WORK DONE

History Corridor module deployed

2. WORK TO BE DONE

Finishing the report for FYP2

3. PROBLEMS ENCOUNTERED
No problem so far

4. SELF EVALUATION OF THE PROGRESS

Work progress slowly because of midterm examination week

_____
Supervisor's signature

_____
Student's signature

Bachelor of Information Systems (Honours) Business Information Systems
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Weekly Log

FINAL YEAR PROJECT WEEKLY REPORT
(Project II)

Trimester, Year: Y3S2	Study week no.: 8
Student Name & ID: Fong Yin Dee 20ACB06522	
Supervisor:	
Project Title: Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach	

1. WORK DONE

FYP 2 system usability score questionnaire checking.
-Background
-target audience
-testing question

2. WORK TO BE DONE
Continue the collect and analyze the data

3. PROBLEMS ENCOUNTERED

No problem so far

4. SELF EVALUATION OF THE PROGRESS

Slow but still able to complete parts of the report.

_____
Supervisor's signature

_____
Student's signature

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FINAL YEAR PROJECT WEEKLY REPORT
(Project II)

Trimester, Year: Y3S2	**Study week no.: 9**
Student Name & ID: Fong Yin Dee 20ACB06522	
Supervisor:	
Project Title: Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach	

1. WORK DONE

-Data analysis done.

-Writing additional information such as the development progress, testing result, new section for conclusion and refining the report from FYP 1

2. WORK TO BE DONE

-Fix some error formatting in the report and complete the development and testing result section

3. PROBLEMS ENCOUNTERED

No problem so far

4. SELF EVALUATION OF THE PROGRESS

Complete the given task within timeframe.

_____
Supervisor's signature

_____
Student's signature

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FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S2	**Study week no.: 10**
Student Name & ID: Fong Yin Dee 20ACB06522	
Supervisor:	
Project Title: Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach	

1. WORK DONE

Complete writing new section for conclusion which are the research finding , knowledge gained .limitation and future enhancement.

2. WORK TO BE DONE

Complete the report and submit the draft for checking.

3. PROBLEMS ENCOUNTERED

No problem

4. SELF EVALUATION OF THE PROGRESS

Complete the given task with 1 week delay.

_____
Supervisor's signature

_____
Student's signature

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FINAL YEAR PROJECT WEEKLY REPORT
(Project II)

Trimester, Year: Y3S2	**Study week no.: 11**
Student Name & ID: Fong Yin Dee 20ACB06522	
Supervisor:	
Project Title: Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach	

1. WORK DONE
[Please write the details of the work done in the last fortnight.]

-Complete on draft checking

2. WORK TO BE DONE

-Continue to enhance on the system design, performance and user experience based on the sus questionnaire result and review collected
-Getting signature from supervisor

3. PROBLEMS ENCOUNTERED

No problem encountered.

4. SELF EVALUATION OF THE PROGRESS

Complete the given task within timeframe.

_____
Supervisor's signature

_____
Student's signature

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FINAL YEAR PROJECT WEEKLY REPORT
(Project II)

Trimester, Year: Y3S2	**Study week no.: 12**
Student Name & ID: Fong Yin Dee 20ACB06522	
Supervisor:	
Project Title: Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach	

1. WORK DONE
[Please write the details of the work done in the last fortnight.]

Done refinement on the system

2. WORK TO BE DONE
Checking for error and submit the final report

3. PROBLEMS ENCOUNTERED

No problem encounter

4. SELF EVALUATION OF THE PROGRESS

Complete the given task within timeframe.

_____
Supervisor's signature

_____
Student's signature

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FINAL YEAR PROJECT WEEKLY REPORT
(Project II)

Trimester, Year: Y3S2	Study week no.: 13
Student Name & ID: Fong Yin Dee 20ACB06522	
Supervisor:	
Project Title: Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach	

1. WORK DONE

Overall FYP 2 reports and final product of system

2. WORK TO BE DONE

Report Submission

3. PROBLEMS ENCOUNTERED

No problem encountered.

4. SELF EVALUATION OF THE PROGRESS

Completed the task within timeframe.

_____
Supervisor's signature

_____
Student's signature

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by Fong YIN Dee

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Form Title : Supervisor's Comments on Originality Report Generated by Turnitin for Submission of Final Year Project Report (for Undergraduate Programs)
Form Number: FM-IAD-005	Rev No.: 0	Effective Date: 13/90/2023	Page No.: 1of 1

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

Full Name(s) of Candidate(s)	FONG YIN DEE
ID Number(s)	20ACB06522
Programme / Course	Bachelor of Information System (Honours) Business Information System (IB)
Title of Final Year Project	**Creative Edutainment Virtual Museum Application for Lembah Bujang using Exploratory Approach**

Similarity	**Supervisor's Comments (Compulsory if parameters of originality exceeds the limits approved by UTAR)**
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Based on the above results, I hereby declare that I am satisfied with the originality of the Final Year Project Report submitted by my student(s) as named above.

_____
Signature of Supervisor

Name: Ts. SAW SEOW HUI

Date: 12/09/2023

_____
Signature of Co-Supervisor

Name: _____

Date: _____

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Student ID	20ACB06522
Student Name	FONG YIN DEE
Supervisor Name	Ts Saw Seow Hui

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√	List of Figures (if applicable)
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