THE USABILITY STUDY OF AR SMART CLOTHING APPLICATION IN ONLINE BUSINESS

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IN ONLINE BUSINESS

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This report is submitted in partial fulfillment of the requirements for the Bachelor of [Computer Science (Interactive Media)] with Honours.

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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DECLARATION

I hereby declare that this project report entitled

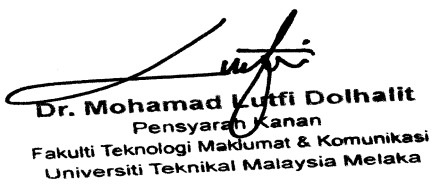
[THE USABILITY STUDY OF AR SMART CLOTHING APPLICATION IN ONLINE BUSINESS]

is written by me and is my own effort and that no part has been plagiarized without citations.

STUDENT : _____ _____ Date : 20th JUNE 2021

(NURUL IZZATI MOHD JAILANI)

I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of [Computer Science (Interactive Media)] with Honours.



SUPERVISOR : _____ Date : 01st JULY 2021

(DR. MOHAMAD LUTFI B. DOLHALIT)

DEDICATION

This final project is dedicated to my beloved parents for their unstoppable support during my journey to complete this final project. They always give moral support and constatent encoragement whenever and wherever I need it.

Next, to my supervisor Dr. Mohamad Lutfi B. Dolhalit who constant guidance I have completed this dissertation. Dr. Lutfi not only enlightened me with academic knowledge but also gave me valuable advice whenever I needed it the most.

To my evaluator Ts. Dr. Ibrahim Bin Ahmad who gives feedback and advice regarding this project.

To my all fellow friends who are always there by being supportive friends.

ACKNOWLEDGEMENTS

In successfully completing this project, many people have helped me. I would like to thank all those who are related to this project.

First of all, I would like to thank Allah S.W.T for giving me the resources, power and courage to complete this project during the entire process. I can not complete this project according to what has been scheduled, without blessing from Him.

Throughout the journey of completing this final project, I have been touch with many people in various types and doing many researches through Internet and books. They contributed to my comprehension and to my learning. I am grateful to my supervisors Dr. Mohamad Lutfi B. Dolhalit for his continuous guidance advice effort, invertible suggestion throughout the research and always accept my updated progress every time I showed to him. I am also very grateful to my evaluator Ts Dr. Ibrahim Bin Ahmad critics, advices and inspiration for the guidance. The project would not have been the same as presented here without their continued support and involvement.

At last, I would like to extend my heartfelt thanks to my parents because without their help this project would not have been successful. Finally, I would like to thank my dear friends who have been with me at the time I needed the most

ABSTRACT

Augmented Reality to Elevate the Online Business is an application which uses 'augmented reality' as a platform for customers as users to use it. It had been developed for all online customers of this Online Shopping. This project includes different forms of interactivity and interactive elements such as 3D models, interactive buttons, interactive sounds, link to social media platforms and 'augmented reality. Multimedia elements like these will attract users.

This project evolves using a variety of software applications such as Unity, Blender and Adobe Illustrator. Unity is the structure in which all the interactive feature ware is combined to create an augmented reality. Blender is for creating 3D models completely. Adobe Illustrator is for designing textures for 3D models. This is a step forward for the users of online shopping and online business.

ABSTRAK

“Augmented Reality to elevate Online Business” adalah aplikasi yang menggunakan 'augmented reality' sebagai platform untuk diketahui oleh pelanggan sebagai pengguna. Ia telah dikembangkan untuk semua pelanggan dalam talian untuk pembelian secara atas talian ini. Projek ini melibatkan pelbagai jenis interaktiviti dan komponen interaktif seperti model 3D, butang interaktif, bunyi interaktif, pautan ke platform media sosial dan 'augmented reality.' Elemen multimedia seperti ini akan menarik perhatian pengguna.

Projek ini menggunakan beberapa aplikasi perisian seperti Unity, Blender dan Adobe Illustrator. Unity adalah kerangka yang menggabungkan semua perisian multimedia untuk mewujudkan kenyataan yang bertambah. Blender digunakan untuk menghasilkan model 3D dengan lengkap. Adobe Illustrator adalah untuk menghasilkan tekstur model 3D. Untuk pengguna pembelian dan perniagaan secara atas talian ini adalah langkah lebih dekat.

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LIST OF ABBREVIATIONS

FYP	-	Final Year Project

LIST OF ATTACHMENTS

CHAPTER 1 : INTRODUCTION

1.1 Introduction

Augmented Reality is an immersive technology which enhances the user's view of the real world by overlaying digital objects on top of the physical objects. In this project, the user is the customer. Users can use Augmented Reality to digitise the specific image given which has been displayed on social media Instagram and Jimdo website, two platforms for this online business. Digitalization is when the image is scanned using Augmented Reality app and it will show 3D models of seven clothes for sale. These seven clothes have the same image marker. User only need to scan once to make the AR clothes appear. The AR clothes for sale are in three different stripe colours to choose from. User can scale in and scale out the image of clothes, which means user can make the cloth bigger or smaller in size. Besides, user can move the image of clothes to the left or to the according to position the AR models accurately on user's body. User can change the position of image marker upside or downside if they want to move the AR clothes to upside or downside. User can try out other design of clothes by clicking on Change button displayed. Futhermore, user can click on three different social media platforms such as Jimdo, Linkedin and Instagram on the screen if they want to get the image marker or ask questions directly to the founder from those platforms.

1.2 Problem Statement

i. Lack of online business platform in apparel and clothing that use Augmented Reality

ii. Shoppers could not get idea of what to buy before going to store

iii. Less of confidence in choosing clothes designs by virtual buying

iv. Lack of time to come to store for trying the clothes

1.3 Objective

i. To analyze the usability component of AR Application for smart clothing application

ii. To apply the usability component AR features for smart clothing development

iii. To develop AR smart clothing application based on the AR usability component

iv. To evaluate the usability of the AR smart clothing application for online business

1.4 Scope

This project's target user will concentrate on Malaysian citizen online shopper for apparel and clothing. Android phone users only can deal with this application.

The information will consist of same design and different colours of clothes for users to choose. The 3D object of AR clothes will appear after users scanning specific image or paper from their Android phone. Users who use this AR application will have various advantages such as save time in choosing design and colours and users will have more confidence in choosing clothes that can catch their eyes without having them to go to store. Besides, users can click on three different platforms for them to visit for asking question directly or getting image marker.

Augmented Reality is chosen as an interactive technique, as well as digital media that will be used as an external feature for this project to improve the result's success rate. Using the application on the Android smartphone, they can scan the augmented reality on the specific paper based on the design of the clothes.

1.5 Project Significance

The significant thing about this project is that it provides three stripes with different colours of clothing and interesting and magnificent way that varies from before purchasing the items confidently. This project will give users a new experience in using AR for trying clothes without having to go to store.

The application's additional contact would boost the attractiveness of the existing faculty. This is because this AR application is evolving, easy to use and it is sensible. It will provide the effective and impressive method of content for customers. The use of a smartphone can be fully utilized by the end user.

1.6 Expected Output

Expected output for this project is can develop a functional Augmented Reality application that can be used by users to try the product. Other than that, sellers who sell product can use this Augmented Reality for marketing. Augmented Reality is another way to boost sale immediately as it is attractive and interesting. Augmented Reality is high new level that will attract any user who uses it in any kind of industries.

1.7 Conclusion

As a conclusion, this is one way to help users to assist consumers in facilitating purchases about the application Augmented Reality by using interactive multimedia platform. This chapter explains about the project overview, problem statements, objectives, scope, project significance and project significance for 'The Usability Study Of AR Smart Clothing Application For Online Business'. This chapter has states the overall understanding of this project. The next chapter will discuss the Literature Review and Project Methodology for this application.

CHAPTER 2 : LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

The previous chapter was discussed such as this project's problem statement, objectives and scope. In this chapter, the literature review and the current project for the piece will be explained a bit. It also includes comparative figures and tables that were created based on a project that used the same product. Analysis of literature typically relies on many tools, such as journal articles, web pages,technical report and newspaper.

The writing survey and venture technique will be represented in this chapter. The data collected from manual, papers, and web source about this application idea will be based on the purpose for helping in the development of better application meet in each of the necessities. First, the purpose of this chapter was to review every prior project or product that had been created and generated. It is connected with this project. Comparison and observation are made between past projects, defining the issue and the issue that can be changed by a new project. The distinction is made on the basis of prior project variations.

This chapter will clarify the approach that has been introduced in the creation of this project. Much of the chapter centred on critical examination of the various methodologies used in this field to determine the best approach to the research questions.

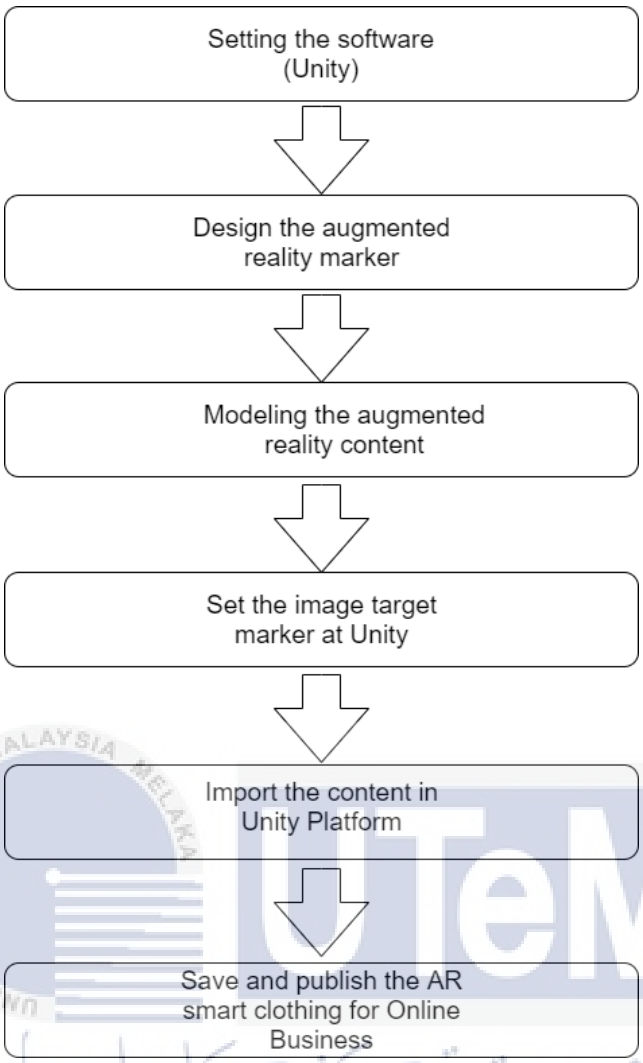


Figure 2.1 Process of smart clothing AR for Online Business

2.2 Domain

i. Augmented Reality

Augmented reality (AR) is a technologically improved version of the natural world that is achieved by the use of artificial visual objects, vibration, or other sensory inputs. It's a growing movement in businesses that deal with mobile computing and business applications. Augmented Reality is evolving and becoming more widely used in a variety of applications. Marketers and entertainment companies have had to fight the myth that virtual reality is nothing more than a marketing tactic since its inception. Consumers, on the other hand, seem to be reaping real gains from this functionality and demand it as part of their buying routine.

ii. Unity

Unity has been chosen as the key implementation platform for the AR project, because it facilitates the development of two-dimensional and three- dimensional technologies as well as augmented and virtual reality. The ability to construct from the same C# codebase on any platform enables prototyping of various operating systems.

iii. New Media

In this age of globalisation, digital media have increasingly developed and changed. AR is mobile and easily usable on mobile devices. Interactive buttons and platforms buttons to be suitable and commonly used in our audiovisual media. Others like marketing, travel and e-commerce have also started using AR as their draw which they have more exciting ways to do.

2.3 Existing System

AR is fast finding use in most, if not all, product-driven industries now that it is on the rise. This covers the ecommerce industry. Many ecommerce store owners, on the other hand, are also wary of embracing AR technology, owing to a lack of understanding of what AR is and how it can change their online sale game. For most people, augmented reality is still a very complex and obscure technology, mostly associated with science fiction films. Digital 3D models, animated holograms, and immersive exhibits. All of these things now happen in fact.

i) FXMirror application in E-commerce context

Figure 2.2 FXMirror application in E-commerce context

FXMirror is the world's first O2O 3D virtual fitting solution and it was created in 2012. FXMirror solution employs patented technology to realistically recreate the shopper's body and skeleton based on heights, feature points, fabric database implementation, and depth map data, and then displays a 3D garment fitting simulation in real-time. There are two types of fitting which are Avatar Fitting and Real Fitting. For Avatar Fitting, it includes many features which are Dynamic Makeover, Scan QR code, Flawless Skin Tones, Style My Hair, Find My Size, On-The-Go Fashion, With The Back View and All Details. Meanwhile for Real Fitting, there are features such as Responsive 3D Fitting, Take the Experience to Mobile, On-The-Go Fashion, With The Back View and All the Details.

ii) KOHL'S Augmented Reality Application in E-commerce context

Figure 2.3 KOHL'S Augmented Reality Application in E-commerce context

With an unique augmented reality experience on Snapchat, Kohl's communicates with customers wherever they are. Kohl's experimenting with innovative ways to engage customers on platforms that appeal to millennial and Generation Z (Gen Z) customers, such as augmented reality to bring the shopping experience to life in collaboration with Snapchat. Kohl's recently teamed up with Snapchat to launch Kohl's Augmented Reality (AR) Virtual Closet, which allows users to shop their favourite styles from a curated selection of Kohl's products. When a user likes a look, they may buy it without ever having to leave the Snapchat app.

iii) Zara Augmented Reality Application in E-commerce context

Figure 2.4 Zara Augmented Reality Application in E-commerce context

When a cell phone is holding up to a sensor inside a store or marked shop windows, AR capabilities include displaying models sporting chosen looks from its collections and allowing consumers to click through to purchase the clothes. Zara's augmented reality displays will be available in 120 stores around the world beginning in April 2018. Models will now be able to appear on shipments of online orders shipped to customers thanks to the technology.

2.3.1 Comparison between existing systems

In the field of e-commerce, there are a number of techniques used to carry the augmented facts. Clothes and Apparel is a favourite thing for all people to do. People love to spend more of their money on clothes as many design will come out every season. But, slighthy of them would not be able to go shopping directly. They prefer window shopping or purchase through online website or social media. Unfortunately, not many e-commerce online shopping for clothes can attract customers from their platform as it is not fun and rare. This makes customers feel unattractive when scrolling the e-commerce online shopping website or social media.

After that, animation production has taken over and several animations have been added to advertise, but only on the website can be used by the user, so it is limited to those users only. In 2-dimensional and 3-dimensional animation, a lot of augmented reality animation has been created. AR provides users with ways to engage with the technology in order to give users new experience gaining data and improved user phrases. The aim of comparing preceding research and project is to examine the differences in each project framework. In terms of utility, interactivity and the multimedia aspect used in each project, the comparison stresses. Table 2.1 shows the comparison of existing system and is explained with details below.

Table 2.1 The comparison of existing system

Element	FXMirror Augmented Reality Application in E-commerce context	KOHL'S Augmented Reality Application in E-commerce context	Zara Augmented Reality Application in E-commerce context
Audio	/	X	X
Video	X	X	X
Animation	/	X	X
Text	/	/	X
Image	/	/	/

Based on the table above, the interactive audio only available for FXMirror application. Video is not available for these three applications. Audio and video are important as it can guide the user on how to use and show step by step. Usually audio will appear when user ask question using their own voice, and the application will reply using voice. As example, Siri on Iphone. Meanwhile, video usually will appear to show about features available in that application or video about using it. For animation, only FXMirror application use this element. Many applications will use avatar animation as it is very interactive and attractive as it will show the identity of a company.

For text feature, only available for FXMirror and KOHL'S applications. Both use text elements in the features provided. Last but not least, all these applications are using image feature. FXMirror, KOHL'S and Zara applications use image to show the product that customer has chosen.

Both of the above-mentioned applications were designed to advertise their bid to the public and to draw their attention to the use of their application. For researchers, it is a helpful marketing technique to make public use of their commodity.

2.4 Project Methodology

The methodology of the project consists of commission, analysis (analytical), idea creation (creative), creation of animation (analytical), design and production (creative), assessment (analytical), and the last will be completed.

This approach would be applied method of analysis or data in various phases of the design process. It also helps the designer to redefine the preliminary hypothesis of a project. Better informed design decisions are more likely to lead to good results obtained for the project, and this approach may require more repetition during development.

During the assessment processes designers will track the achievements and shortcomings of the project to the process. Furthermore, this summative consultation can help create ongoing partnerships that seem profitable to both parties and can also be another service designers can offer to their customers.

2.5 Conclusion

In order to provide users with information, this chapter will address and examine current augmented reality technologies and current projects used in the field of education. In addition , this chapter also discusses the domain knowledge of this project and the process of methodology for designing this project. Next, project specifications consisting of hardware and software will be addressed in Chapter 3. Project milestone will also state as the guideline to build this project.

CHAPTER 3 : ANALYSIS

3.1 Introduction

In this technology-filled period, young people and adults are prefer to purchase items online instead of shop-in-store shopping. There are many reasons behind this. One of the reasons is users are be able to shop 24-hour every day. Most of retail shops nowadays are already have their own application and website. Unfortunately, users are not be able to try the suitable of the design physically. Users only can pick the design and assume their own suitable size. The number of individuals who use smartphone are massively increase nowadays which becoming the reason of developing this smart AR clothes application. Users are be able to put the design of clothes on their body.

This chapter is a type research report in which data that were founded are using purchase. Analysis of the data is a big part of a study. Nowadays application creation and previous research can be valuable method for writing an analysis of the literature. Because of the less multimedia involved, the precing version of online business may be less appealing and knowledge written on board is too complex to understand.

An application for the distribution of information via AR is open. AR Smart Clothing Application will be explaning this new application on online business. This chapter will adress the approach that was used in the creation of this project. There are few hardware specifications and software will be used to build this project.

3.2 Current Scenario Analysis

This research is a procedure of breaking down possible future occasions by thinking about possible elective outcomes. The present scenario being examined is less functional online business application and undelivered results. There are some application that have been using AR system for their online business but not all can meet the suitable characteristics.

3.3 Requirement Analysis

Review of the specifications would include certain tasks that would assess the needs or conditions to fulfil another or altered object. The target consumer for this application is users who want to try design of shirts on their body. Users can scale in and scale out depends on their wants.

3.3.1 Project Analysis

3.3.1.1 Need Analysis

Today , technology is rising rapidly in every sector. Unfortunately, technology in the field e-commerce which is online business is still in progress to improve, so it is possible to change many things. Now is the moment for us to make things more exciting by using technology in e-commerce which is online business. The topic chosen is AR Smart Clothing application for Online Business. There are some people who have trouble understanding this subject.

3.3.1.2 User Analysis

The main objective of developing this project is to analyze the usability component of AR Application for smart clothing application. This project was therefore established to promote the interactive usage for online business specifically for clothing. Target users for this project obviously for customers who want to purchase clothes. Using this application a can bring a little satisfaction as it is attractive and interactive when users use it.

3.3.1.3 Technical Analysis

This product is technically developed using Blender as it it 3D models. Using Unity, the software for this app was created. When the user installs the application on their smartphone, this application will work but only for android user. The creation of that application includes interactive elements.

3.3.2 Software Requirement

Software to create augmented reality (AR) are Unity and Blender. Android users need to install this application from Google Play on their smartphone or tablet. User can directly go to social media such as Instagram or Jimdo website to search the image marker to make augmented reality function well. Users can see 3D models with the application, and experience the interaction between users and application. Users can interact with the button features on it. Besides, users also can click on platforms button available such as Instagram, Linkedin and Jimdo.

Table 3.1 Software Requirement

Software	Function
Unity	The software used to develop this AR project. The coding will be done with this software.
Blender	Used to create the 3D models.
Adobe Illustrator	Used to create texture of design layered three different colours for seven shirts.

3.3.3 Hardware Requirement

The hardware requirement is the most important part in order to complete this project.

Table 3.2 Hardware Requirement

Hardware	Function
Laptop	Used by developer to develop application or software and also used for writing this project report.
Mobile Phone	Used to download the application and for scanning the image target in the smart phone. Only Android phone are used.
Printer	Used to print the image marker.

3.4 Project Schedule and Milestones

As a checklist to ensure that the project can be completed according to the schedule and plan, the milestone and Gantt chart are important. There are two phases to this project. Step 1 focuses on the process of growth and ensures that the result of augmented reality performs well and follows the strategy. Although phase two is a testing step in which the product will be tested to see if the project is achieving the target or not. Table below will show the project schedule and project milestone.

Table 3.3 Project Schedule

Milestones **Final Year Project 1**	**Start Date**	**End Date**
Briefing Project	29 January 2021	29 January 2021
Selection of Potential Supervisor	2 February 2021	7 February 2021
Assigning student to supervisor : Proposal preparation	1 March 2021	8 March 2021
Development progress : Meeting with supervisor I	15 March 2021	19 March 2021
Development progress : Meeting with supervisor II	29 March 2021	2 April 2021

Development progress : Meeting with supervisor III	19 April 2021	23 April 2021
Development progress : Meeting with supervisor IV	3 May 2021	7 May 2021
Development progress : Meeting with supervisor V	24 May 2021	24 May 2021
Progress Status	14 June 2021	18 June 2021
Presentation and Report Submission FYP 1	21 June 2021	25 June 2021

Milestones **Final Year Project 2**	**Start Date**	**End Date**
Development progress : Meeting with supervisor I	19 July 2021	25 July 2021
Development progress : Meeting with supervisor II	26 July 2021	01 August 2021
Development progress : Meeting with supervisor III	02 August 2021	08 August 2021
Development progress : Meeting with supervisor IV	09 August 2021	15 August 2021
Development progress : Meeting with supervisor V	16 August 2021	22 August 2021
Project Testing	23 August 2021	29 August 2021
Presentation and Report Submission FYP 2	30 August 2021	05 August 2021

Table 3.4 Project Milestones

No	Activities Final Year Project 1	Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Proposal preparation														
2	Development progress : Meeting with supervisor I														
3	Development progress : Meeting with supervisor II														
4	Development progress : Meeting with supervisor III														
5	Development progress : Meeting with supervisor IV														
6	Development progress : Meeting with supervisor V														
7	Development Process														
8	Testing and Maintenance														
9	Presentation and Report Submission FYP1														

No	Activities Final Year Project 2	Week 1	2	3	4	5	6	7
1	Development progress : Meeting with supervisor I							
2	Development progress : Meeting with supervisor II							
3	Development progress : Meeting with supervisor III							
4	Development progress : Meeting with supervisor IV							

5	Development progress : Meeting with supervisor V							
6	Development Process							
7	Testing and Maintenance							
8	Presentation and Report Submission FYP2							

3.5 Conclusion

In conclusion , this chapter addresses the current situation and the study of specifications that consist of project requirements, software requirements and hardware requirements in more detail. The project timeline and milestone are also set out in this chapter as a reference for developing this project. The next chapter will talk about the design of Chapter 4

CHAPTER 4 : DESIGN

4.1 Introduction

In this chapter will be listed the previous chapter already addressed about the study and the result of the previous chapter. This chapter is essential which explains how the project process flows and the design information. For the production of The Usability Study of AR smart clothing in online business, all the designs that were made during the design process will be used.

4.2 System Architecture

The system architecture of this project will describe the flow. One marker only is used in this project. This marker is used whenever user wants to pop up the AR models. There are seven design of shirts.

Users need to download the image marker or open our platforms to get the image marker. Users need to have APK file in their phone. AR can only be encountered by android users, and the user will need to pass the file to the phone to access the camera. The APK file named “AR Clothes Business”.

4.2.1 Marker for Clothes AR Application in Online Business

The design is created using Adobe Illustrator as marker. The marker used in this project is for user or customer to be able to scan easily as it can download and print colored of it.

Figure 4.1 Maker for all 7 3D clothes

4.3 Preliminary Design

High level design clarified the system's architecture design including the Augmented Reality Clothes 3D Model user interface.

4.3.1 Interactive Design (Augmented Reality)

4.3.1.1 Idea for 3D character

The 3D characters concept are given below. In order to render the design interactive, seven of these concepts have been selected and will be enhanced with the feature of image. Blender software was used to build it. There are seven 3D clothes with different three stripes colors are created. One marker used through the Unity application.

Design idea Shirt 1

Figure 4.2 Designed Shirt 1 with different colors of stripes

Design idea Shirt 2

Figure 4.3 Designed Shirt 2 with different colors of stripes

Design idea Shirt 3

Figure 4.4 Designed Shirt 3 with different colors of stripes

Design idea Shirt 4

Figure 4.5 Designed Shirt 4 with different colors of stripes

Design idea Shirt 5

Figure 4.6 Designed Shirt 5 with different colors of stripes

Design idea Shirt 6

Figure 4.7 Designed Shirt 6 with different colors of stripes

Design idea Shirt 7

Figure 4.8 Designed Shirt 7 with different colors of stripes

4.3.1.2 Idea for Augmented Reality content

Design for Marker

Marker is created using Adobe Illustrator. Text and colored stripes are used for design.

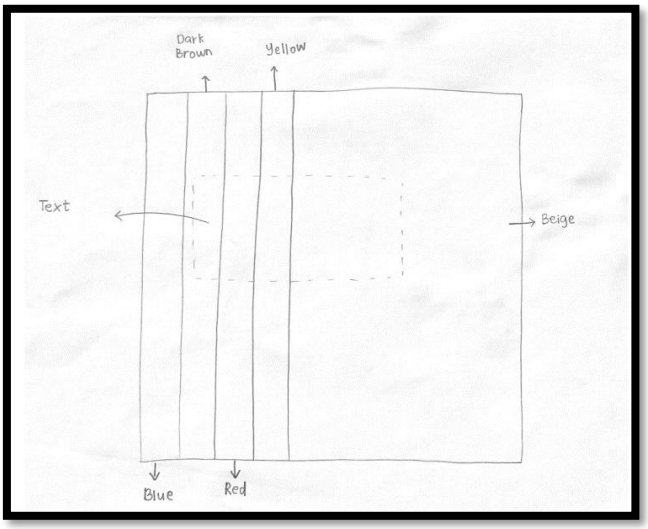


Figure 4.9 Designed for AR marker

4.4 User Interface Design

The user interface serves as a means for device interaction between users. User interface is the most important medium, and most of the successful system depends on how many users can understand how to use the system or product. In order to create better interaction between the users and the software, the process of designing the user interface must be very careful.

4.4.1 Navigation Design

The navigation design will be shown through the flow chart below.

Figure 4.10 Navigation structure of Augmented Reality

4.4.2 Input Design

The purpose of creating this application is to analyze the usability component of AR Application for smart clothing application. Thus, for this "AR Smart Clothing in Online Business" application, the user has to go to the platforms provided such as Instagram, Linkedin and Jimdo to get the image target or marker. User will enjoy using this AR application with the interactive and interactivity of this augmented reality.

4.4.3 Output Design

The performance is to produce an AR application for 3D clothes. The interface of the output design is shown below.

Figure 4.11 Output Design : Opening

Figure 4.12 Output Design : Main Screen

Figure 4.13 Output Design : After scanning marker

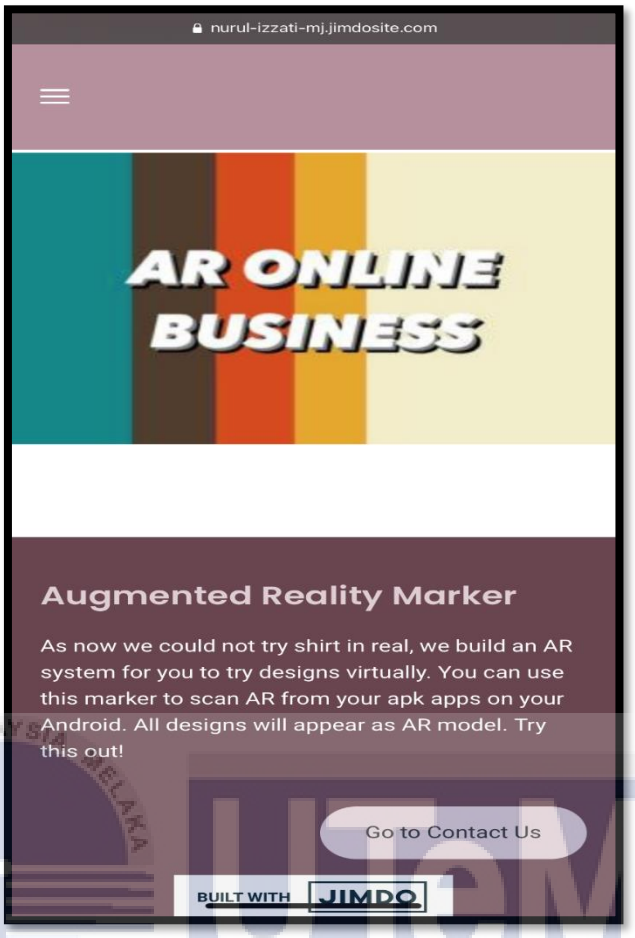


Figure 4.14 Output Design : Jimdo Website

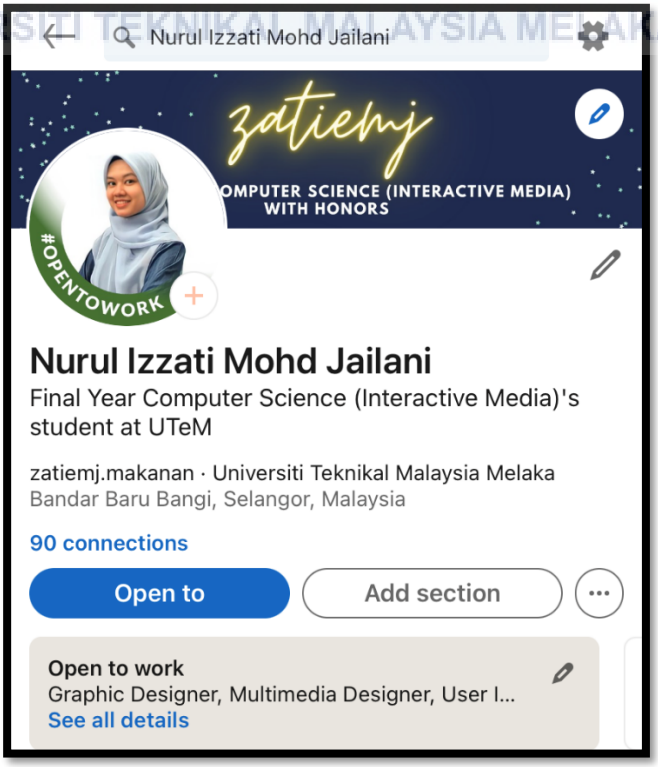


Figure 4.15 Output Design : Linkedin

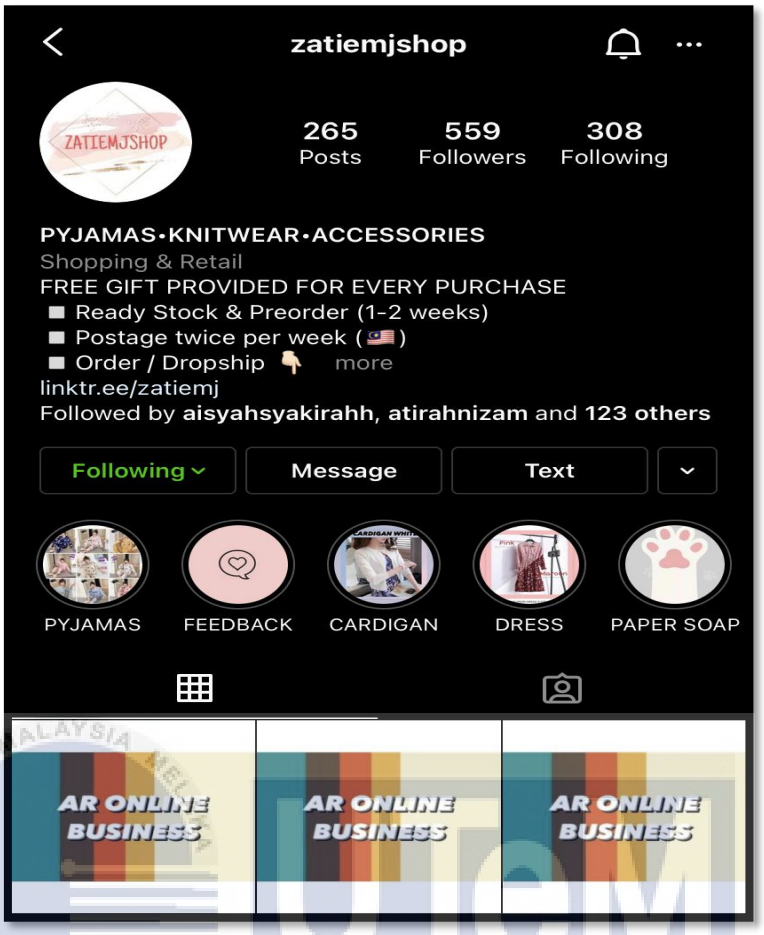


Figure 4.16 Output Design : Instagram

4.4.4 Metaphor

The design is based on clothes from zatiemjshop instagram.

4.4.5 Template Design

This application interface does not have a particular design. The concept was produced by chosing the most suitable design for user to use.

4.4.6 Media creation and integration

Unity software has developed the programme. Vuforia will be the database which will save all the content and the target image. Blender software is for creating 3D shirts.

4.5 Conclusion

This chapter outlines the product 's design and provides material, collecting ideas to describe this project in more depth. This chapter also describes how each content ideas were planned, and the ideas were chosen and will be produced as the content of reality augmented packaging box product or foe.

CHAPTER 5: IMPLEMENTATION

5.1 Introduction

During this implementation step the method of introducing and designing the multimedia elements will be elaborated. This chapter covers all of the media creation process. Media development includes animation, audio and interaction creating. Explains also about the process in this step of creating all the above described media development.

The inclusion of all aspects of the media would then be extended to Augmented Reality. The version control method and the environment configuration will also be addressed in this chapter. The discussion is about plug-in detail, product version as well as the implementation process for this project. When doing the product setup management, there is some control to be taken.

5.2 Media Creation

Media development involves four elements in the multimedia process, namely text , graphics, audio, and animation. This project includes three components that are text, 3D animation and audio. Combine all of the elements to produce the final production. To create the final usable product all of the part will be assembled. Detailed data on multimedia development will be explains in this chapter.

5.2 .1 Production of 3D Shirt

Three dimensional shirt or model is one of the most significant elements of multimedia in the development of this project. The model of shirt is used to provide for the user the real situation of trying the real clothes that are selling from the shop but in virtual way. User will be able to try the seven different colors of 3D shirts. There are many interactive buttons as features to allow user change the colors, position and size of the 3D shirts.

3D shirts are created using Blender software and all of these shirts have different three colors in each layer. All the 3D shirts have the same size and shape. Adobe Illustrator software is used to create the texture and three different layered colors for the shirt and save in Joint Photographic Expert Group (jpg) file. In Blender, the 3D model is in original full grey color with no texture added. Then, texture is added from jpg file that has been created from Adobe Illustrator.

The size and shape of the shirt is made using the free size and normal shape same as other apparel and clothing shops sell. So, it will look simple but still nice to wear as it is a daily clothes to wear anytime and anywhere.

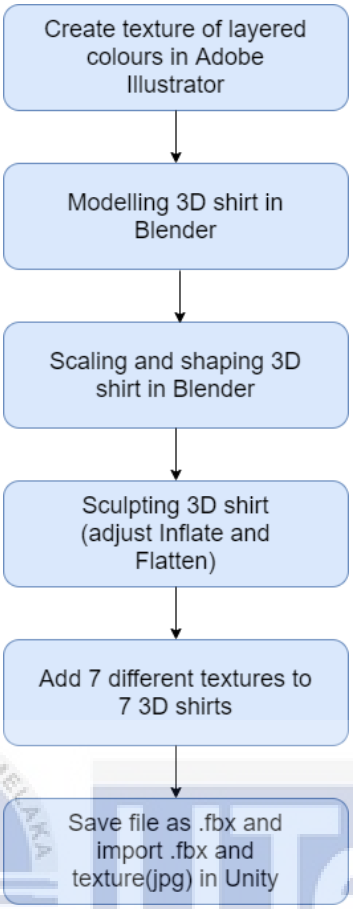


Figure 5.1 The process of creating 3D Shirt

5.3 Media Integration

Integration of media is about combining all the aforementioned production. Within AR Shirt, all media such as 3D animation, audio and text produced for this Clothing in Online Business will be implemented. It is important that both content and design become part of Unity. Unity software is used to develop and it will be the basis for the development of augmented reality. Post the AR Smart Clothing Application in Online Business after the process has been done.

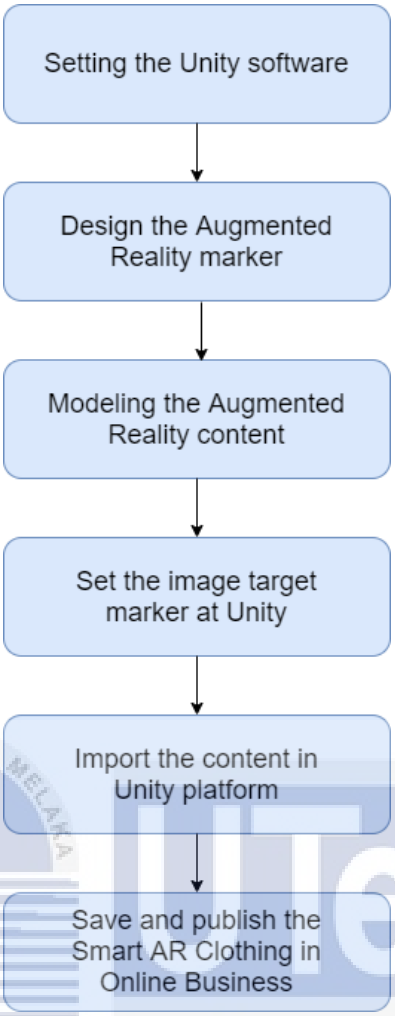
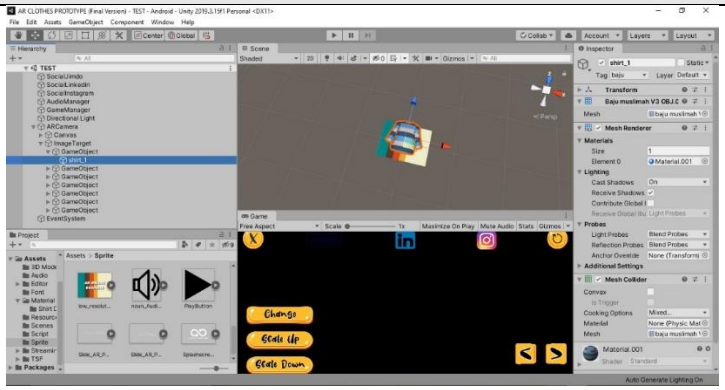
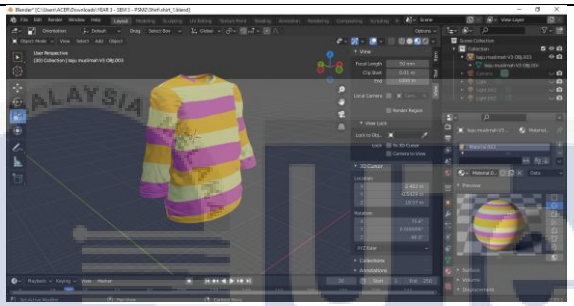
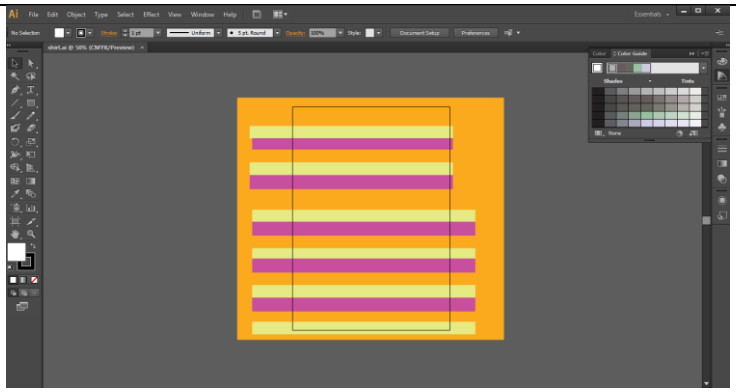


Figure 5.2 Development Process

5.4 Product configuration management

The configuration process is important, and it is essential to explain all the software used in developing this project. It is to be able to achieve the impact of desire. The software configuration is shown in the table below for Unity Software, Blender and Adobe Illustrator.

Table 5.2 Software configuration process

Software	Configuration setting
Unity Software	
Blender Software	 
Adobe Illustrator Software	

5.5 Implementation process

The implementation status will define development progress for each of the segments covered by this project. The following table displays the full implementation status of the Smart AR Clothing in Online Business.

Table 5.3 Implementation process and description

AR 3D Shirt	Description	Implementation status
1	Content that involve to 3D shirt 1 are interactive buttons (change shirt, change position and change size), audio of music and three social media buttons.	Complete
2	Content that involve to 3D shirt 2 are interactive buttons (change shirt, change position and change size), audio of music and three social media buttons.	Complete
3	Content that involve to 3D shirt 3 are interactive buttons (change shirt, change position and change size), audio of music and three social media buttons.	Complete
4	Content that involve to 3D shirt 4 are interactive buttons (change shirt, change position and change size), audio of music and three social media buttons.	Complete
5	Content that involve to 3D shirt 5 are interactive buttons (change shirt, change position and change	Complete

	size), audio of music and three social media buttons.	
6	Content that involve to 3D shirt 6 are interactive buttons (change shirt, change position and change size), audio of music and three social media buttons.	Complete
7	Content that involve to 3D shirt 7 are interactive buttons (change shirt, change position and change size), audio of music and three social media buttons.	Complete

5.6 Conclusion

In conclusion, the details were explained in this chapter during the implementation process. After the implementation process is complete, the validation phase will then take place.

CHAPTER 6: TESTING

6.1 Introduction

The testing process for that project will be explained in this chapter. To ensure the smooth running of the project, testing procedures are important. This chapter includes test design, test and analytical results, testing and tracking execution. The evaluation will be carried out using one methodology, such as a user survey. This project will assess user experience, usability and effectiveness of the product.

In order to determine whether this programme can operate effectively and bring new information to the general public or not, the testing approach can focus on evaluating the user's understanding of what the project's primary goal is, what problems or bugs users encounter, how users perceive the programme, what critical details this product needs to provide, to help the consumer to do identify the information it needs and if the content fit for purpose.

Usability testing is a test that aims to integrate how consumers want the application to be. In trying to read minds, the same applies. Usability testing ensures that the augmented reality is applied in a way that suits the needs and desires of the user with satisfying expectations (effectiveness) and easily (effectively) in a short-sighted manner. Regarding usability, that is all about the user's experience when interacting with the augmented reality, and the user's attitude to it.

6.2 Test Plan

6.2.1 Test User

The test user should determine how many participants the target user of this project is interested in the analysis. The person who is involved in the test is the one that occupies the project's scope. The phase of testing will be carried out by supplying real-time users with a survey query. Users check the marker on the picture, and then ask users to answer the survey query. In this project, participants involved are 50 people.

There are 47 from random respondents and 3 from media expert. Below is table for media expert details.

Table 6.1 Media Expert respondent details

No	Name	Age	Gender	Occupation
1	Muhammad Shahrom Bin Mohd Tarmizi	25	Male	Videographer and Editor
2	Norathirah Binti Said	25	Female	Designer
3	Muhammad Fikri Ariff Bin Mohd Fuzi	24	Male	Editor

6.2.2 Test Environment

The test environment is the location or position selected during the process of testing. The location chosen for this test must be acceptable where it is easy and discoverable to the user. Moreover, it has also checked the hardware and software setup and preparation for this evaluation. After that the Android Smartphone would need the hardware for this test. In this project, the participants must be Andoird user. Due to pandemic, people are required to stay at home so the test is conducted from their homes.

6.2.3 Test Schedule

The length and intervals must be included in the test schedule, so the testing will run smoothly. The test time was shown on the basis of Table 6.1.

Table 6.2 Schedule of Testing Activity

Process	Description
Tester / User	Public
No of Tester / User	50 people
Testing Due Date	15-27 August 2021
Testing duration	Depends on people
Testing Venue	At their homes

Demonstration of how the application and augmented reality work by watching videos is done for users who could not, or never used the technology of augmented reality. Two videos are provided for the users to watch. The first video is Augmented Reality application from FXMirror company. The second video is Smart AR Clothing in Online Business. These videos were tested to verify whether the participants understood or not on how to use the virtual reality programme before the demonstration was shown. Upon initiation of the analysis, users were granted an opportunity to inspect the app by downloading the apk file. The time needed to complete and to complete the presentation and research took less than five minutes. For the survey, the users were provided with a question collection. They must answer the given questions after the users have completed the testing phase.

6.3 Test Strategy

Test strategy is not a specific technique of application or function assessment, but a general way of dealing with the testing process. The paper for the testing plan is an unusual administrative record. It also determines the aim of the research being fulfilled. Different assessment methods may be used depending on the type of application to be evaluated, and depending on the implementation process.

Testing usability of the product would be the focus of the test process. Usability techniques will be used as part of this research process for the usability test to configure the UI created by Jacob Nielsen. Such principles were called "conceptual model" because they are simple rules of thumb and not precise guidelines for usability. It's otherwise referred to as 3 general interface concepts interaction. As the qualitative data is about the graphical interpretations that can be generated on the basis of a survey, observation , interview or assessment subject, this test will gather the qualitative data.

There are 3 conceptual model that involve in this testing which are:

- Visibility of the system status
- User control and freedom
- Error prevention

After they test it, they must answer all the questions in google form. This survey were conduct at users own home due to pandemic.

6.4 Test Implementation

6.4.1 Test Description

The explanation of the test will explain the purpose of the test and the expected test result. During the training session for user acceptance testing, which is randomly aged people 18-36 years old for male and female genders. The creator explains the concept and users watch the video of the prototype, then all respondents will individually do the test. They need to test by using the apk file with image marker provided through Jimdo website and Instagram platform. Hence, all respondents need to fill out questionnaires given in google form distributed by developer.

6.4.2 Test Data

The evaluation will be ready for reporting once the testing session is complete. In order to be tested, all the test results are recorded. The purpose of testing and user acceptance testing is to assess if, in chapter one, this project achieves its specified objective. It collects and analyses all results of the tests.

6.5 Test Results and Analysis

The results of the assessment that was carried out will be shown on the result and review. Depending on the survey issue, all the graph analysis performed was presented.

6.5.1 Testing result for survey question

Question 1

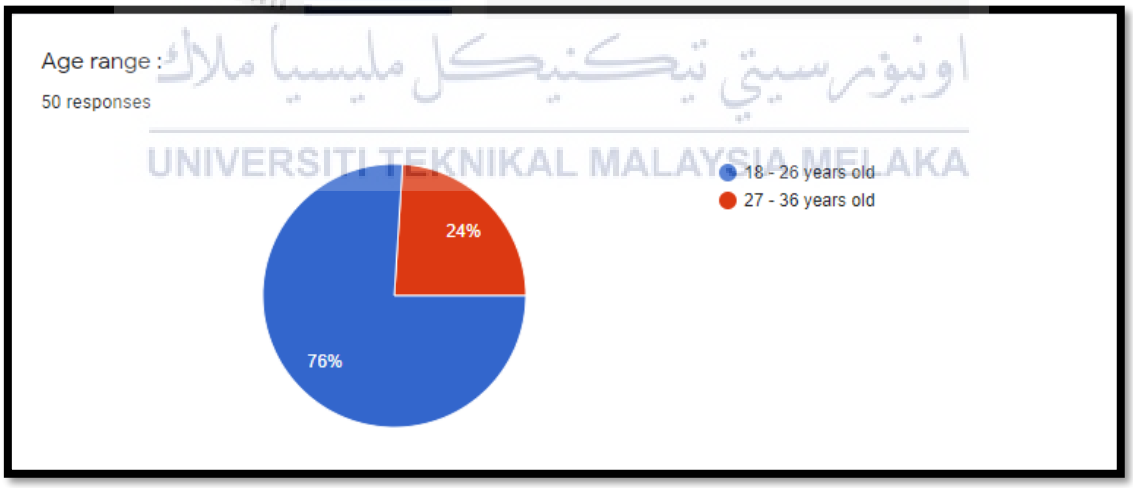


Figure 6.1 : Testing result for question 1

Table 6.3 : Testing result for question 1

TYPE RESPONDENT	AGE	RESULT (respondent)
Expert 1 : Muhammad Shahrom Bin Mohd Tarmizi Expert 2 : Norathirah Bt Said	25	66.67% = 2
Expert 3 : Muhammad Fikri Ariff Bin Mohd Fuzi	24	33.33% = 1
Random respondent (47 people)	18 – 26	70% = 35
Random respondent (47 people)	27 - 36	24% = 12

Question 2

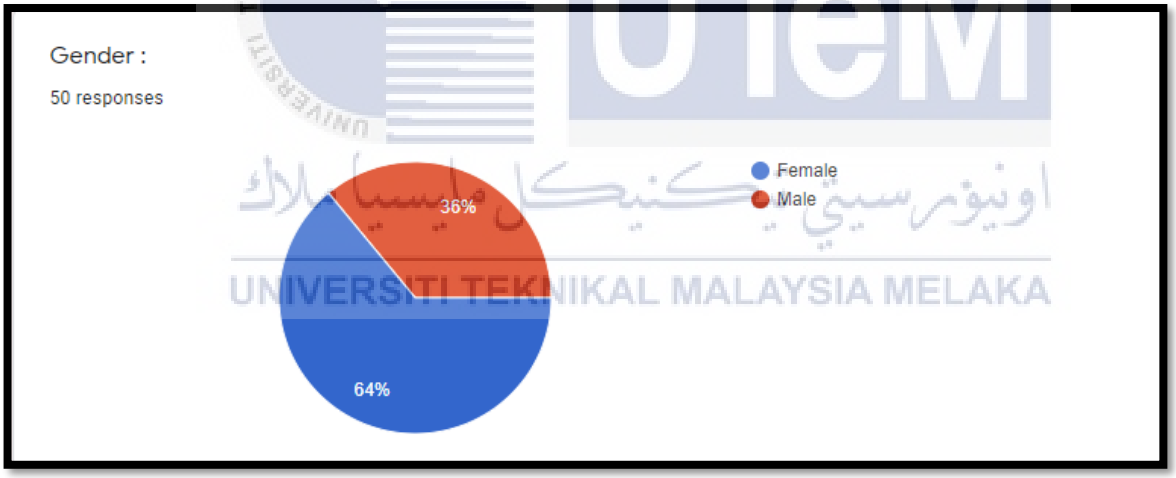


Figure 6.2 : Testing result for question 2

Table 6.4 : Testing result for question 2

TYPE RESPONDENT	GENDER	RESULT (respondent)
Expert 1 : Muhammad Shahrom Bin Mohd Tarmizi Expert 3 : Muhammad Fikri Ariff Bin Mohd Fuzi	Male	66.67% = 2
Expert 2 : Norathirah Bt Said	Female	33.33% = 1
Random respondent	Male	(16/47)*100

(47 people)		= 34.04% = 16 people
Random respondent (47 people)	Female	(31/47)* 100 = 65.96% = 31 people

a) User Experience

Question 3

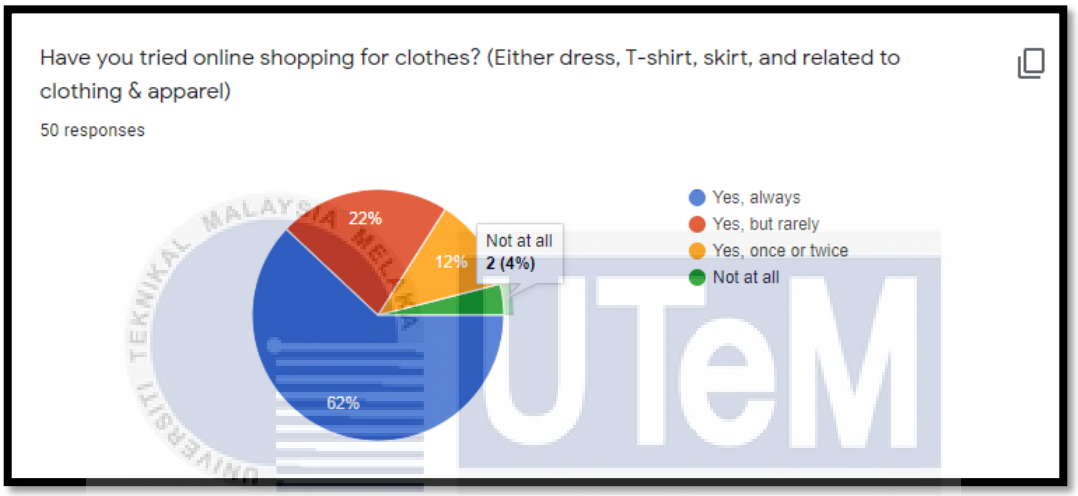


Figure 6.3 : Testing result for question 3

Table 6.5 : Testing result for question 3

TYPE RESPONDENT	TRIED ONLINE SHOPPING	RESULT (respondent)
Expert 1 : Muhammad Shahrom Bin Mohd Tarmizi Expert 3 : Muhammad Fikri Ariff Bin Mohd Fuzi	Yes, but rarely	66.67% = 2
Expert 2 : Norathirah Bt Said	Yes, always	33.33% = 1
Random respondent (47 people)	Yes, always	(30/47)*100 = 63.83% = 30
	Yes, but rarely	(9/47)*100 = 19.15% = 9
	Yes, once or twice	(6/47)*100 = 12.77% = 6

	Not at all	(2/47)*100 = 4.26% = 2

Question 4

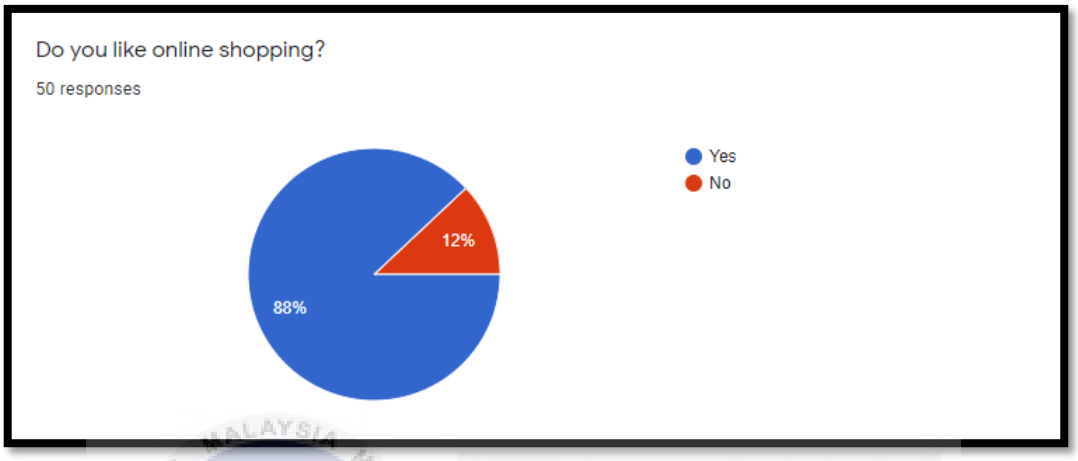


Figure 6.4 : Testing result for question 4

Table 6.6 : Testing result for question 4

TYPE RESPONDENT	ANSWER	RESULT (respondent)
Expert 1 : Muhammad Shahrom Bin Mohd Tarmizi Expert 2 : Norathirah Bt Said Expert 3 : Muhammad Fikri Ariff Bin Mohd Fuzi	Yes	100% = 3
Random respondent (47 people)	Yes	(41/47)*100 = 87.23% = 41
Random respondent (47 people)	No	(6/47)*100 = 12.77% = 6

Question 5

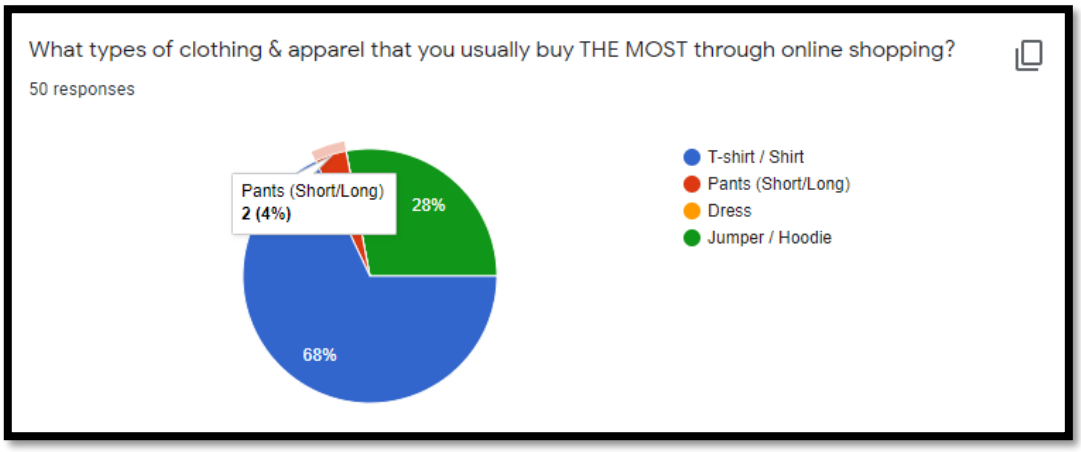


Figure 6.5 : Testing result for question 5

Table 6.7 : Testing result for question 5

TYPE RESPONDENT	TYPE OF CLOTHING	RESULT (respondent)
Expert 1 : Muhammad Shahrom Bin Mohd Tarmizi Expert 3 : Muhammad Fikri Ariff Bin Mohd Fuzi	Jumper / Hoodie	66.67% = 2
Expert 2 : Norathirah Bt Said	Tshirt / Shirt	33.33% = 1
Random respondent (47 people)	Tshirt / Shirt	(33/47)*100 = 70.21% = 33
	Pants (Short/Long)	(2/47)*100 = 4.26% = 2
	Dress	(0/47)*100 = 0% = 0
	Jumper / Hoodie	(12/47)*100 = 25.52% = 12

Question 6

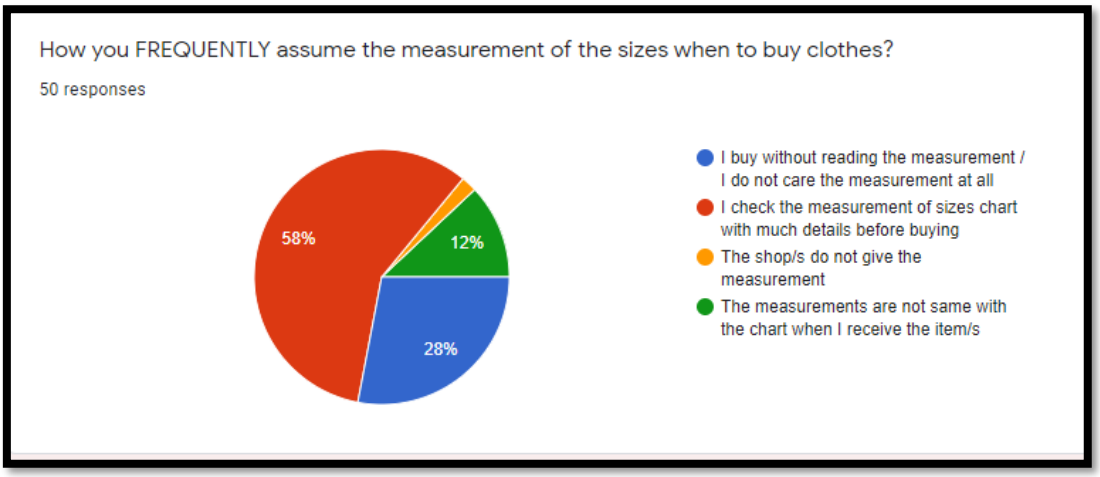


Figure 6.6 : Testing result for question 6

Table 6.8 : Testing result for question 6

TYPE RESPONDENT	TRIED ONLINE SHOPPING	RESULT (respondent)
Expert 1 : Muhammad Shahrom Bin Mohd Tarmizi Expert 2 : Norathirah Bt Said Expert 3 : Muhammad Fikri Ariff Bin Mohd Fuzi	Check measurement with much details	100% = 3
Random respondent (47 people)	Buy without reading / do not care	(14/47)*100 = 29.79% = 14
	Check measurement with much details	(26/47)*100 = 55.32% = 26
	Shops do not give measurement	(6/47)*100 = 2.13% = 1
	Measurement not same when received items	(6/47)*100 = 12.77% = 6

b) Effectiveness (i)

Question 7

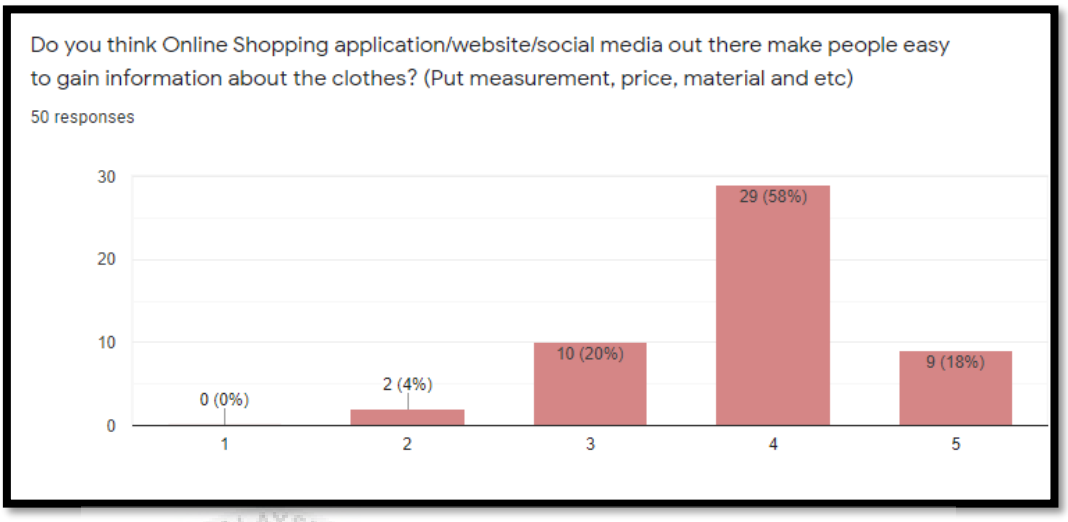


Figure 6.7 : Testing result for question 7

Table 6.9 : Testing result for question 7

TYPE RESPONDENT	Online Shopping platform make people easy to gain information (Rate)	RESULT (respondent)
Expert 1 : Muhammad Shahrom Bin Mohd Tarmizi	3	33.33% = 1
Expert 2 : Norathirah Bt Said Expert 3 : Muhammad Fikri Ariff Bin Mohd Fuzi	4	66.67% = 2
Random respondent (47 people)	1	(0/47)*100 = 0% = 0
	2	(0/47)*100 = 0% = 0
	3	(9/47)*100 = 19.15% = 9
	4	(27/47)*100 = 57.45% = 27
	5	(9/47)*100 = 19.15% = 9

c) Accessibility

Question 8

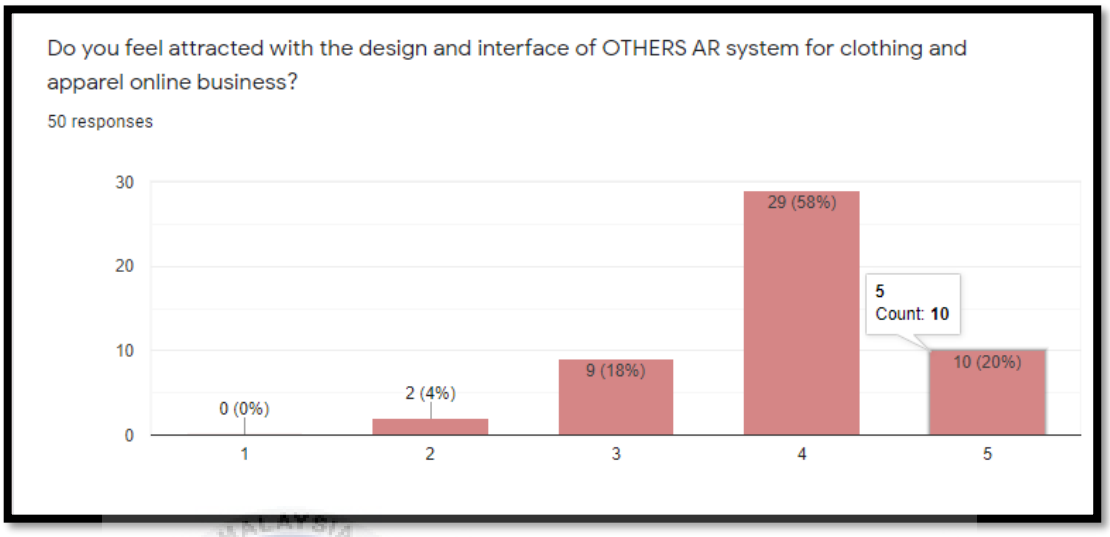


Figure 6.8 : Testing result for question 8

Table 6.10 : Testing result for question 8

TYPE RESPONDENT	Feel satisfied with intercation button my AR system (Rate)	RESULT (respondent)
Expert 1 : Muhammad Shahrom Bin Mohd Tarmizi	3	33.33% = 1
Expert 2 : Norathirah Bt Said	4	33.33% = 1
Expert 3 : Muhammad Fikri Ariff Bin Mohd Fuzi	5	33.33% = 1
Random respondent (47 people)	1	(0/47)*100 = 0% = 0
	2	(2/47)*100 = 4.26% = 2
	3	(8/47)*100 = 17.02% = 8

	4	(28/47)*100 = 59.57% = 30
	5	(9/47)*100 = 19.15% = 9

b) Effectiveness (ii)

Question 9

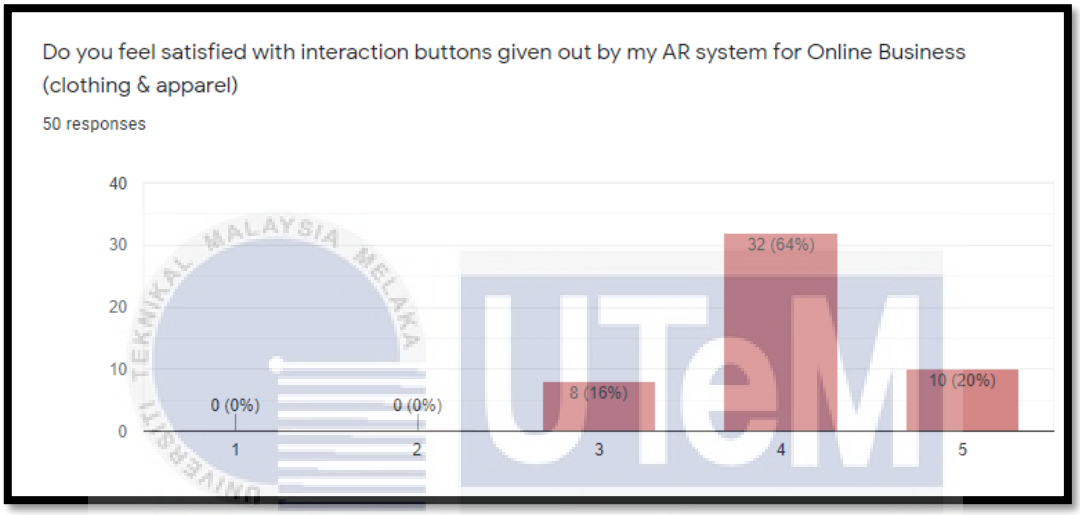


Figure 6.9 : Testing result for question 9

Table 6.11 : Testing result for question 9

TYPE RESPONDENT	Feel satisfied with intercation button my AR system (Rate)	RESULT (respondent)
Expert 1 : Muhammad Shahrom Bin Mohd Tarmizi	5	33.33% = 1
Expert 2 : Norathirah Bt Said Expert 3 : Muhammad Fikri Ariff Bin Mohd Fuzi	4	66.67% = 2
Random respondent (47 people)	1	(0/47)*100 = 0% = 0
	2	(0/47)*100 = 0% = 0
	3	(8/47)*100 = 17.02% = 8

	4	(30/47)*100 = 63.83% = 30
	5	(9/47)*100 = 19.15% = 9

d) Feedback

Question 10

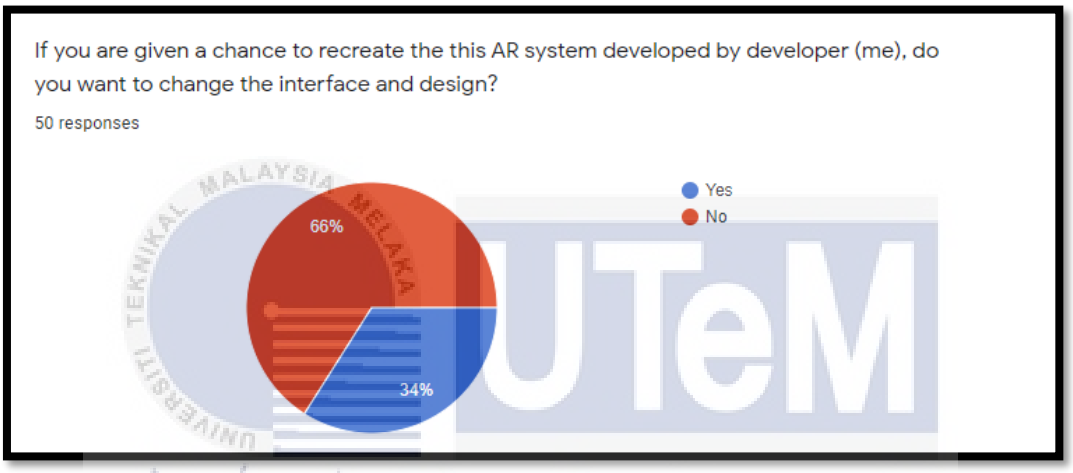


Figure 6.10 : Testing result for question 10

Table 6.12 : Testing result for question 10

TYPE RESPONDENT	ANSWER	RESULT (respondent)
Expert 1 : Muhammad Shahrom Bin Mohd Tarmizi Expert 2 : Norathirah Bt Said Expert 3 : Muhammad Fikri Ariff Bin Mohd Fuzi	Yes	100% = 3
Random respondent (47 people)	Yes	(14/47)*100 = 29.79% = 14
Random respondent (47 people)	No	(33/47)*100 = 70.21% = 33

Question 11

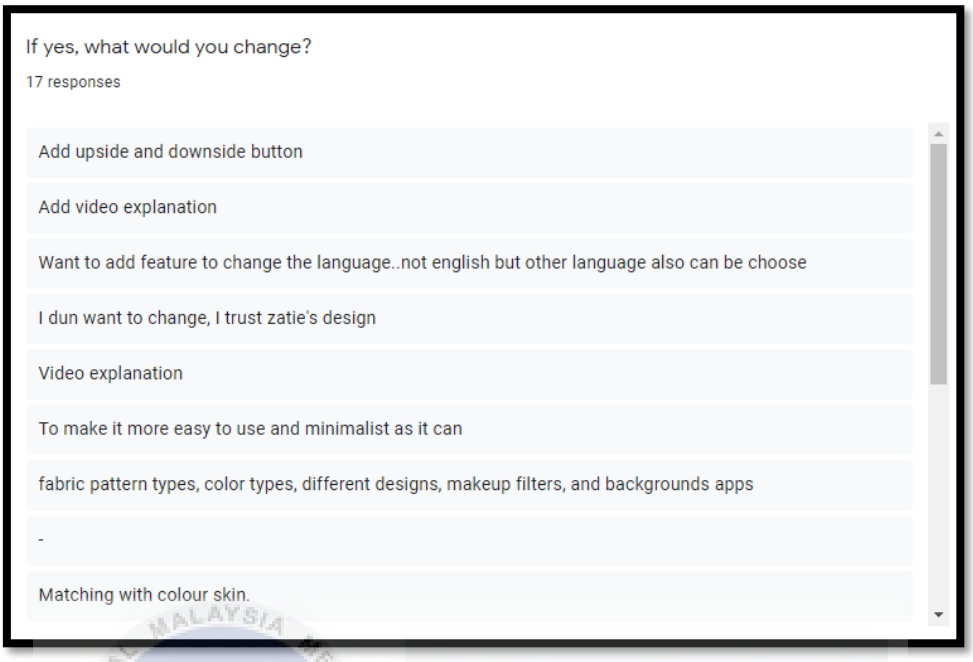


Figure 6.11 : Testing result for question 11

Figure 6.5 : Testing result for question 11

Table 6.12 : Feedback from media expert for question 11

TYPE RESPONDENT	Feedback
Expert 1 : Muhammad Shahrom Bin Mohd Tarmizi	"The system will suggestion when the system scan of customer body and program will suggest what dress would what is right for the customer"
Expert 2 : Norathirah Bt Said	"Add video explanation"
Expert 3 : Muhammad Fikri Ariff Bin Mohd Fuzi	"Want to add feature to change the language..not english but other also can be choose"

6.5.2 Testing result for observation

- To observe whether or not the users can seamlessly use the 3D shirt models with interactive buttons

It is stated from the collected test data that 10 users were strongly agree as they click on rate number 5. Meanwhile, 32 users rate number 4 which means agree with the Augmented Reality technology of my project. Therefore users still need instructions from the observation to be able to experience "AR Smart Clothing in Online Business". It is because they are still unfamiliar with the Unity software that scanned the marker or the picture.

- To observe any issues encountered by the user (any error or mistake made by the user).

This "AR Smart Clothing in Online Business" was truly dependent on the type of phone that is Android consumer. With good quality camera and recording, during the scanning of the marker the users do not face any difficulties. From the observation it indicates that the "wait" problem only exists because the andriod phone programme is not modified until after the marker has been scanned, It takes a long time for the loading process to reveal its output.

Since they are not acquainted with Augmented Reality Technology, I need to show how to use the Augmented Reality and explain how this Augmented Reality Technology works.

Besides from the opinions above, 17 from 50 users want to upgrade the original system especially for the features.

- Observing if they require assistance during the process.

When users were testing the product, some assumption was made on whether or not the users needed assistance during the process. Given that most of the users had no experience with this emerging technology, the users were given the brief on augmented reality. After that, the users were given a few times to understand the instructions and then the test was made to see if they needed any help to marker scanning. The users will understand the instruction provided from the observation and the phone camera was pointed out on the photo. They just enjoy the content after scanning the house picture and exit the Vuforia application without having any support.

6.6 Conclusion

This chapter will explain as the conclusion about the subtle elements of the testing process. The developer can evaluate the image from the test stage and can understand whether the Avatar application can be improved using Augmented Reality. Likewise, the feedback from the test outcome will aid in the probability of future production of a superior product. In addition, by ending this testing, the developer will get feedback on what users need and what users need for their product during the session. The following chapter will be the end of the entire field of this project from that point forward.

CHAPTER 7: PROJECT CONCLUSION

7.1 Introduction

This chapter will discuss the strengths and weaknesses in developing this project for the augmented reality. In this process, the strength and weakness of the product are obtained from the preceding test step. This software has plenty of weaknesses which can be improved and strengthened, thus taking advantage of the power of this software.

7.2 Observation on Weakness and Strengths

Any product made will experience strength and weakness with the product. The product 's qualities can be evaluated in light of the product 's goal, it is to ensure whether the developer is capable of achieving the objectives or creating a decent product that can draw attention to people gathering. Yet this "AR Smart Clothing in Online Business" there are still a weakness and there are still ways to develop where the deficiency will possibly be overcome by carrying out further research and redesigning the product's content.

In view of the perception, the product being marketed using Augmented Reality generated incredible reactions that led to the consistency and weakness of the product being differentiated. Thinking back to the goals of the project, the goal is to design and create an AR Smart Clothing Application that uses augmented reality to contain important information.

However, the limitation of the "AR Smart Clothing in Online Business" relies on the internet access to download its application, if the device receives or remains in the smartphone's better condition, there will be no problem accessing the Augmented Reality content. But if users with low smartphone quality take the process of loading when entering the application too long to recover and consumer won't experience high quality measurements. Besides, upside and downside buttons are not available to more the position of the AR shirts.

Gadgets such as Android phones are the key devices for accessing the AR shirt models application. There are few smartphone or tablet forms, however, that can not download the Unity application contained in the APK file. The problem can be defined by the fact that a Gyroscope sensor is not integrated on and enabled by the system. It's because Gyroscope sensor is a part of the essential preconditions for the base prerequisites for the application to be downloaded.

Futhermore, user can not detect the measurement on the spot when trying the AR shirt models. User only can put the shirts on their body.

For the strength of the product, the augmented reality can spread the excitement about the innovation of the new media in intuitive way. It can give the users a pleasant experience with the combination of animation, audio, interactive buttons and some cooperation from users and the system. From the test results it was reported that the guideline also gives simple and easy to understand by all kinds of target users on the Augmented Reality application.

This model programme also gives users the ability to explore the augmented reality technology, which they themselves will encounter. Users no need any device like joystick or goggles to interact with technology, but users only need their smartphone like android phone to connect with this new technology and get absorbed in the cloths of Augmented Reality Application.

Besides, user can get the image marker directly when they click the Jimdo button and Instagram button on the top center of the interface. User can read the measurements and details about the shirts from the platforms available. User can also click Linkedin button to contact and ask question to the founder directly.

7.3 Propositions for Improvement

In every system, techonlogy or innovation, there are must be a lot of thing to upgrade so it can be better system for target users. The "AR Smart Clothing in Online Business" needs user to learn by themselves on how to use the application. So one of the improvements that can give a superior understanding on the content is provide tutorial video on the home page for this application which means developer must add many scenes in this application. What's more, the content that has been developed may insufficient for this smart clothing application. Other than that, create measurements and details feature in this application when user click the AR model of certain shirts.

Other than including more content in the "AR Smart Clothing in Online Business" the content that already provided still need some change in the way for quality and informative. The content that need some improvement interactivity of the content. It is because the content can give the big impact for users in understanding the purpose of the product that have been made.

7.4 Project Contribution

The project contribution of the "The Usability Study of AR Smart Clothing in Online Business" can add more design and features such as different kind of apparel and clothing for Online Business to all people with variety of ages. There a lot of online business in apparel and clothing application but in this product "Usability Study of AR Smart Clothing in Online Business" not only developed to save time in trying clothes as well as to introduce the augmented reality technology with the general population. It is because the survey gathered in the testing process expressed that, out of 42 participants who have an interest with this project.

7.5 Conclusion

Augmented Reality and preparation is a good community combination that is prepared to make a brilliant impact on the world of learning. Given the challenges the stuff faces, the program always prepares to inspire everything. Little issue on the product would not check the developing of Augmented Reality in instruction. The product will eventually undergo more improvement in a perfect environment, and the concept of understanding the Virtual Reality avatar application is succeeded.

REFERENCES

Adam Hayes. (December 2020). Augmented Reality. Retrieved from https://www.investopedia.com/terms/a/augmented-reality.asp

7 Benefits of Augmented Reality in E-Commerce (November 2020). Accessed 2020, https://www.aircards.co/blog/7-benefits-augmented-reality-ecommerce

Augmented Reality in E-commerce-Statistics and Trends (January 2021). Accessed 2021, https://www.invespcro.com/blog/augmented-reality-in-e-commerce/

Svetla Pavlova. (May 2020). How 6 Brands Are Using Augmented Reality (and How You Can Too) Retrieved from https://www.threekit.com/blog/6-brands-using-augmented-reality-in-ecommerce

Nicole Martins Ferrera. (December 2018). 5 Best Augmented Reality Ecommerce Example. Retrieved from https://my.oberlo.com/blog/best-augmented-reality-ecommerce-examples

FXMirror Official Website http://www.fxmirror.net/en/features

Reimagining the Digital Shopping Experience with Snapchat (13 August 2021). Accessed 2020, https://corporate.kohls.com/news/archive-/2020/august/reimagining-the-digital-shopping-experience-with-snapchat

Sastri Munsamy. (02 December 2018). The difference between a test plan and a test strategy. Retrieved https://www.inspiredtesting.com/news-insights/insights/353-the-difference-between-a-test-plan-and-a-test-strategy

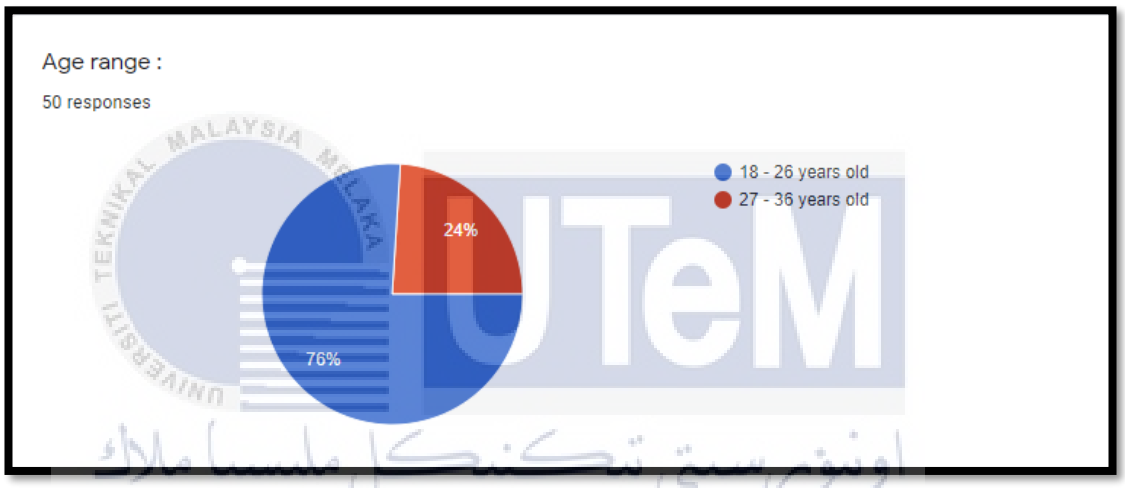
Rajkumar. (04 December 2020). The Complete Guide to Writing Test Strategy. Retrieved from https://www.softwaretestingmaterial.com/test-strategy/

APPENDIX A

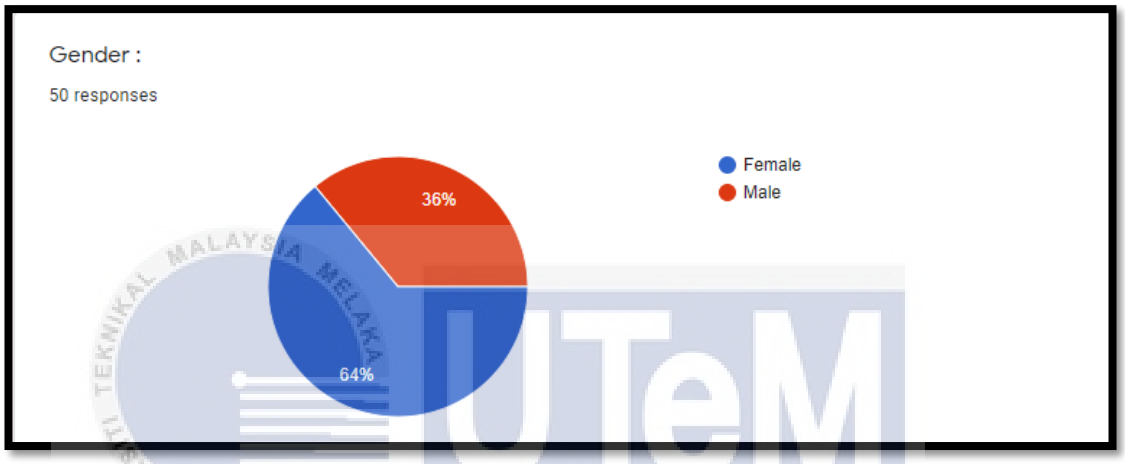
APPENDIX B

a. Google Form question

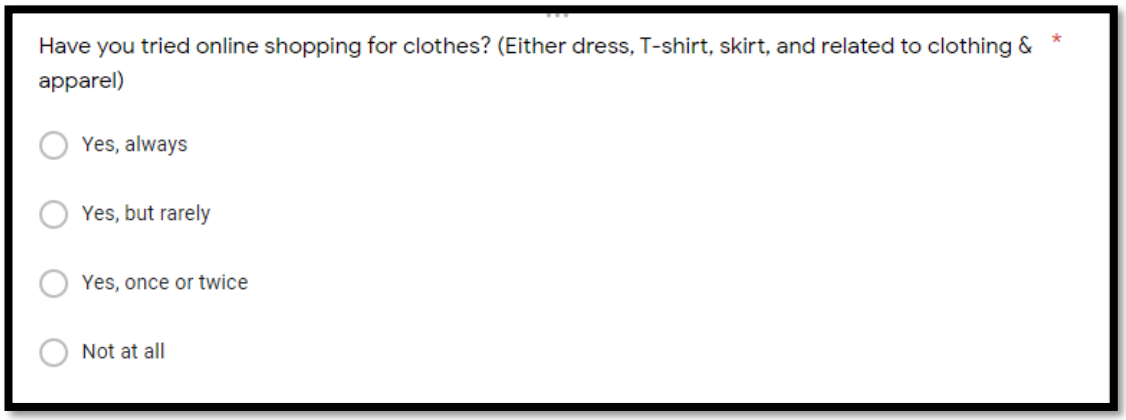
Question 1

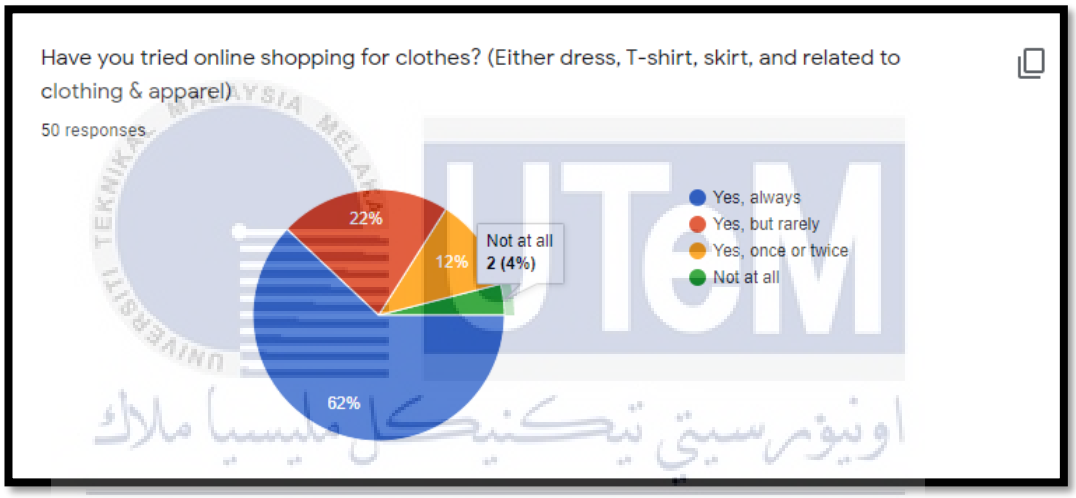


Question 2

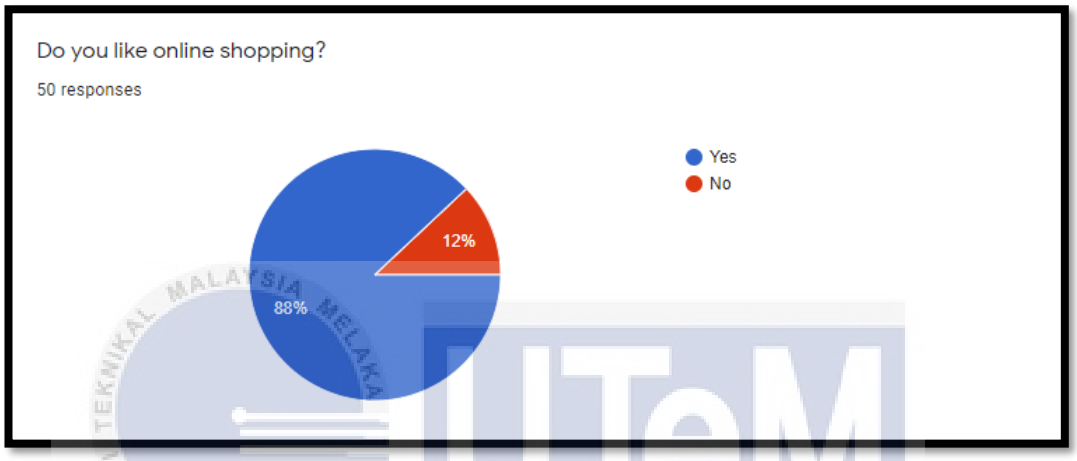


Question 3





Question 4



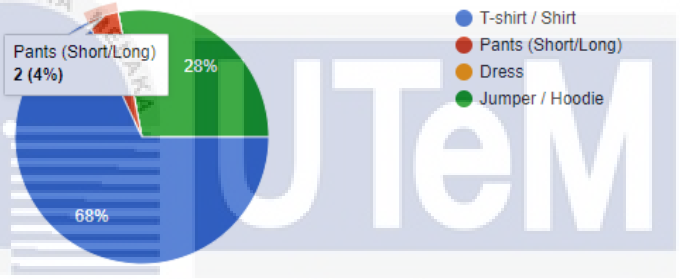
Question 5

What types of clothing & apparel that you usually buy THE MOST through online shopping? *

- T-shirt / Shirt
- Pants (Short/Long)
- Dress
- Jumper / Hoodie

What types of clothing & apparel that you usually buy THE MOST through online shopping?

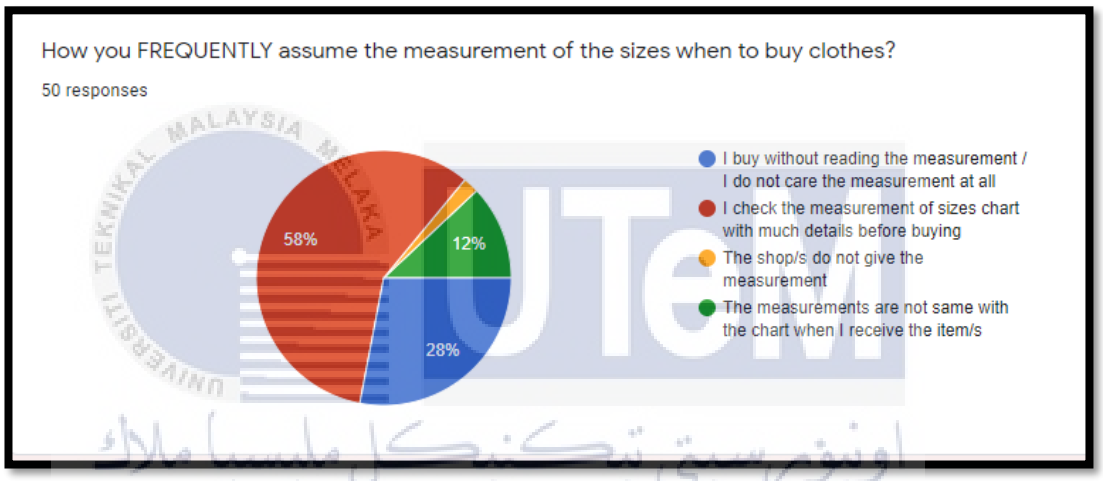
50 responses



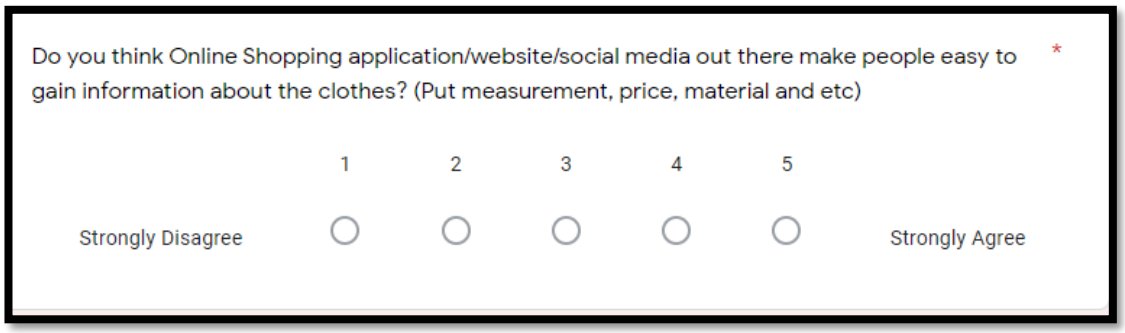
Question 6

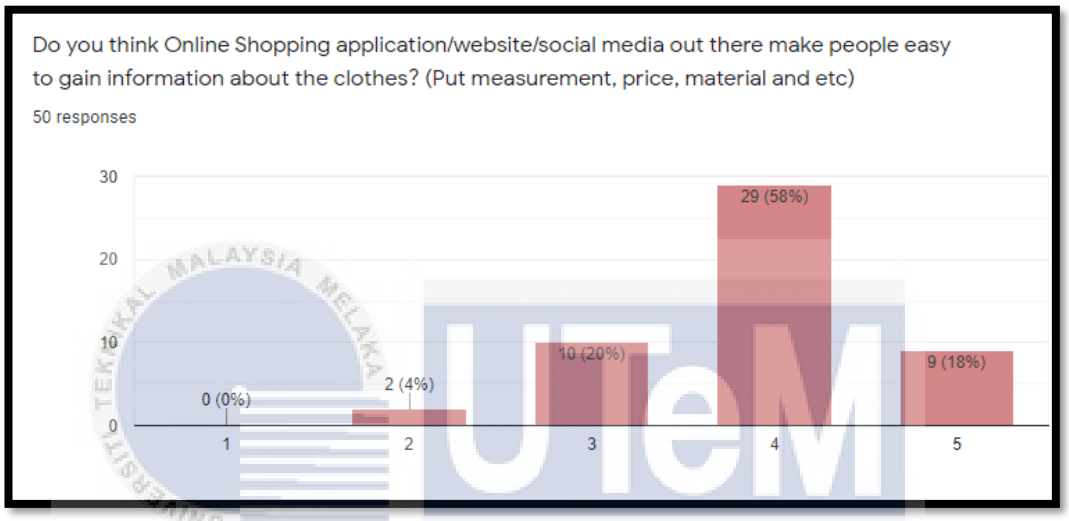
How you FREQUENTLY assume the measurement of the sizes when to buy clothes? *

- I buy without reading the measurement / I do not care the measurement at all
- I check the measurement of sizes chart with much details before buying
- The shop/s do not give the measurement
- The measurements are not same with the chart when I receive the item/s

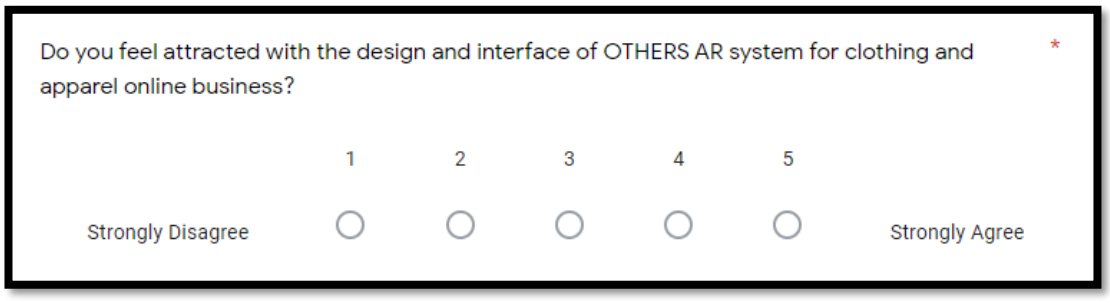


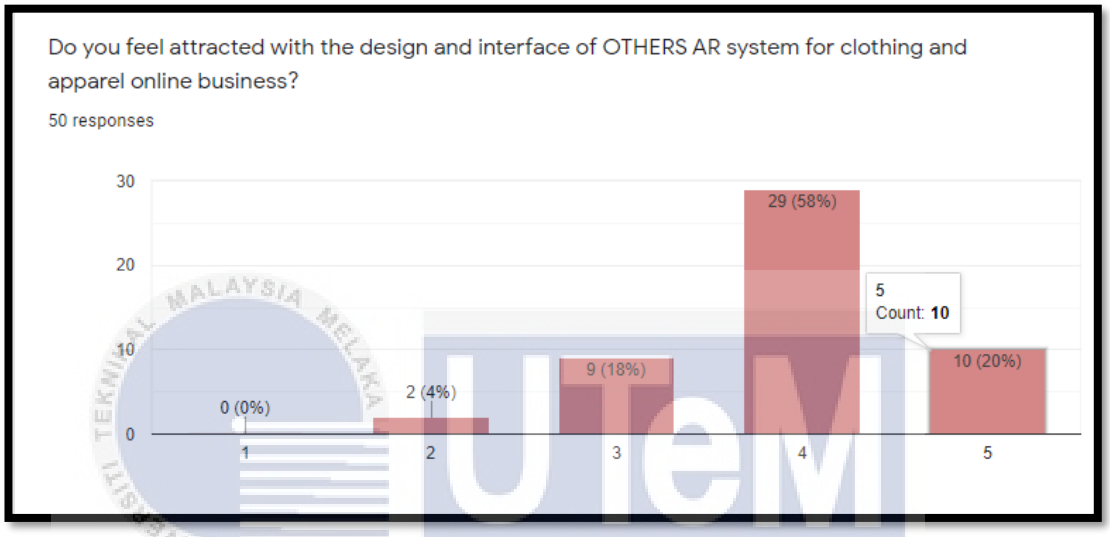
Question 7



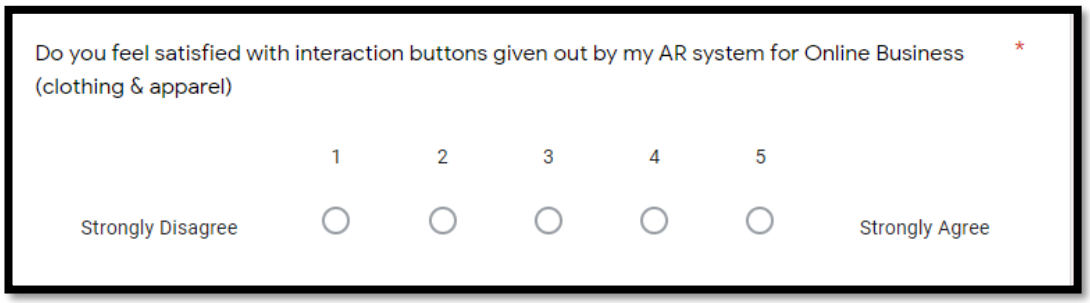


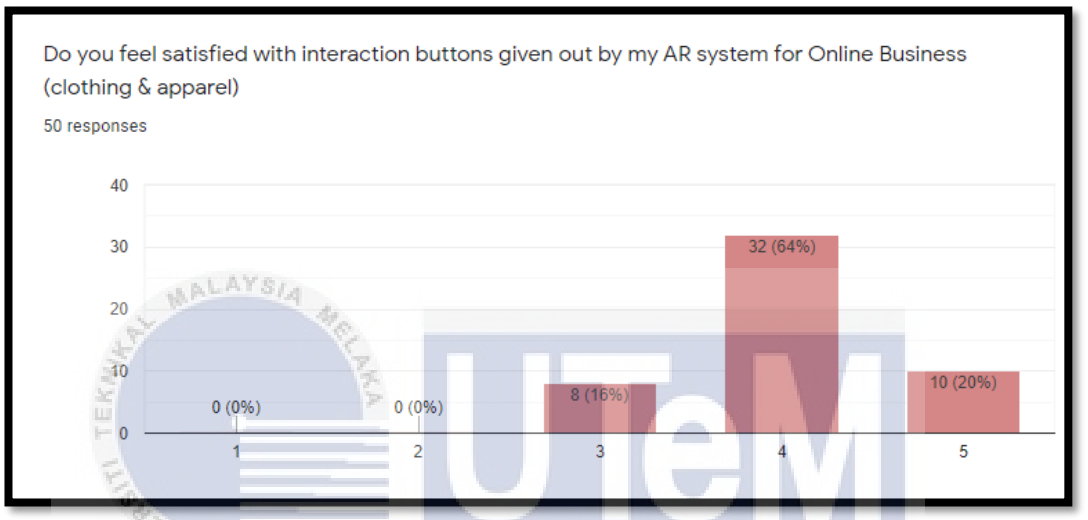
Question 8





Question 9

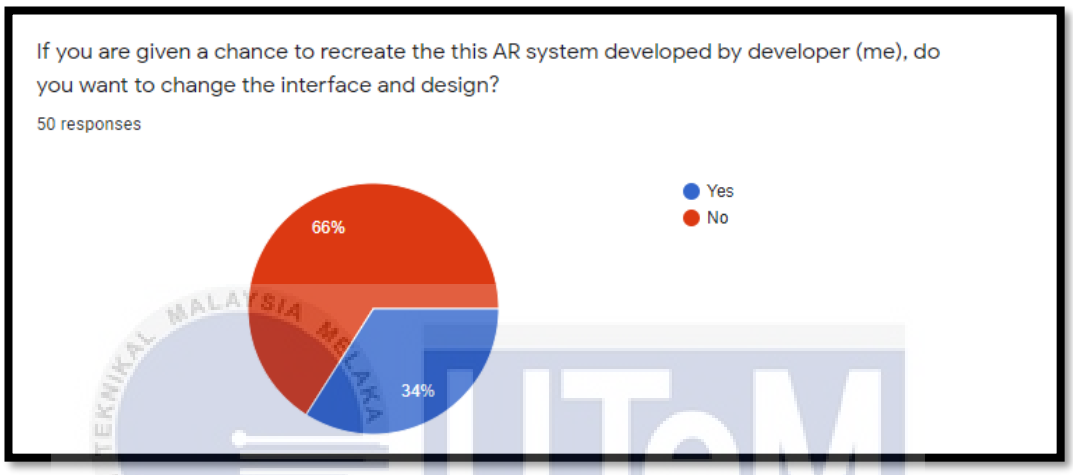




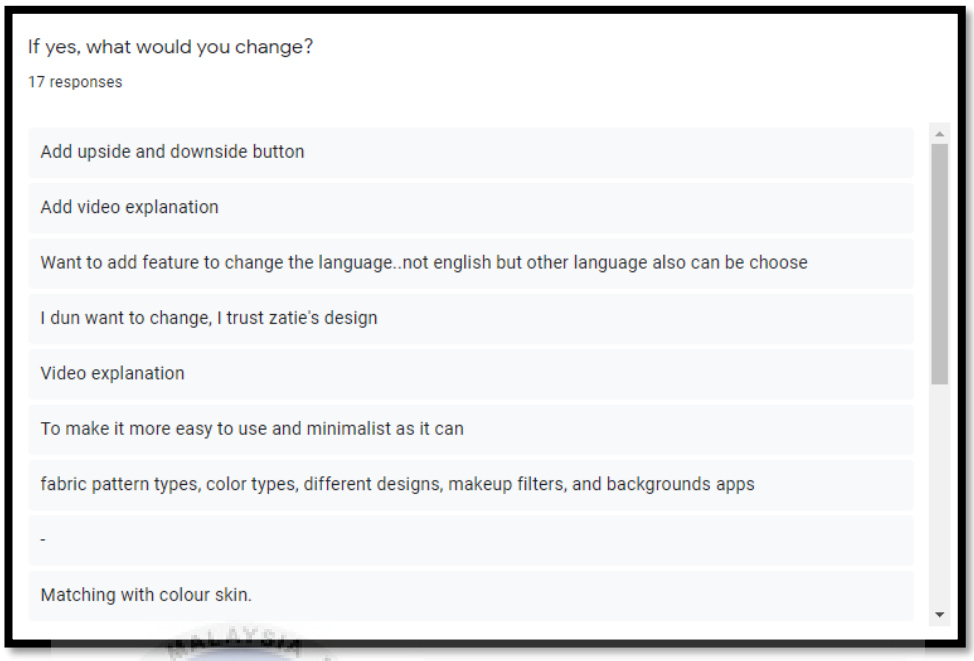
Question 10

If you are given a chance to recreate the this AR system developed by developer (me), do you want to change the interface and design? *

- Yes
- No

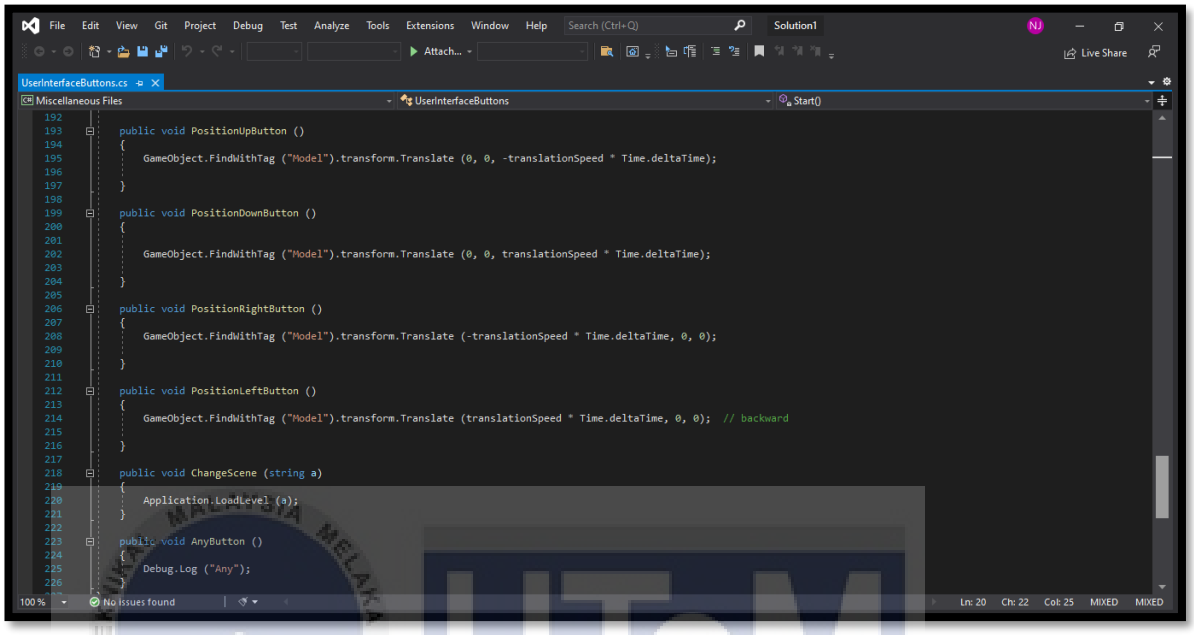


Question 11



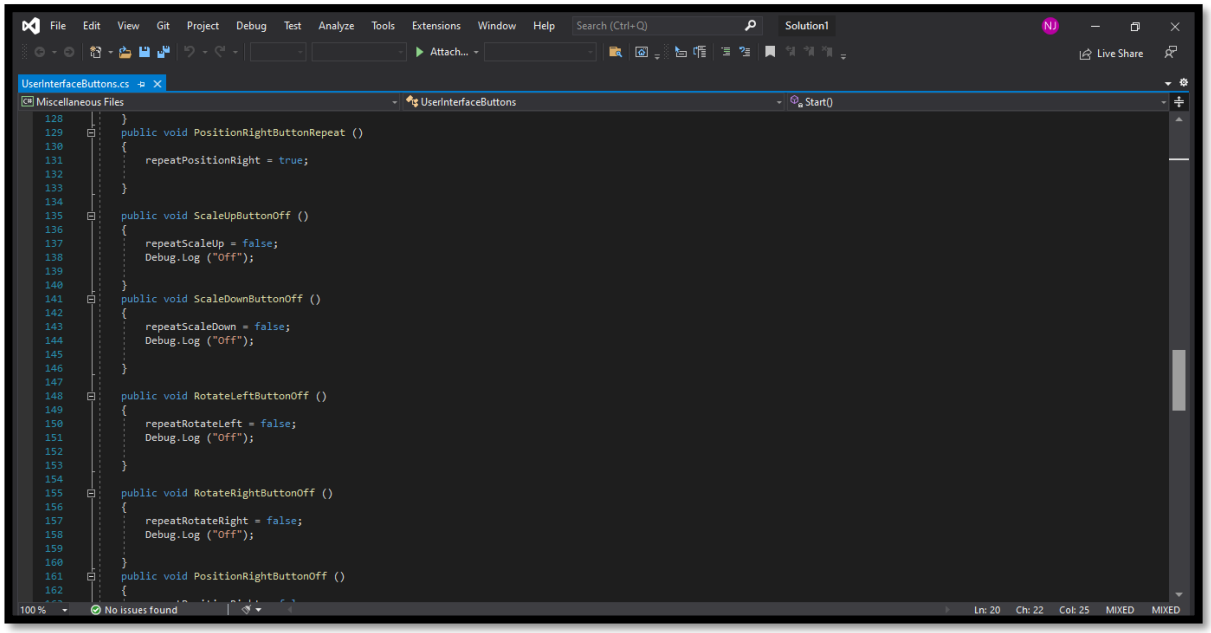
b. Source Code

i. User Interface

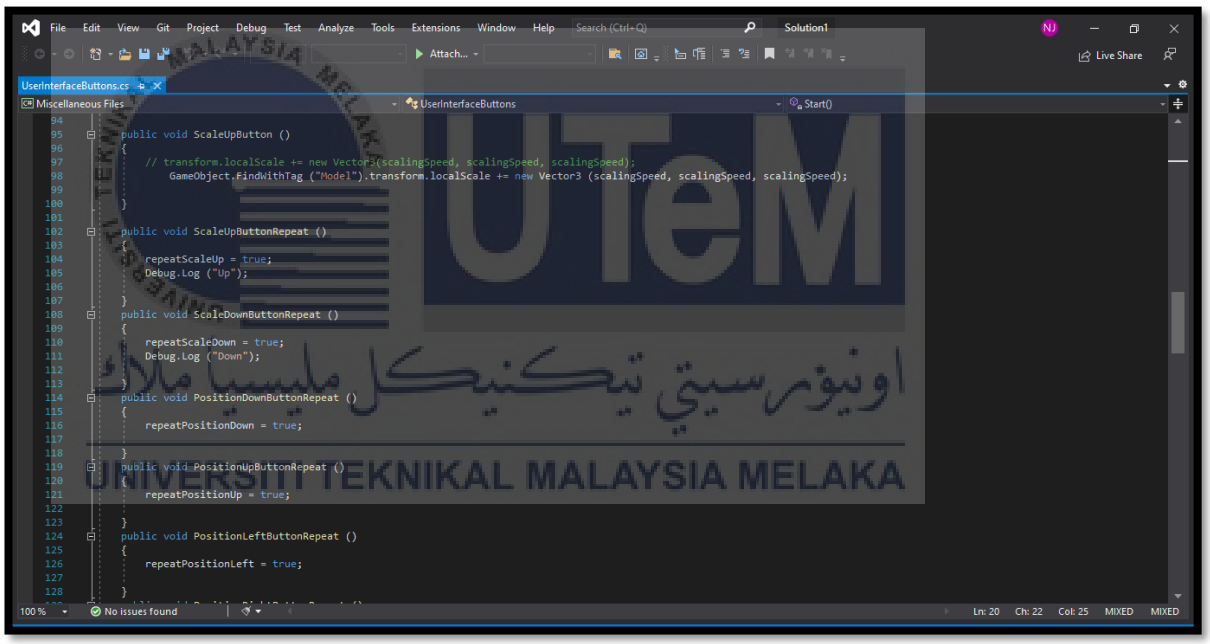


```
public void PositionUpButton ()
{
    GameObject.FindWithTag ("Model").transform.Translate (0, 0, -translationSpeed * Time.deltaTime);

}

public void PositionDownButton ()
{

    GameObject.FindWithTag ("Model").transform.Translate (0, 0, translationSpeed * Time.deltaTime);

}

public void PositionRightButton ()
{
    GameObject.FindWithTag ("Model").transform.Translate (-translationSpeed * Time.deltaTime, 0, 0);

}

public void PositionLeftButton ()
{
    GameObject.FindWithTag ("Model").transform.Translate (translationSpeed * Time.deltaTime, 0, 0);  // backward

}

public void ChangeScene (string a)
{
    Application.LoadLevel (a);
}

public void AnyButton ()
{
    Debug.Log ("Any");
}
```

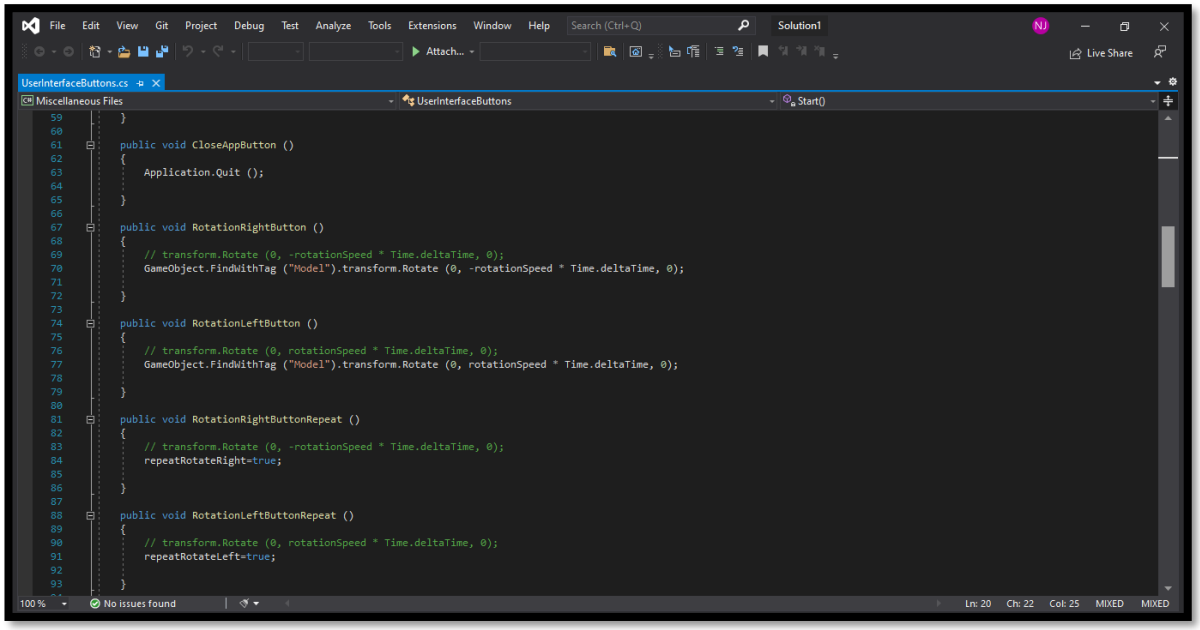
```
}
public void PositionLeftButtonOff ()
{
    repeatPositionLeft = false;
    Debug.Log ("Off");

}
public void PositionUpButtonOff ()
{
    repeatPositionUp = false;
    Debug.Log ("Off");
}
public void PositionDownButtonOff ()
{
    repeatPositionDown = false;
    Debug.Log ("Off");

}

public void ScaleDownButton ()
{
    // transform.localScale += new Vector3(-scalingSpeed, -scalingSpeed, -scalingSpeed);
    GameObject.FindWithTag ("Model").transform.localScale += new Vector3 (-scalingSpeed, -scalingSpeed, -scalingSpeed);

}

public void PositionUpButton ()
{
    GameObject.FindWithTag ("Model").transform.Translate (0, 0, -translationSpeed * Time.deltaTime);

}

public void PositionDownButton ()
{
```



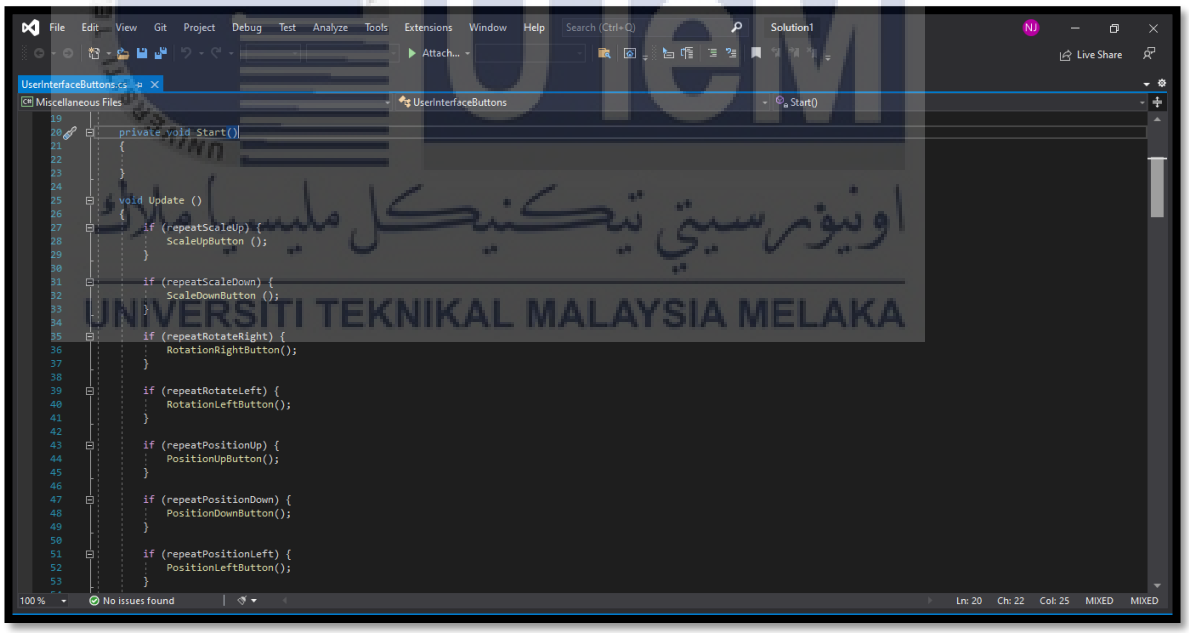
```
}
public void PositionRightButtonRepeat ()
{
    repeatPositionRight = true;

}

public void ScaleUpButtonOff ()
{
    repeatScaleUp = false;
    Debug.Log ("Off");

}
public void ScaleDownButtonOff ()
{
    repeatScaleDown = false;
    Debug.Log ("Off");

}

public void RotateLeftButtonOff ()
{
    repeatRotateLeft = false;
    Debug.Log ("Off");

}

public void RotateRightButtonOff ()
{
    repeatRotateRight = false;
    Debug.Log ("Off");

}
public void PositionRightButtonOff ()
{
```



```
public void ScaleUpButton ()
{
    // transform.localScale += new Vector3(scalingSpeed, scalingSpeed, scalingSpeed);
        GameObject.FindWithTag ("Model").transform.localScale += new Vector3 (scalingSpeed, scalingSpeed, scalingSpeed);


}

public void ScaleUpButtonRepeat ()
{
    repeatScaleUp = true;
    Debug.Log ("Up");

}
public void ScaleDownButtonRepeat ()
{
    repeatScaleDown = true;
    Debug.Log ("Down");

}
public void PositionDownButtonRepeat ()
{
    repeatPositionDown = true;

}
public void PositionUpButtonRepeat ()
{
    repeatPositionUp = true;

}
public void PositionLeftButtonRepeat ()
{
    repeatPositionLeft = true;

}
```

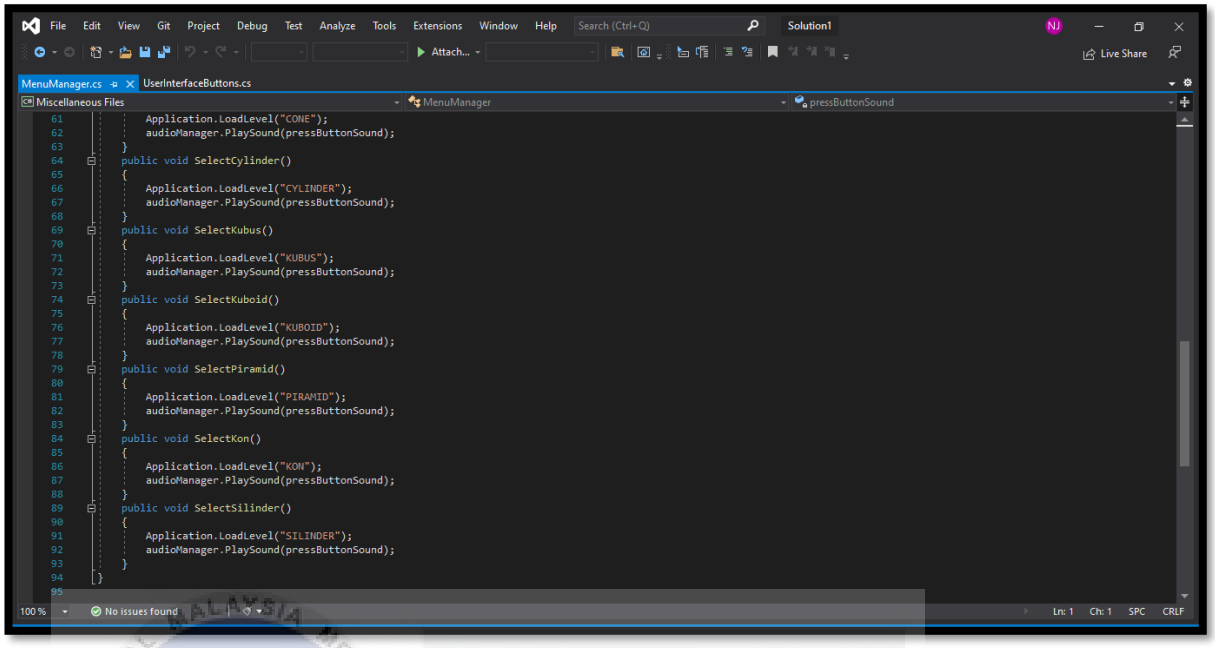


```
}

public void CloseAppButton ()
{
    Application.Quit ();

}

public void RotationRightButton ()
{
    // transform.Rotate (0, -rotationSpeed * Time.deltaTime, 0);
    GameObject.FindWithTag ("Model").transform.Rotate (0, -rotationSpeed * Time.deltaTime, 0);

}

public void RotationLeftButton ()
{
    // transform.Rotate (0, rotationSpeed * Time.deltaTime, 0);
    GameObject.FindWithTag ("Model").transform.Rotate (0, rotationSpeed * Time.deltaTime, 0);

}

public void RotationRightButtonRepeat ()
{
    // transform.Rotate (0, -rotationSpeed * Time.deltaTime, 0);
    repeatRotateRight=true;

}

public void RotationLeftButtonRepeat ()
{
    // transform.Rotate (0, rotationSpeed * Time.deltaTime, 0);
    repeatRotateLeft=true;

}
```

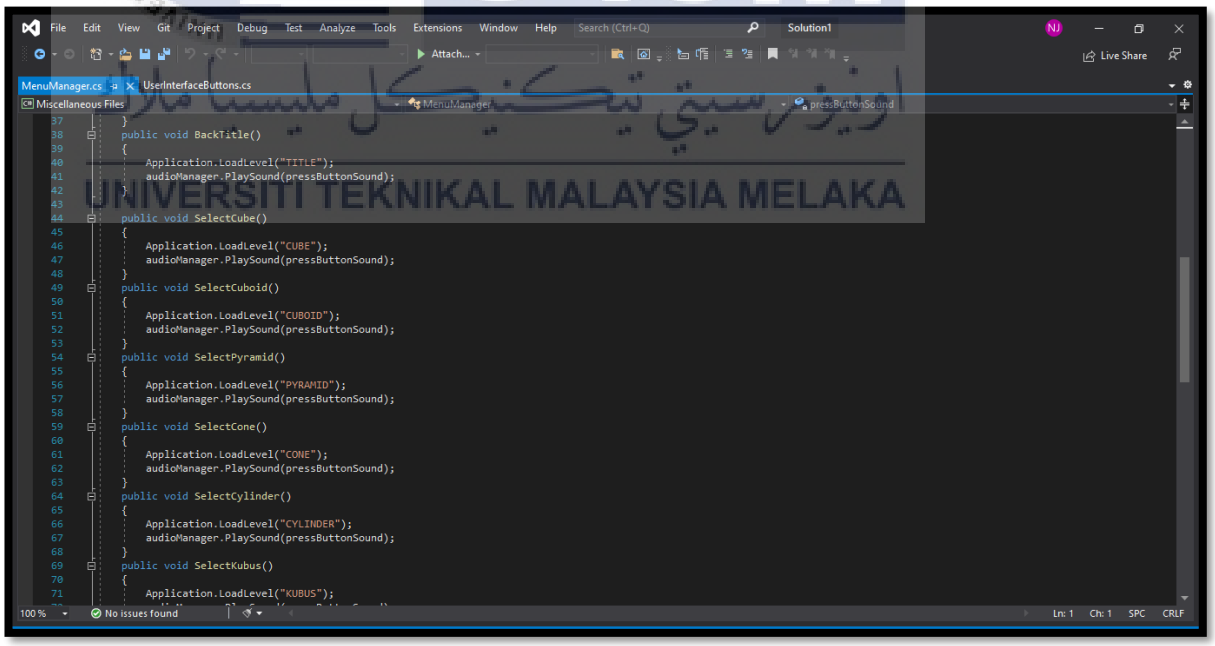


```
private void Start()
{

}

void Update ()
{
    if (repeatScaleUp) {
        ScaleUpButton ();
    }

    if (repeatScaleDown) {
        ScaleDownButton ();
    }
    if (repeatRotateRight) {
        RotationRightButton();
    }

    if (repeatRotateLeft) {
        RotationLeftButton();
    }

    if (repeatPositionUp) {
        PositionUpButton();
    }

    if (repeatPositionDown) {
        PositionDownButton();
    }

    if (repeatPositionLeft) {
        PositionLeftButton();
    }
```

ii. Menu Manager



```
        Application.LoadLevel("CONE");
        audioManager.PlaySound(pressButtonSound);
    }
    public void SelectCylinder()
    {
        Application.LoadLevel("CYLINDER");
        audioManager.PlaySound(pressButtonSound);
    }
    public void SelectKubus()
    {
        Application.LoadLevel("KUBUS");
        audioManager.PlaySound(pressButtonSound);
    }
    public void SelectKuboid()
    {
        Application.LoadLevel("KUBOID");
        audioManager.PlaySound(pressButtonSound);
    }
    public void SelectPiramid()
    {
        Application.LoadLevel("PIRAMID");
        audioManager.PlaySound(pressButtonSound);
    }
    public void SelectKon()
    {
        Application.LoadLevel("KON");
        audioManager.PlaySound(pressButtonSound);
    }
    public void SelectSilinder()
    {
        Application.LoadLevel("SILINDER");
        audioManager.PlaySound(pressButtonSound);
    }
}
```



```
    }
    public void BackTitle()
    {
        Application.LoadLevel("TITLE");
        audioManager.PlaySound(pressButtonSound);
    }
    public void SelectCube()
    {
        Application.LoadLevel("CUBE");
        audioManager.PlaySound(pressButtonSound);
    }
    public void SelectCuboid()
    {
        Application.LoadLevel("CUBOID");
        audioManager.PlaySound(pressButtonSound);
    }
    public void SelectPyramid()
    {
        Application.LoadLevel("PYRAMID");
        audioManager.PlaySound(pressButtonSound);
    }
    public void SelectCone()
    {
        Application.LoadLevel("CONE");
        audioManager.PlaySound(pressButtonSound);
    }
    public void SelectCylinder()
    {
        Application.LoadLevel("CYLINDER");
        audioManager.PlaySound(pressButtonSound);
    }
    public void SelectKubus()
    {
        Application.LoadLevel("KUBUS");
```

```
public class MenuManager : MonoBehaviour
{
    [SerializeField]
    string pressButtonSound = "ButtonClick";

    AudioManager audioManager;

    // Start is called before the first frame update
    void Start()
    {
        audioManager = AudioManager.instance;
        if (audioManager == null)
        {

            Debug.LogError("No audiomanager found!");
        }
    }
    public void SELECT()
    {
        Application.LoadLevel("SELECT");
        audioManager.PlaySound(pressButtonSound);
    }
    public void BMSELECT()
    {
        Application.LoadLevel("BM_SELECT");
        audioManager.PlaySound(pressButtonSound);
    }
    public void Quit()
    {
        Application.Quit();
        audioManager.PlaySound(pressButtonSound);
    }
    public void BackTitle()
    {
        Application.LoadLevel("TITLE");
```

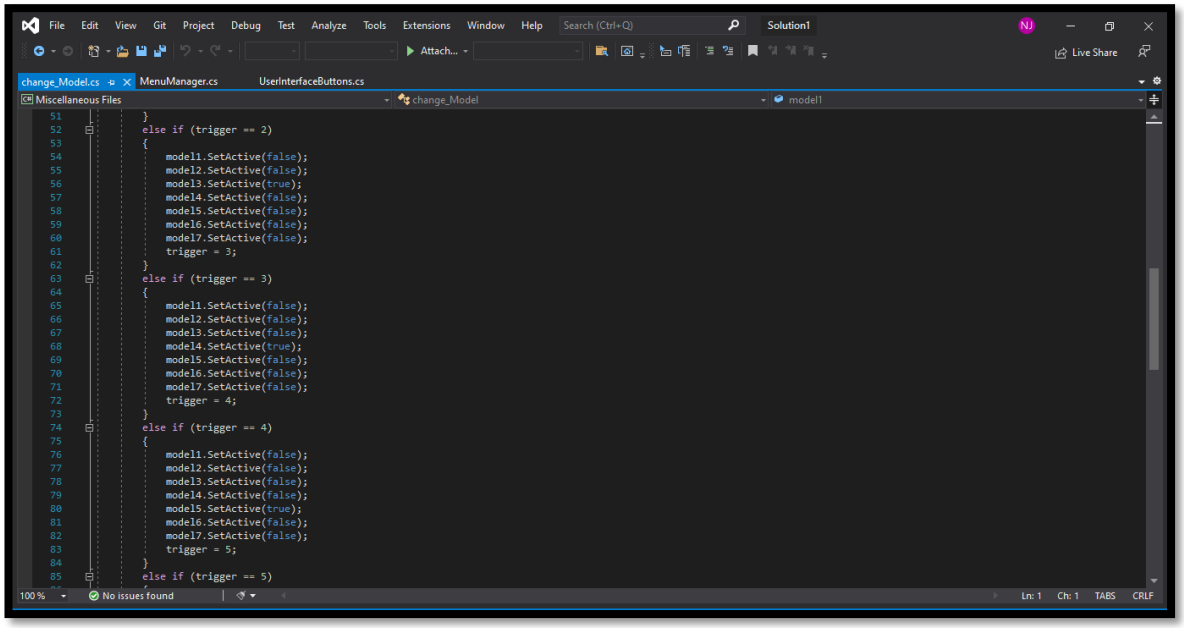
iii. Game Manager

```
        audioManager.PlaySound(pressButtonSound);
    }
    public void Down()
    {
        audioManager.PlaySound(pressButtonSound);
    }
    public void Right()
    {
        audioManager.PlaySound(pressButtonSound);
    }
    public void Left()
    {
        audioManager.PlaySound(pressButtonSound);
    }
    public void ScaleUp()
    {
        audioManager.PlaySound(pressButtonSound);
    }
    public void ScaleDown()
    {
        audioManager.PlaySound(pressButtonSound);
    }
    public void Reset()
    {
        Application.LoadLevel(Application.loadedLevel);
        audioManager.PlaySound(pressButtonSound);
    }
    public void Quit()
    {
        Application.Quit();
        audioManager.PlaySound(pressButtonSound);
    }
}
```

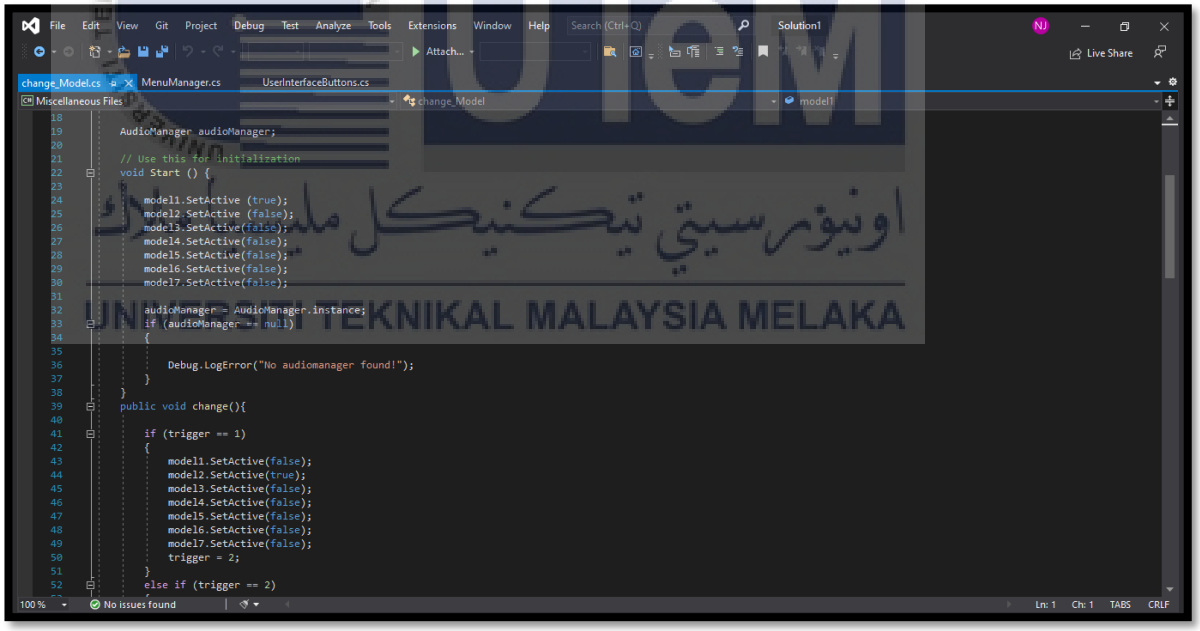
```
public class GameManager : MonoBehaviour
{
    [SerializeField]
    string pressButtonSound = "ButtonClick";

    AudioManager audioManager;

    // Start is called before the first frame update
    void Start()
    {
        audioManager = AudioManager.instance;
        if (audioManager == null)
        {

            Debug.LogError("No audiomanager found!");
        }
    }
    // Update is called once per frame
    void Update()
    {

    }
    public void Up()
    {
        audioManager.PlaySound(pressButtonSound);
    }
    public void Down()
    {
        audioManager.PlaySound(pressButtonSound);
    }
    public void Right()
    {
        audioManager.PlaySound(pressButtonSound);
    }
```

iv. Change Object

```
        }
        else if (trigger == 5)
        {
            model1.SetActive(false);
            model2.SetActive(false);
            model3.SetActive(false);
            model4.SetActive(false);
            model5.SetActive(false);
            model6.SetActive(true);
            model7.SetActive(false);
            trigger = 6;
        }
        else if (trigger == 6)
        {
            model1.SetActive(false);
            model2.SetActive(false);
            model3.SetActive(false);
            model4.SetActive(false);
            model5.SetActive(false);
            model6.SetActive(false);
            model7.SetActive(true);
            trigger = 7;
        }
        else if (trigger == 7)
        {
            model1.SetActive(true);
            model2.SetActive(false);
            model3.SetActive(false);
            model4.SetActive(false);
            model5.SetActive(false);
            model6.SetActive(false);
            model7.SetActive(false);
            trigger = 1;
        }
        audioManager.PlaySound(pressButtonSound);
```

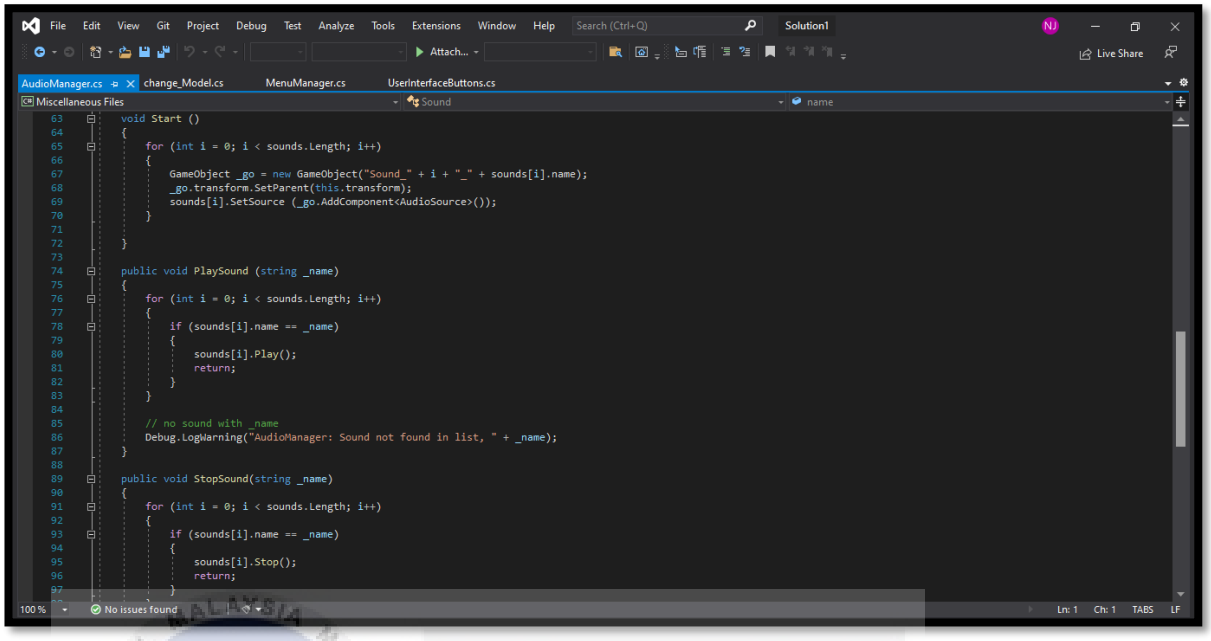


```
    }
    else if (trigger == 2)
    {
        model1.SetActive(false);
        model2.SetActive(false);
        model3.SetActive(true);
        model4.SetActive(false);
        model5.SetActive(false);
        model6.SetActive(false);
        model7.SetActive(false);
        trigger = 3;
    }
    else if (trigger == 3)
    {
        model1.SetActive(false);
        model2.SetActive(false);
        model3.SetActive(false);
        model4.SetActive(true);
        model5.SetActive(false);
        model6.SetActive(false);
        model7.SetActive(false);
        trigger = 4;
    }
    else if (trigger == 4)
    {
        model1.SetActive(false);
        model2.SetActive(false);
        model3.SetActive(false);
        model4.SetActive(false);
        model5.SetActive(true);
        model6.SetActive(false);
        model7.SetActive(false);
        trigger = 5;
    }
    else if (trigger == 5)
```

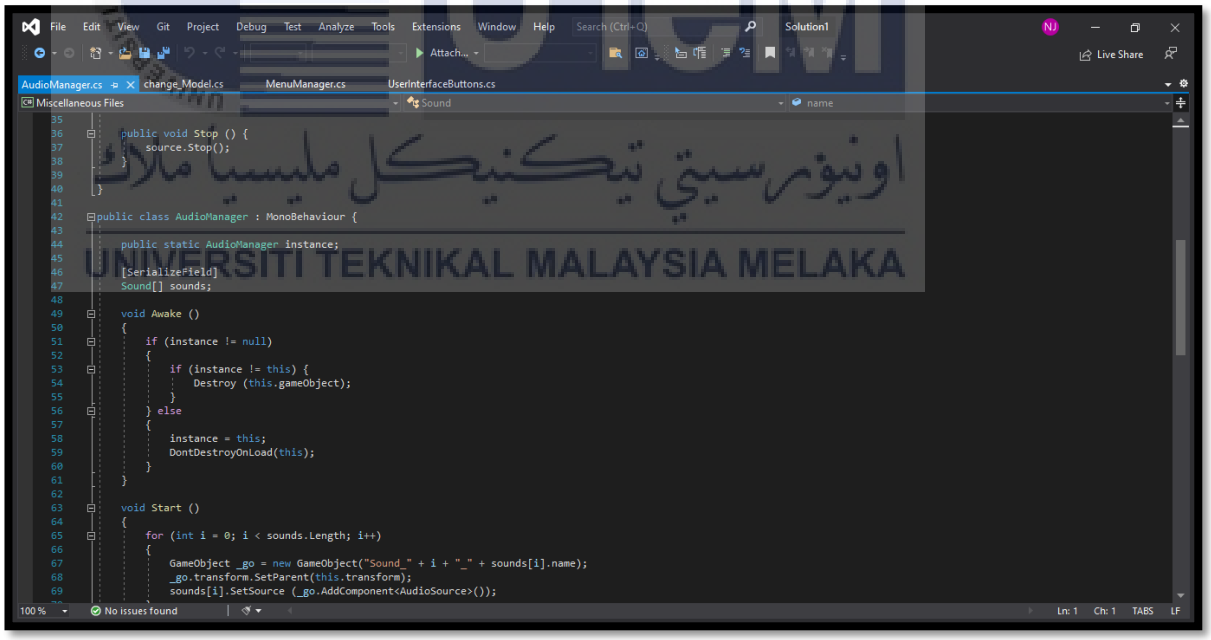


```
AudioManager audioManager;

// Use this for initialization
void Start () {

    model1.SetActive (true);
    model2.SetActive (false);
    model3.SetActive(false);
    model4.SetActive(false);
    model5.SetActive(false);
    model6.SetActive(false);
    model7.SetActive(false);

    audioManager = AudioManager.instance;
    if (audioManager == null)
    {

        Debug.LogError("No audiomanager found!");
    }
}
public void change(){

    if (trigger == 1)
    {
        model1.SetActive(false);
        model2.SetActive(true);
        model3.SetActive(false);
        model4.SetActive(false);
        model5.SetActive(false);
        model6.SetActive(false);
        model7.SetActive(false);
        trigger = 2;
    }
    else if (trigger == 2)
```

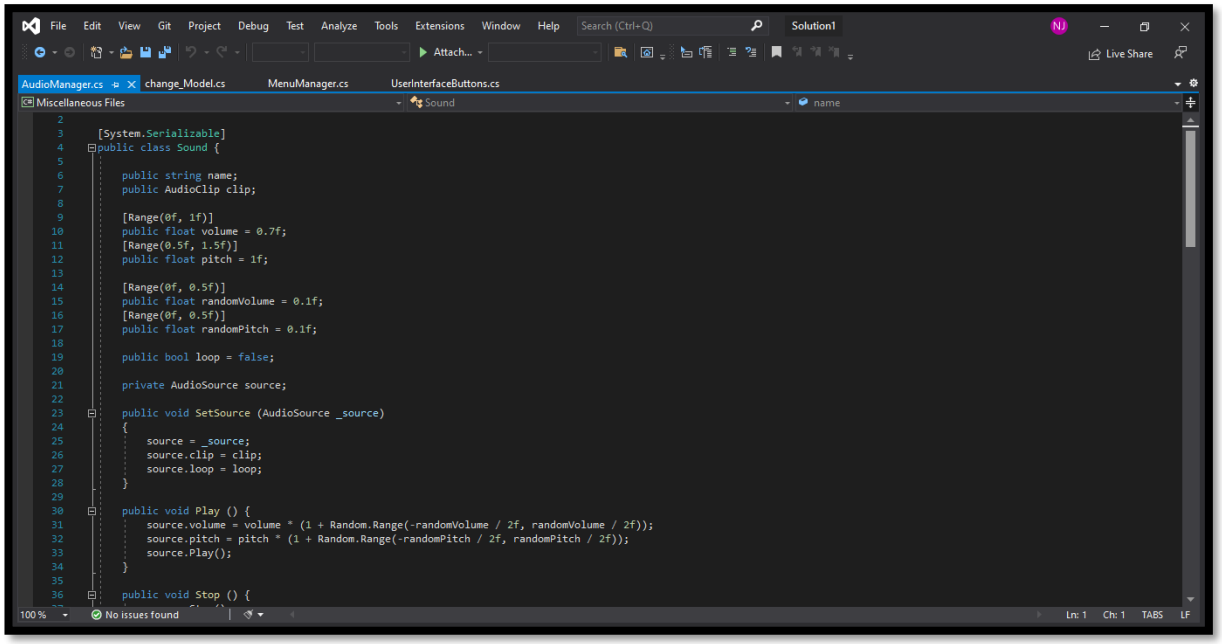
v. Audio Manager



```
void Start ()
{
    for (int i = 0; i < sounds.Length; i++)
    {
        GameObject _go = new GameObject("Sound_" + i + "_" + sounds[i].name);
        _go.transform.SetParent(this.transform);
        sounds[i].SetSource (_go.AddComponent<AudioSource>());
    }

}

public void PlaySound (string _name)
{
    for (int i = 0; i < sounds.Length; i++)
    {
        if (sounds[i].name == _name)
        {
            sounds[i].Play();
            return;
        }
    }

    // no sound with _name
    Debug.LogWarning("AudioManager: Sound not found in list, " + _name);
}

public void StopSound(string _name)
{
    for (int i = 0; i < sounds.Length; i++)
    {
        if (sounds[i].name == _name)
        {
            sounds[i].Stop();
            return;
        }
    }
```



```
public void Stop () {
    source.Stop();
}
}

public class AudioManager : MonoBehaviour {

    public static AudioManager instance;

    [SerializeField]
    Sound[] sounds;

    void Awake ()
    {
        if (instance != null)
        {
            if (instance != this) {
                Destroy (this.gameObject);
            }
        } else
        {
            instance = this;
            DontDestroyOnLoad(this);
        }
    }

    void Start ()
    {
        for (int i = 0; i < sounds.Length; i++)
        {
            GameObject _go = new GameObject("Sound_" + i + "_" + sounds[i].name);
            _go.transform.SetParent(this.transform);
            sounds[i].SetSource (_go.AddComponent<AudioSource>());
```



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