

**WEDDING PLANNER APPLICATION USING  
AUGMENTED REALITY**

**BY  
LEONG JIA XUAN**

**A REPORT**

**SUBMITTED TO**

**Universiti Tunku Abdul Rahman**

**in partial fulfillment of the requirements**

**for the degree of**

**BACHELOR OF COMPUTER SCIENCE (HONOURS)**

**Faculty of Information and Communication Technology**

**(Kampar Campus)**

**JANUARY 2021**

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**Date:** 16/4/2021

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## DECLARATION OF ORIGINALITY

I declare that this report entitled “**WEDDING PLANNER APPLICATION USING AUGMENTED REALITY**” is my own work except as cited in the references. The report has not been accepted for any degree and is not being submitted concurrently in candidature for any degree or other award.

Signature : 

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Date : 14 APRIL 2021

## **ACKNOWLEDGEMENTS**

I would like to express my sincere thanks and appreciation to my supervisor, Miss Lai Siew Cheng who has approved my proposed title and supports me to engage in this augmented reality project. She never hesitates to provide me effective feedback and some good suggestions for my project. Without her kind guidance, I would not be able to accomplish my project within this period. Besides, I would like to thank my family and friends for their spiritual support and encouragements all the time. They always motivate me when I face difficulties in my project. Their love and support guide me to overcome my stress and lead me to the right direction. Lastly, I must thank my parents for caring me and standing by my sides when I face any hardship throughout my degree course.

## **ABSTRACT**

This project is intended to develop a wedding planner application with integrated Augmented Reality (AR) technology. The main purpose of developing this mobile app called “WedDream” is to realise people’s dream wedding by providing them with a number of functional features. Before defining the project scope and requirements, several applications like The Big Day, LadyMarry and MyWed that available in the market are selected to be studied. This action contributes into the inspiration and motivation of WedDream app. In order to improve the performance of existing wedding planner applications, this project has merged the basic planning features and AR venue design function into a single application. The fundamental modules implemented is including the checklist, budget, guest list and countdown features. To develop an interactive and practical application, Agile Software Development approach is adopted due to its effectiveness in coping with the frequent changing demands. In this project, Android Studio is chosen to build the framework of mobile app and other functional modules by using Java language. Nevertheless, the AR venue design module is being developed with Unity game engine along with AR Foundation framework and ARCore Extensions package which supports the AR functionality. In addition, the core language for implementing AR technology is C# programming language. As a result, this project is believed to assist users in planning their big day and design a fantasy wedding venue according to their desired style.

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## LIST OF ABBREVIATIONS

<i>AR</i>	Augmented Reality
<i>iOS</i>	iPhone Operating System
<i>UI</i>	User Interface
<i>RSVP</i>	Répondez s'il vous plaît
<i>2D</i>	Two-dimensional
<i>3D</i>	Three-dimensional
<i>SDLC</i>	System Development Life Cycle
<i>SDK</i>	Software Development Kit
<i>OS</i>	Operating System
<i>MR</i>	Mixed Reality
<i>API</i>	Application Programming Interfaces
<i>UWP</i>	Universal Windows Platform
<i>C#</i>	C-Sharp
<i>UML</i>	Unified Modeling Language

# Chapter 1 Introduction

## 1.1 Problem Statement

This project is developed to build a mobile application for users to do their wedding planning and venue design tasks in an efficient way after surveying the available systems in the market. The problem statements of this application are stated as below.

### **Lack of design feature in current existing systems**

Since the existing systems do not provide design features, couples are unable to design the wedding ceremony venue by themselves. Thus, they are still required to hire a wedding planner in order to give assistance in designing the venue. As for the low-income clients, they might be incapable to afford the expenses of hiring a designer as the charges are very costly. Even with a professional consultant, miscommunications often occur between client and designer during the design phase. This scenario happens because some of the couples have difficulties in expressing their desires.

### **Unable to view the visual effect of venue design plan**

A design plan is important for people to get a specific idea of the actual design. However, people are unable to obtain a clear picture of the design without the support of visual effects. They may face challenges where the design outcome does not meet their expectation and requirements. As consequence, the work of redesigning has to be done and the progress is being delayed seriously. This not only consumes a lot of time and effort but also wastes the money in purchasing decoration items and renting a venue.

### **Difficulty in design modification**

Without a design feature integrated with AR technology to view the visual effect of the ceremony decoration plan, users may find it hard to get an overview of their site design. Hence, couples face difficulties in realising their plan. They are not able to affirm whether the design plan meets their expectations beforehand and try to optimise and improve their works in advance. Consequently, design modification and improvement will definitely cost additional time and funds.

## **1.2 Background and Motivation**

### **1.2.1 Background Information**

A wedding is one of the most important and happiest moments in a person's life. Planning a dream wedding is a multifaceted work where couples need to take many things into consideration. Hence, a professional wedding planner plays a significant role in realising the beautiful and memorable weddings. A wedding planner assists the bride and groom in planning, coordinating, and designing their grand ceremony. Nevertheless, hiring a consultant can be expensive and lead to a budgetary problem. Apart from that, miscommunication between the client and wedding planner may occur during the planning phase.

With the advancement of modern technology, problems can be solved through a functional application in assisting couples to organise their wedding effectively. A wedding planner app is an application that allows users to plan their big day without consulting a professional planner. Current wedding planner apps provide several useful features like checklists, schedules, guest lists, and budget managers. Moreover, these applications also offer other advanced functions such as sharing, collaboration, countdown, analytics, and vendor lists.



However, these existing systems work well in managing and planning the wedding preparations like a butler, but do not provide the design feature for users to decorate their ceremony site. With the intention of providing a convenient platform for people who aims to design their imaginary wedding venue, a wedding planner app integrated with Augmented Reality (AR) technology is proposed. This system is helpful in finalizing the visual plan of venue design and decoration.

### **1.2.2 Motivation**

Integrating Augmented Reality (AR) technology into a typical wedding planner app helps the couples to plan their dream wedding in a more effective approach. This project is developed with the intention that couples can plan their big day and design a fantasy wedding venue according to their desired style. Users are encouraged to utilise the basic tools as well as the advanced design feature all in one app. A visual effect is useful for users to check the accomplishment of personalised requirements in the ceremony decoration plan. By realising their plan virtually, the couples can save a great deal of time and money in optimising their design. This is because users can envision their plan freely before making the actual purchase on decoration items. Hence, this project provides great help for couples to visualise and finalise their planning and design.

### **1.3 Project Objectives**

This project is mainly aiming to provide an effective and convenient approach for users to plan and design their dream wedding in a budget-friendly method. Hence, the couples need not spend a great deal of money to hire a professional wedding planner in assisting their wedding preparations. There are several objectives to be achieved by the proposed application.

### **To provide basic features of a wedding planner app**

This application is proposed to offer some important functions in wedding planning like a checklist, budgeting tool, guest list manager, and countdown feature. Users can deal with their wedding preparation tasks by managing their personalised to-do lists. Besides, a budget planner is developed for users to monitor and control their expenditure. The guest list manager helps to record the information and attendance status of the invited guests. Moreover, a countdown feature allows users to look forward to their big day in a stylish interface.

### **To develop a venue design feature for users to decorate their ceremony site**

By implementing a design feature, users can envision and visualise their ceremony decoration plan. The design feature is provided with numerous decoration items to be placed freely according to users' requirements. Hence, they can save the cost of hiring a wedding planner or designer. This is helpful for users to design a perfect wedding venue based on their expectations and desired style.

### **To allow users to view their design virtually using AR technology**

This mobile app is proposed to integrate the AR technology for users to view the visual effect of their venue design plan. Consequently, users can get a clear idea and overview of their design. Furthermore, this project provides great help for couples to easily modify their planning and design. They can check whether the design plan meets their requirements and try to improve their works ahead. This solves the problem of users that they feel unsatisfied with the outcome after consuming a large amount of money to purchase items or rent a venue.

## **1.4 Project Scope**

In this project, a wedding planner app integrated with Augmented Reality (AR) technology will be delivered as the outcome. This application is developed to support only the devices on the Android platform. Firstly, this wedding planner app provides some basic functions that are available on existing systems, including a checklist, budgeting tool, guest list manager, and countdown feature. Since the main objective of this system is to realise AR technology into the app as a design feature, other planning features like serviceable vendor list and booking services are not included.

Nowadays, there are a variety of wedding styles for couples to select based on their preferences. The choices may vary according to their ethnic groups, cultures, religions, and countries. For instance, traditional weddings such as Chinese, Malay or Indian style, and modern Western style are different in wedding preparation and ceremony. Thus, the venue design feature proposed in this application is focusing on the modern Western style. The proposed system consists of predefined 3D decoration items for the user to select while designing the venue of the wedding ceremony. These elements include bouquets, balloon, light, and so on. Users may select and place the virtual items onto the environment captured by the device. Hence, they can envision their plan, decorate their wedding venue virtually, and optimise their design plan.

## **1.5 Impact, Significance and Contribution**

In this modern era of science and technology, Mobile Augmented Reality (AR) technology is being utilised in many fields and aspects. This technology is evolving in a fast manner and is predicted to be one of the key technologies in the future. Since current available wedding planning systems do not provide a design feature, this project is developed to kickstart the integration of AR technology into a wedding planner app. The major contribution of this project is to implement a mobile application that helps people to plan and design their dream wedding in an effective way. The immersed AR technology is to provide a virtual fitting room for users to place the virtual items into the environment of the physical world in real-time. This allows the users to have an interactive experience with the application.

## **1.6 Report Organisation**

A good report structure is significant to convey the purpose and information of a project effectively to the audience. Report organisation should be clear and systematise to guide the reader in understanding the major points of each chapter. In general, this report is divided into six chapters with unique contents. Firstly, chapter 1 is presenting the introduction part which clarifies the problem statement, background information, motivation, and project objectives. Besides, it outlines the scope, impact, significance, and contribution of this project. Secondly, chapter 2 is focused on the planning and analysis stage where existing works done by other developers are being studied. Besides, the comparison is made between previous applications in market and the newly proposed system to refine the requirements. In chapter 3, the system design is illustrated to better visualise the project. The application overview, flowchart, block diagram and use case diagram are provided in this chapter.

Then, chapter 4 contains the design specifications in development phase including methodology and general work procedure, development tools and technology, user and hardware requirements, and even the verification plan. Other than that, the project timeline is presented as well. Next, chapter 5 is used to describe the details of implementation and testing of the application. Last but not least, chapter 6 is reviewing the conclusion together with project review, implementation issues and challenges, novelty and future work as a project summary.

## Chapter 2 Literature Review

This chapter firstly delivers an in-depth review of existing systems related to the wedding planner app. Then, it introduces the augmented reality (AR) technology implemented in mobile applications nowadays. In addition, this chapter also includes other mobile applications using AR technology. Several systems are selected to be studied in order to inspire and motivate the development of the proposed application. Since the integration of AR technology into the wedding planner app is currently not available in the market, the systems chosen for the literature review are either wedding planner apps without AR technology or mobile AR application regarding interior design.

### 2.1 Review of Existing Systems

#### 2.1.1 The Big Day

An application named “The Big Day” is founded by Marina Mazein in the year of 2018 (Thebigday.app, n.d.). This application is a convenient and flexible wedding planning app available on both Android and iOS platforms. It provides useful planning tools including a checklist, timeline, guest list, and budget manager. In addition, the ultimate function of this wedding planner is to share the countdown with friends and family of the user.

Firstly, the wedding checklist tool guides users to deal with their wedding preparation tasks. Users can manage their to-do lists using recommended pre-defined tasks or customised their own items under built-in categories like budget, location, or invitations. The timeline functionality helps to schedule the wedding day and organise other associated activities or special occasions. Besides, the guest list manager enables users to curate their personal guest list by grouping the guests with tags and tables. Users may also keep track of the guest’s attendance by recording the RSVP state in the app easily. Moreover, the budgeting planner helps users to make a list of wedding expenditures. This allows users to monitor and control their expenses. By categorising

all the spending, users get a clear overview of all their payments. Furthermore, the countdown feature provides users an option to install a special widget on the home screen of their device. They are also able to share the snapshot of the countdown of the wedding day to their loved ones through a built-in sharing function.

In order to have a clearer picture of this application, the figures below show the simple and user-friendly UI design of The Big Day obtained from the Google Play store.

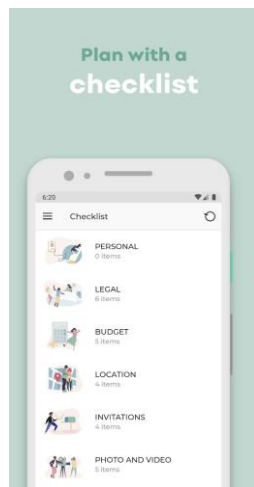


Figure 2.1.1.1: Checklist interface.

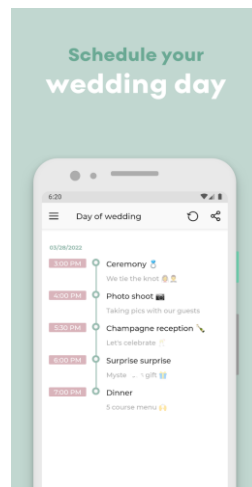


Figure 2.1.1.2: Timeline interface.

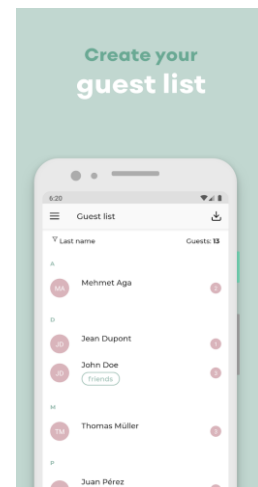


Figure 2.1.1.3: Guest list interface.

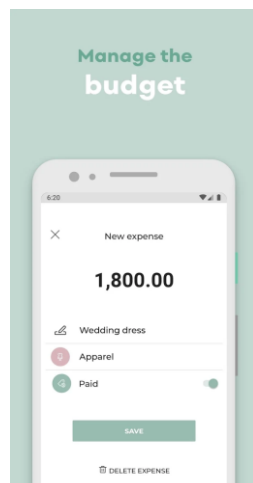


Figure 2.1.1.4: Budget interface.

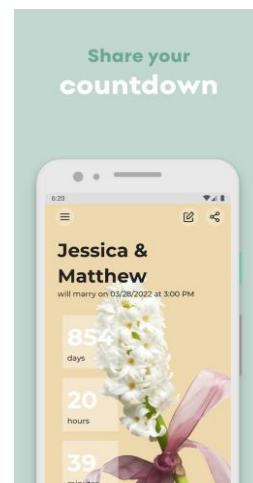


Figure 2.1.1.5: Countdown interface.

### **Strengths**

The Big Day Wedding Planner is simple yet reliable with the provision of many features in one single application. Users can plan their dream wedding easily and hassle-free with the guest list planner, budgeting tool, timeline manager, and checklist integrated into an app. Besides, the modern and user-friendly design of UI makes the application easy to use by the users. The simple handling and intuitive UI design increase the user's learnability. On the other hand, The Big Day is a cross-platform app since it can be downloaded on devices in both Android and iOS mode. Most of the application features are available for the free and sign-up process is not required.

### **Weaknesses and Limitations**

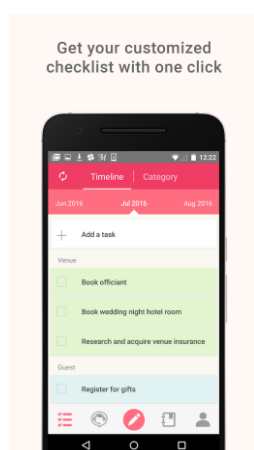
One of the weaknesses of this application is the lack of vendors list with contact information. Some applications available in the market do provide a number of wedding vendors in multiple categories including venue, wedding photography, or makeup artists. Moreover, this application does not support the realisation of decoration and design plan virtually. A visual effect of venue design using AR technology before finalizing the plan provides a great help in improving the design plan and avoiding potential waste of money and time resource.

### **2.1.2 LadyMarry Wedding Planner**

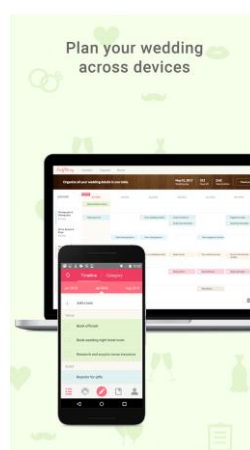
LadyMarry Wedding Planner (Ladymarry.com, n.d.) is a wedding app that provides some fun features for brides and grooms to plan their dream wedding. This application supports both Android and iOS mobile devices and does not require any payments to download the app from the store. Before getting started, a set of preliminary questions is prompted by this app to create a customised checklist automatically according to the wedding date and location. A list of personal wedding tasks will be created once users have successfully signed up.

LadyMarry delivers a few handy tools like a personalised wedding to-do list, guest list manager, and organiser function. This app helps to plan users' monthly checklist based on their own preferences. Under the organiser interface, users may record down all the important details aligned with their wedding timeline. The guest list manager allows users to group the invited guests under different categories and track their attendance without difficulty by recording the RSVP state. Besides, the great feature provided by LadyMarry is the serviceable vendor list. Users can access to local vendors near their wedding location and search for suitable services. Users are not only able to view the contact information and ratings of vendors, but also to check the vendor's pricing and availability. Nevertheless, LadyMarry will redirect users to a third-party website like Thumbtack or Yelp to handle the booking of any services (Roth, 2019).

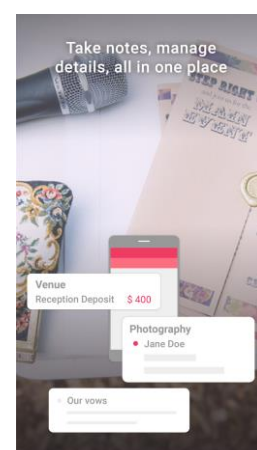
Moreover, this application offers a sharing feature for users to share their tasks, progress, or wedding countdown with their families and friends. Just like The Big Day, a special countdown widget can be installed on the user's device. Furthermore, LadyMarry provides a cross-device syncing function so users can access their wedding planning info on different devices. This contributes to a wedding collaboration function where users can invite their partner or confidant to be their collaborators. Hence, users may freely delegate any tasks that required completion and ask their collaborative helpers to manage it.



*Figure 2.1.2.1: Checklist interface.*

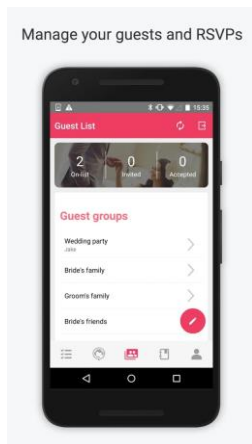


*Figure 2.1.2.2: Cross-device syncing.*



*Figure 2.1.2.3: Organiser interface.*

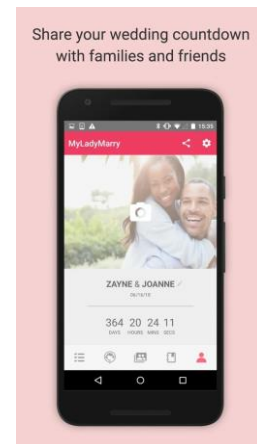




*Figure 2.1.2.4: Guest list interface.*



*Figure 2.1.2.5: Sharing feature.*



*Figure 2.1.2.6: Countdown interface.*

## **Strengths**

LadyMarry is an intelligent app with cross-device syncing and wedding collaboration features. Hence, users are not required to synchronise everything manually, but able to enjoy their customised planning in a fast and collaborative way. They can enjoy managing their planning and deals with their wedding team all together in one app. Besides, the vendor list with contact information and the partnership with third-party booking websites are helpful for users to hire vendors for wedding photography, videography, stylist, florist, or music band easily. Furthermore, LadyMarry is a cross-platform application available on both Android and iOS platforms.

## **Weaknesses and Limitations**

Although this application provides multiple fun features including hands-on tips and day-of timeline, users do not own a budgeting tool to help to calculate the total expenses and remaining funds. On the other hand, this application does not support the design feature for users to handle their ceremony decoration or wedding venue design plan. With the mobile AR technology integrated, users can have a chance to view their design virtually before the actual purchase of decoration products or venue renting. This helps in saving costs and money for the brides and grooms.

### 2.1.3 MyWed

MyWed is an Android wedding planner app that provides a number of features for couples to plan their big day. Same as other applications available in the market, this app contains convenient tools like checklist, budget, guest list, and vendor list manager. Besides, MyWed offers countdown, collaboration, and analytics features. Users may also add widgets with countdown and checklist to their home screen.

Firstly, this application helps to pre-configure the recommended tasks on a monthly basis with a selected wedding date. All the wedding preparations can be customised by users by editing, adding, or deleting the tasks at any time. Next, the wedding budget can be recorded and monitored under different categories like attire and accessories, health and beauty, music and show, flowers and décor, ceremony, or reception. On the other hand, users may manage the guest lists and distribute the guests into groups and tables. The details of every guest such as general info, contact information, groups attached, and attendance status can be recorded.

Moreover, MyWed allows users to manage their list of vendors with details attached. Unfortunately, this application does not include a built-in ability to search for vendors. It works as a virtual address book as users can only contact the vendors through the app after inputting their information (Roth, 2019). Furthermore, a useful analytic tool is made available for users to analyse their guest and vendor lists. Lastly, users may invite their family members and friends to be collaborators in order to control and monitor their wedding preparation and progress easily.

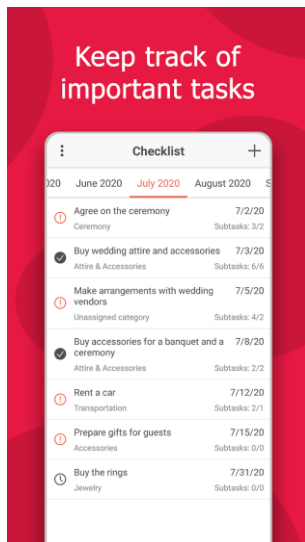


Figure 2.1.3.1: Checklist interface.

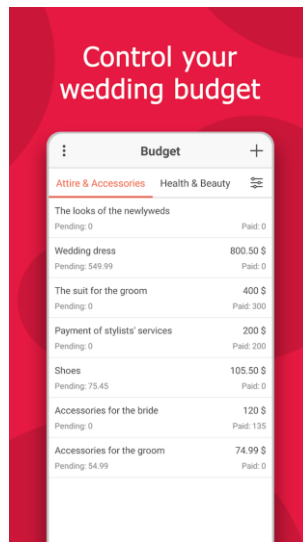


Figure 2.1.3.2: Budget interface.

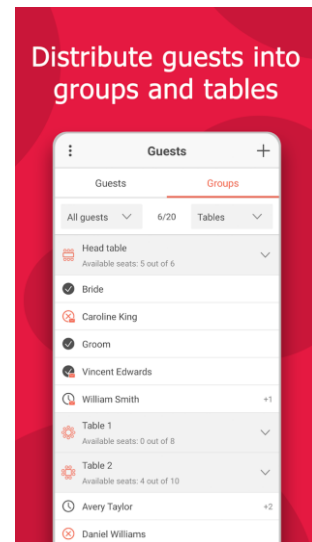


Figure 2.1.3.3: Guests list interface.

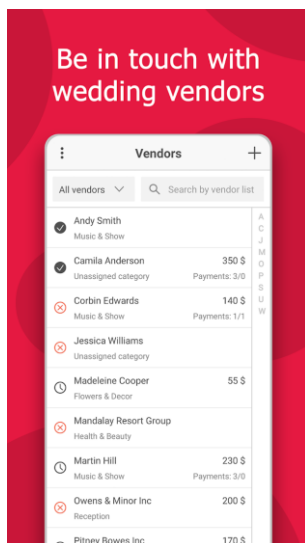


Figure 2.1.3.4: Vendors list interface.

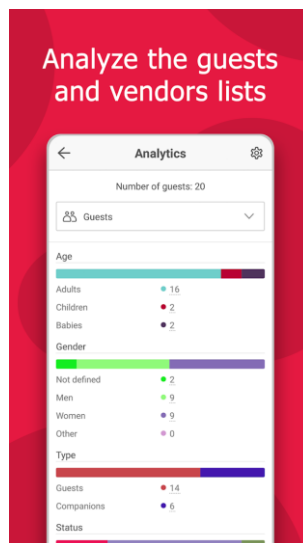


Figure 2.1.3.5: Analytics feature.

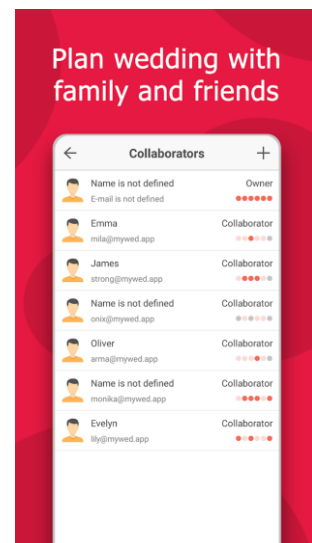


Figure 2.1.3.6: Collaborators interface.

### **Strengths**

One of the strengths of the MyWed wedding planner app is reliable. This is because users' data and their information are storing on the data server and can be synchronised on all devices once users signed in. As a result, users need not worry about the problem of data loss due to the breakage of their phone or tablet. In addition, this application offers strong analytic and collaboration features. Hence, users are able to view the guest profile with a percentage of age group, gender, identity, and status. Users can also enjoy doing their wedding preparations and planning with their loved one altogether in a single app.

### **Weaknesses and Limitations**

The main weakness of MyWed application is it does not provide users with the function of finding vendors under different categories. However, the vendor list functions as a virtual address book where users are required to enter the contact information manually into the app. Other than that, this app includes in-app purchases and the price is slightly steep. Users can only enjoy premium features after making the payment and subscription. Furthermore, this application is only available on the Android platform. Additionally, this wedding planner app does not offer design features for users to decorate their wedding venue and visualise the effect of design using AR technology.

## 2.2 Augmented Reality Technology in Mobile Application

### 2.2.1 Augmented Reality Technology

Augmented Reality is being categorised into two main techniques: marker-based AR and marker-less AR. First of all, marker-based AR is also called recognition-based AR that requires a marker detection. The concepts of image recognition, pattern recognition, and computer vision are used to detect the marker (Trivedi and Dubey, 2020). An AR marker can be the image, barcode, or QR code. Once the marker is being detected, the system will replace it with the virtual object or digital content.



*Figure 2.2.1.1: Marker-based AR.*

Apart from that, the flexibility of marker-less AR is higher than marker-based AR since it does not limit the users from placing virtual objects on a specific location (marker as the target). Currently, marker-less AR is being implemented extensively in the industry. There are several types of AR technology that fall under the marker-less category, including location-based AR, projection-based AR, outlining AR, and superimposition AR.

Location-based AR is depending on the location detection feature and is acquiring the GPS, compass, and accelerometer data to display relevant information on the smart device (Igreet.co, n.d.). For example, the popular game Pokémon Go and some tourist guide applications (Gerrity, 2018). Besides, projection-based AR is a special type of technology that does not require a mobile device. It is basically projecting the digital content on a physical surface using light projection. Moreover,

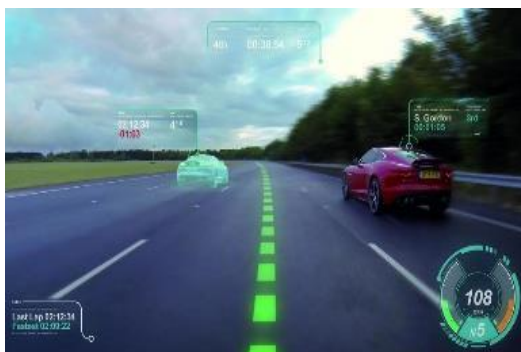
outlining AR is using object recognition to distinguish the boundaries and lines to get an overview of the user's surroundings (Poetker, 2019). Last but not least, superimposition AR provides the best user experience for users to visually merge the physical and virtual worlds together. It provides an augmented view from replacing a portion or entire view of the real world (Poudel and Al-Azzam, 2018).



*Figure 2.2.1.2: Location-based AR.*



*Figure 2.2.1.3: Projection-based AR.*



*Figure 2.2.1.4: Outlining AR.*



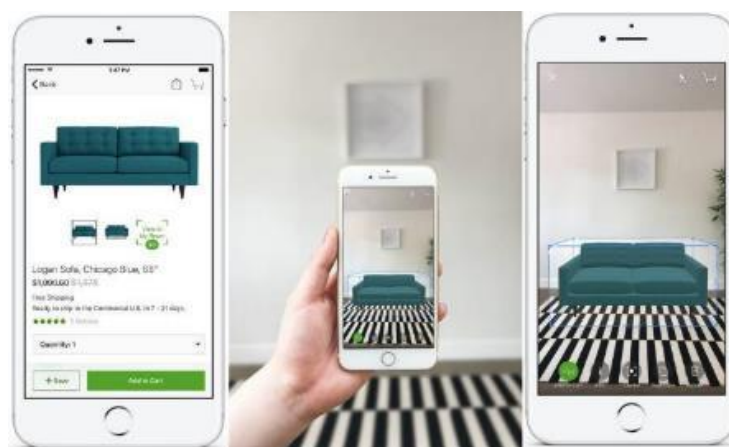
*Figure 2.2.1.5: Superimposition AR.*

At the present time, the implementation of mobile AR is a popular craze and still in the exploration phase. This emerging technology is being applied in various fields such as interior design, gaming, tourism, navigation systems, retail, and education. Since the market of integrating AR technology into a wedding planner app has not been explored, a mobile app using AR technology in the interior design area and a smart thesis will be studied to gain a better understanding and motivate the development of our proposed application.

### 2.2.2 Houzz Interior Design Ideas

Houzz Interior Design Ideas is an application developed for people to design their homes and browse the design ideas related to home decor. At the same time, this platform offers e-commerce functionality which allows users to browse and purchase extensive products including home interiors and exteriors in-app. Since Houzz is an interior design and planning application using top AR technology, we will look into the latest AR feature provided within its app, which is the “View in My Room” tool (Sheehan, 2019).

The advanced AR feature allows users to place virtual products onto the current view of their physical room by using the camera of mobile devices. Users may view the products like furniture, home décor, lighting, and other appliances in the 2D or 3D view. Besides, users may place the virtual objects freely inside their room to identify whether the design matches their expectations. Users can perform some interactions with the Houzz app such as rotate the product in 360 degrees or pinch the product to adjust its size. Moreover, this application has updated its AR feature to cover the floor with computer-generated tiles in a true-to-scale manner. Obviously, the latest version of this tool performs well in determining the floor’s orientation and estimating the corner of the room and the amount needed of tiles to cover the floor nicely (Potuck, 2019). As a result, the Houzz application supports robust AR features in 3D view and live size scaling.



*Figure 2.2.2.1: 3D view of furniture in the room.*



*Figure 2.2.2.2: True-to-scale tile flooring feature.*

### **2.2.3 Vu Event Planning App**

Vu is a product of the thesis proposed by Yun Liu to integrate AR technology and interaction into an event planning app (Liu, 2017). Vu event planning app is developed to achieve the goal for users to plan, display, manage budgets for their design plan, and optimising their design in advance (Liu, 2017). In this application, users may select to create and design different types of events. Before starting to design, users are required to enter the information of their event including date, venue, and theme. Next, they can browse the decoration items like bouquet and ribbons to design their venue in an AR view. Lastly, this event planning app allows users to save their design plan and view the number of decoration items used.

The major advantage of this application is implementing AR technology that provides the visual effect of decoration of people's wedding ceremony venue. This app acts as a virtual fitting room for users to improve and optimise their design plan easily since the decoration can be viewed beforehand to ensure it meets their expectations and requirements. Additionally, this project explores the integration of AR technology, interaction design, and 3D modelling to provide a good user experience for people to plan events effectively on a functional platform. (Liu, 2017).





Figure 2.2.3.1: Welcome page.

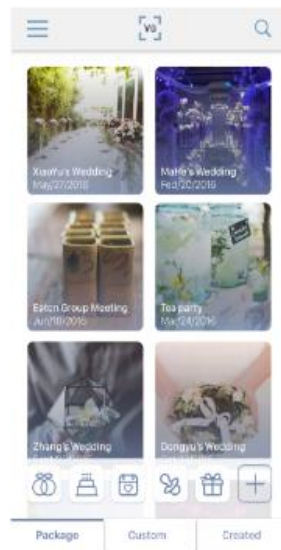


Figure 2.2.3.2: Home page.



Figure 2.2.3.3: Edit event information interface.

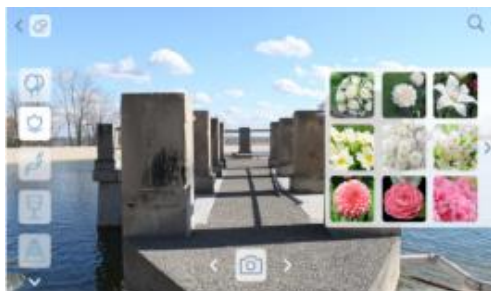


Figure 2.2.3.4: Browse items feature.



Figure 2.2.3.5: AR view.



Figure 2.2.3.6: Saved finalised design.

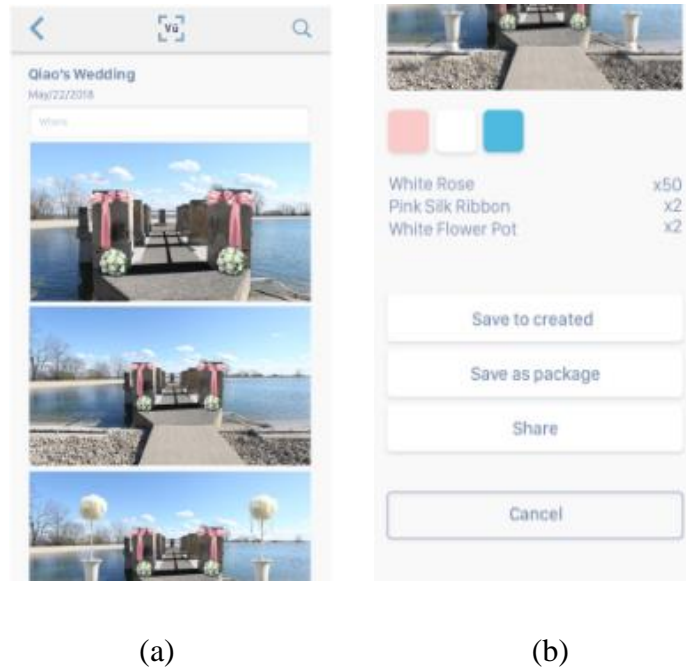


Figure 2.2.3.7 (a) & (b): Saved design plan with images and items' details.

## 2.3 Critical Review

According to the study done in the previous section, the features of these existing systems are concluded and made as a reference to propose our innovative application. Needless to mention, some information and layout design of the reviewed existing system will be taken into consideration. Nevertheless, the reviewed applications are only delivering the basic planning functions like checklist, budgeting tool, guest list manager and other, but not providing any design feature for the user. Hence, the implementation of AR technology into wedding planner app is significant to provide visual effects in the design of wedding ceremony venue. After reviewing the augmented reality technology in mobile applications and other related systems, the superimposition AR under marker-less AR category is believed to be the most suitable AR technology to be integrated into our wedding planner app. Table 2.3.1 shows the comparison of the functionalities of existing systems and the proposed application.

*Table 2.3.1: Table of Comparison between Reviewed Systems and Proposed Application.*

	<b>The Big Day</b>	<b>LadyMarry</b>	<b>MyWed</b>	<b>Proposed Application</b>
<b>Platform</b>	Android / iOS	Android / iOS	Android	Android
<b>Checklist</b>	Yes  (Record both pre-defined tasks and customised items into categories)	Yes  (Record both pre-defined tasks and customised items into timeline and categories)	Yes  (Record customised items only into timeline)	Yes  (Record customised items only into categories)
<b>Guest List Manager</b>	Yes  (Manage guests by tags and tables with RSVP status recorded)	Yes  (Manage guests into groups with RSVP status recorded)	Yes  (Manage guests by groups and tables with RSVP status recorded)	Yes  (Manage guests with RSVP status recorded)
<b>Budget Tool</b>	Yes	✘	Yes	Yes
<b>Countdown</b>	Yes	Yes	Yes	Yes
<b>Timetable</b>	Yes  (Add events and list activities)	✘	✘	✘

	according to the timeline)			
<b>Vendor List</b>	✘	Yes  (Information and booking service provided)	Yes  (Store contact information only)	✘
<b>Sharing Function</b>	Yes	Yes	✘	✘
<b>Widget</b>	Yes (Countdown)	Yes (Countdown)	Yes (Countdown and Checklist)	✘
<b>Collaboration</b>	✘	Yes	Yes	✘
<b>Analytics</b>	✘	✘	Yes	✘
<b>Venue Design Feature</b>	✘	✘	✘	Yes  (Design venue with decoration items provided using AR Technology)
<b>Augmented Reality (AR) Technology</b>	✘	✘	✘	Yes

## Chapter 3 System Design

### 3.1 System Flowchart

The system flowchart is illustrated to show the process flow when running the application. Basically, the implemented application is consisting of 6 major modules, including account management, countdown, checklist management, budget management, guest list management and AR venue design modules. The details of each module are elaborated in section 3.2, Application Overview.

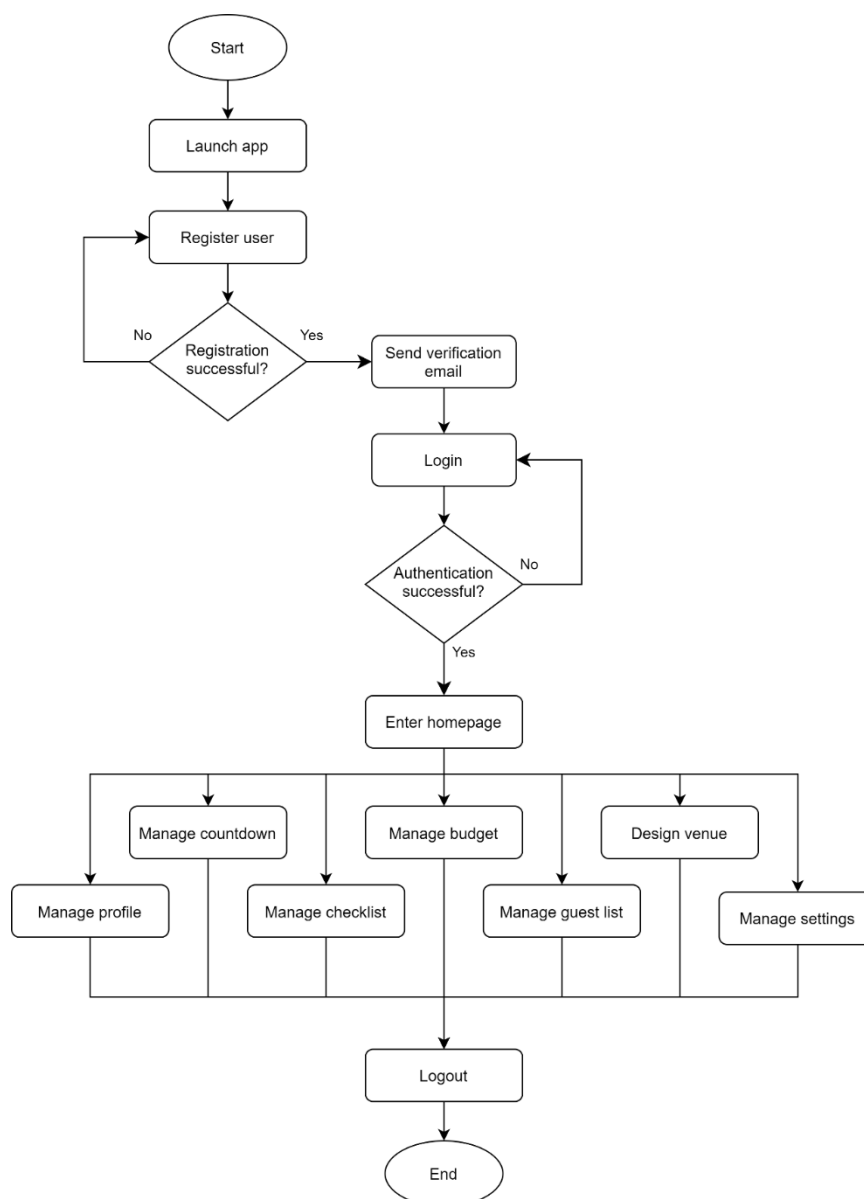


Figure 3.1.1: Flowchart of wedding planner application.

## **3.2 Application Overview**

### **Account Management Module**

Account management is a module that mainly provides features to process and manage user account data and their profile details. This component is used to handle the user registration and login process by collaborating with Firebase authentication handler. Besides, this subsystem also provides functions for user to manage his/her individual account. Users are able to edit and update their personal information as well as their account details into system database. This action is done by the component by accessing Firebase Realtime Database to complete information retrieval and modification.

### **Countdown Module**

Countdown module provides functionality for users to display the remaining time until their wedding days in a stylish interface. This feature allows users to view their personal countdown by editing their partner's name and wedding date. They can update their wedding details whenever they like as the wedding information is stored in the online central database. Hence, active internet connection is required to retrieve and upload data into the database.

### **Checklist Management Module**

Checklist management module allows users to record and manage their to-do lists under built-in categories like personal, attire and accessories, photography, beauty and makeup, ceremony and other. Users can make use of this tool to deal with their wedding preparation tasks and customised their own event items. Every single record of event item will include the category, task title and its progress status. Besides, users may update the task status, add or delete the task records into or from the checklist at any time.

### **Budget Management Module**

A budgeting tool is important in a wedding planner application for users to monitor and control their wedding expenditures. The top sticky bar in the budget interface can give users a clearer overview of their budget amount, total expenses and remaining balance. Other than that, users are able to manage their budget list by adding or removing expense records from the online database. The expense record will include the title, category and spending amount.

### **Guest List Management Module**

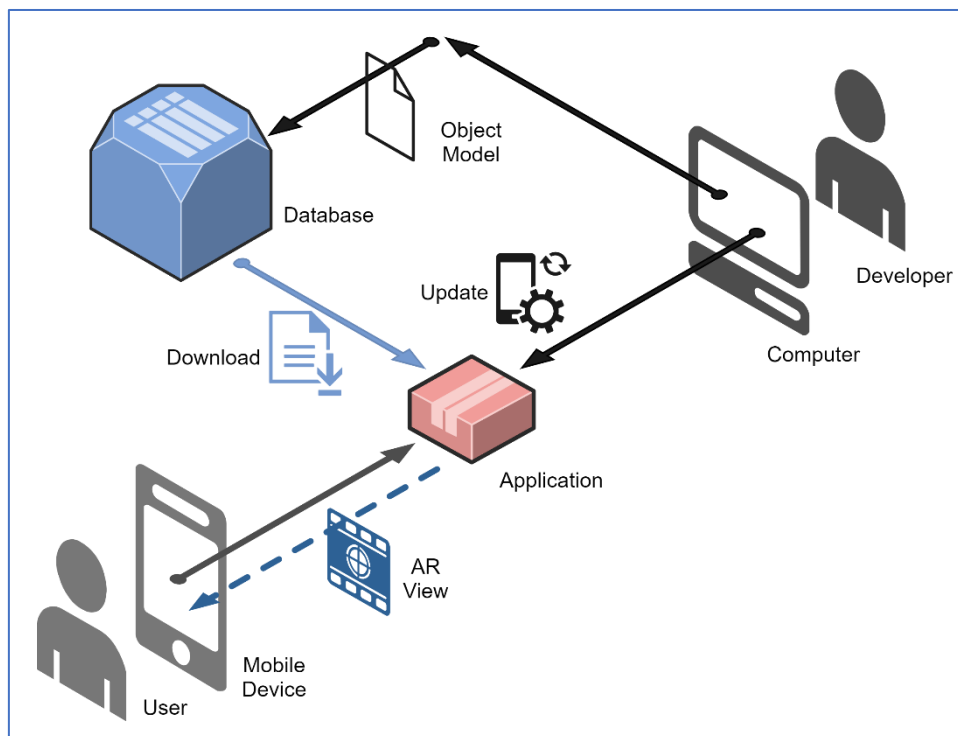
The guest list management module developed in this project is a simple version that enables users to record the RSVP status of their invited guest with group tags. Users can create their personal guest list by easily adding the guest into list. The attendance of guest can be calculated by viewing the total number of people who attending or pending the invitation on the top bar. After adding the guest record into list, user may edit and update the details at any time. Moreover, the guest record can be deleted from the list by a single click on the remove button.

### **Augmented Reality (AR) Venue Design Module**

Venue design module is an indispensable component in this wedding planner application which provides user a virtual view of their ceremony decoration plan with Augmented Reality view. Under this feature, users can first open their camera to display the real-world scenario visually on the device screen, and then pick and place the virtual decoration items onto the live camera feed. Besides, the virtual 3D objects can be selected and transformed freely to visualise the design effects, for example translate, rotate and scale. Hence, this component requires an access to users' camera and cloud's central database for viewing and retrieving the predefined 3D models of deco items.

### 3.3 Block Diagram

A block diagram is illustrated to represent the interaction between the user and developer of our wedding planner application. Firstly, the user can launch the application and make use of the features provided. The application is going to download the object model or retrieve some related data from a cloud database. The application will perform actions carried out by user and generate an Augmented Reality view through the mobile device to the user. Besides, the developer can upload the object model to the cloud database and provide the updates to the mobile user.



*Figure 3.3.1: Block diagram of wedding planner application's interaction.*



### 3.4 Use Case Diagram

Under this section, a UML use case diagram is presented to showcase the high-level view of the implemented system including the functionalities provided to users. This diagram is mainly drawn to describe the relationship between the wedding planner application and its user. Besides, the use case diagram also explains the actions can be performed by user and the way of user interacting with the system.

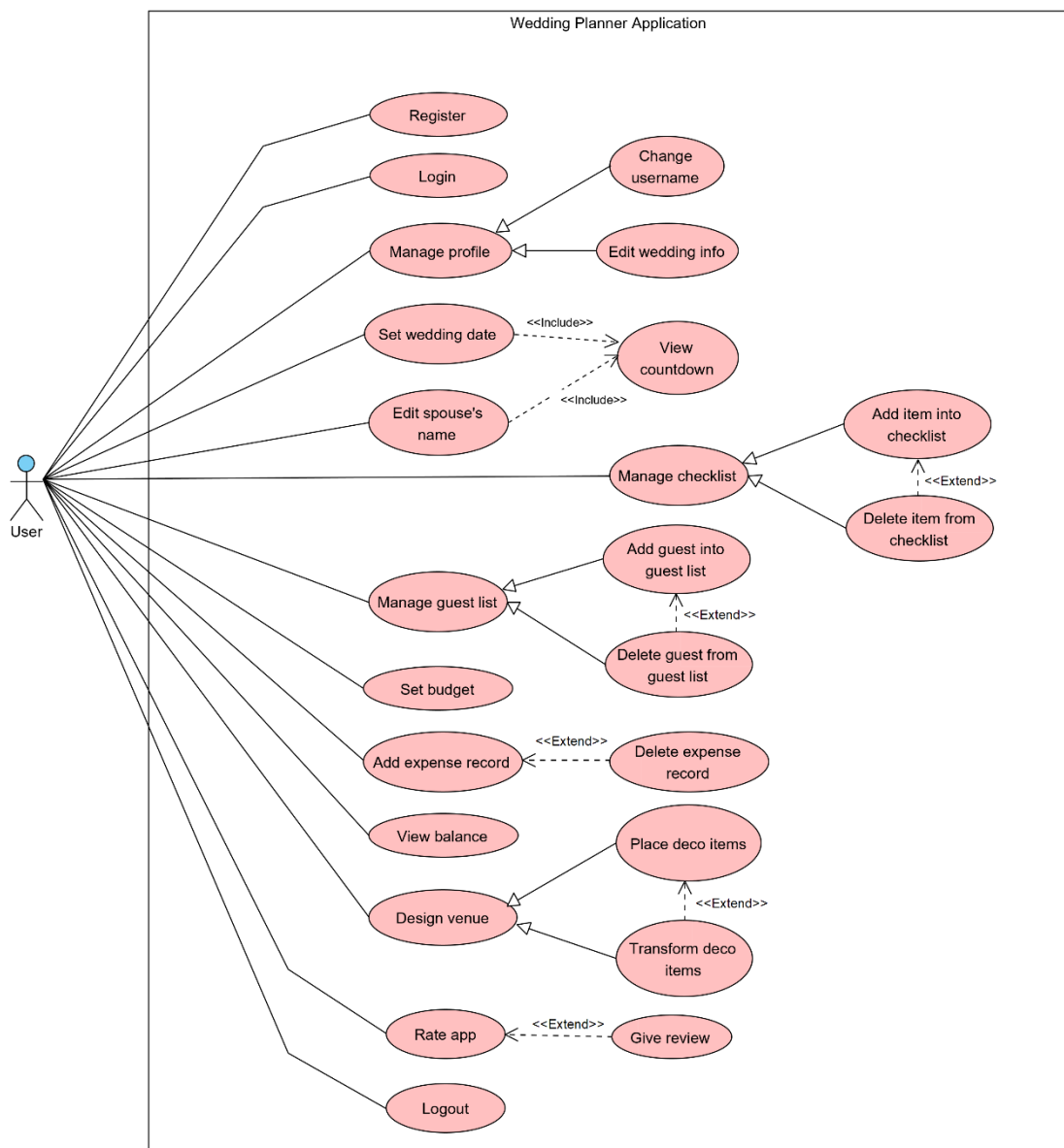
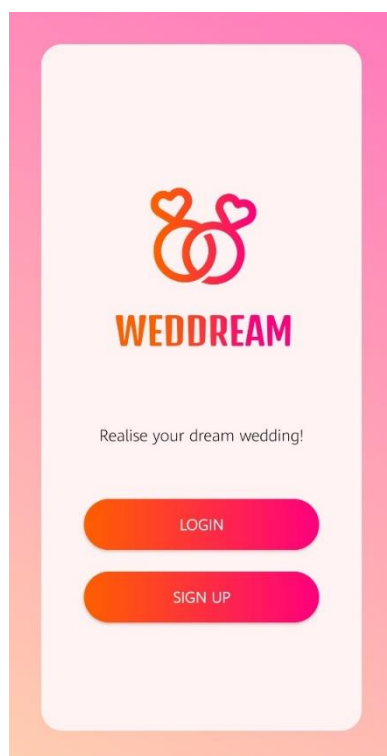


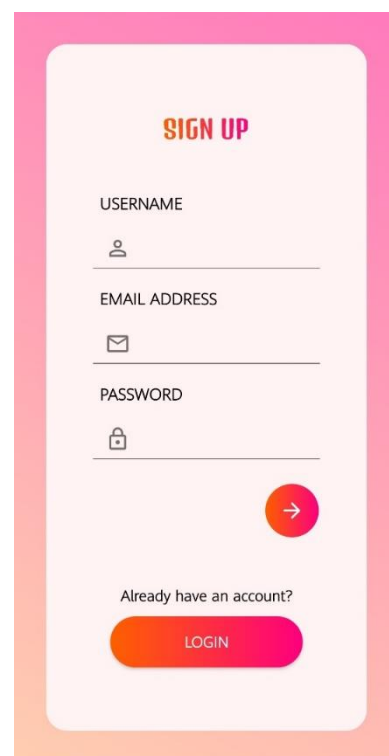
Figure 3.4.1: Use case diagram of wedding planner application.

### 3.5 User Interface Design

In this project, the user interfaces (UI) of application are designed by using XML layout tool in Android Studio. The screen captures of different pages are displayed as below, including the landing page, sign up page, log in page and navigation menu. Besides, the countdown, checklist, budget, guest list and design interfaces are included as well. Lastly, the setting, edit profile and app review pages are also presented in this section.



*Figure 3.5.1: Landing page.*



*Figure 3.5.2: Sign up page.*

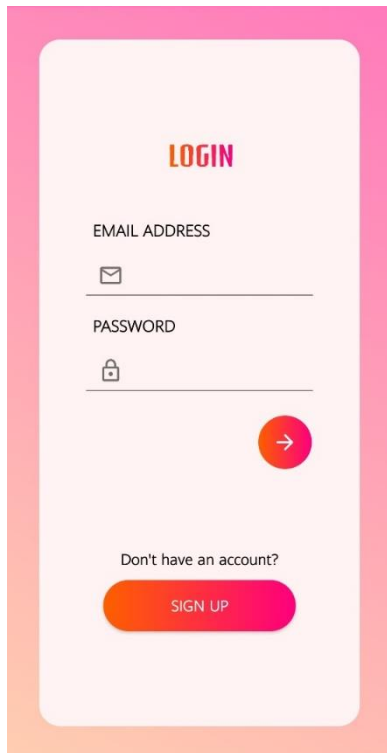


Figure 3.5.3: Login page.

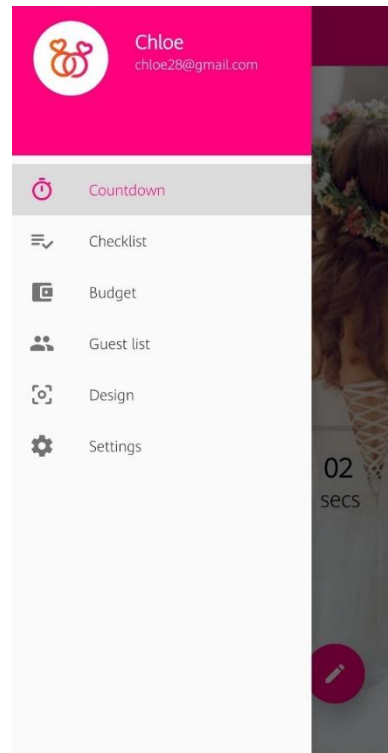


Figure 3.5.4: Navigation menu.

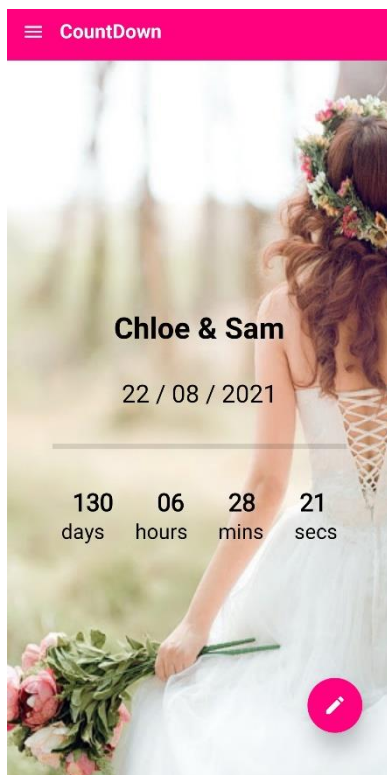


Figure 3.5.5: Countdown interface.

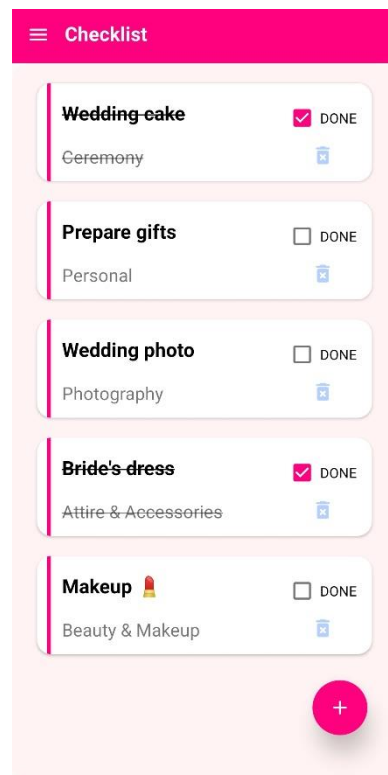


Figure 3.5.6: Checklist interface.

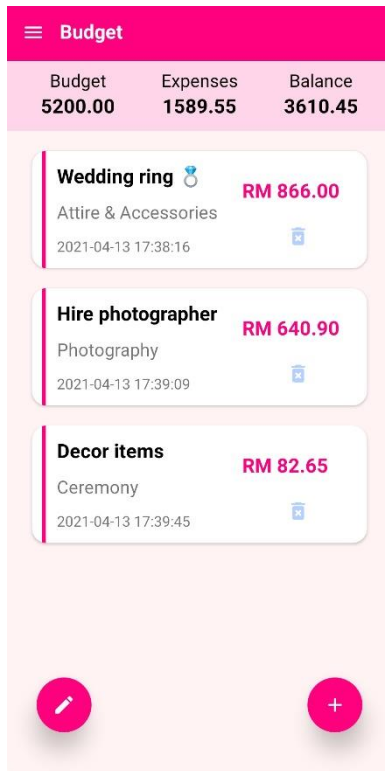


Figure 3.5.7: Budget interface.

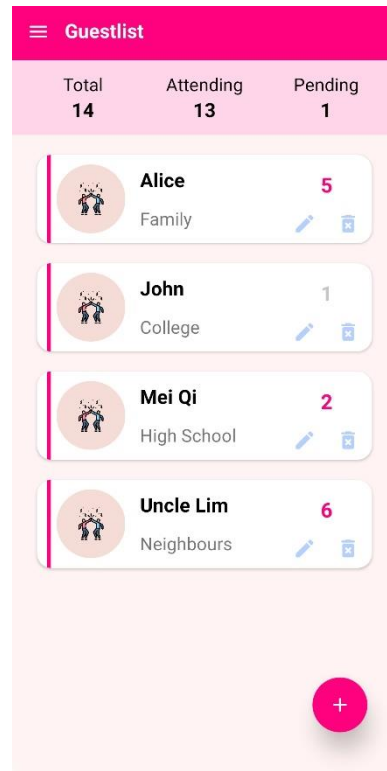


Figure 3.5.8: Guest list interface.

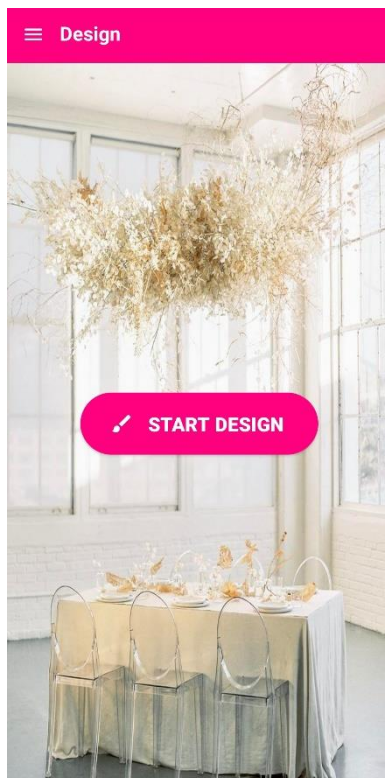


Figure 3.5.9: Design interface.

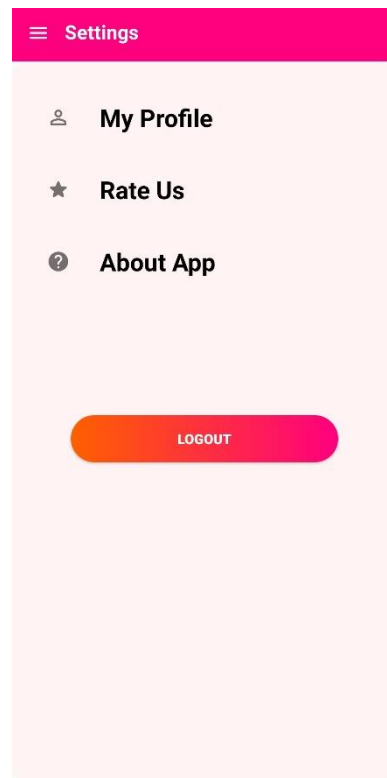


Figure 3.5.10: Setting page.

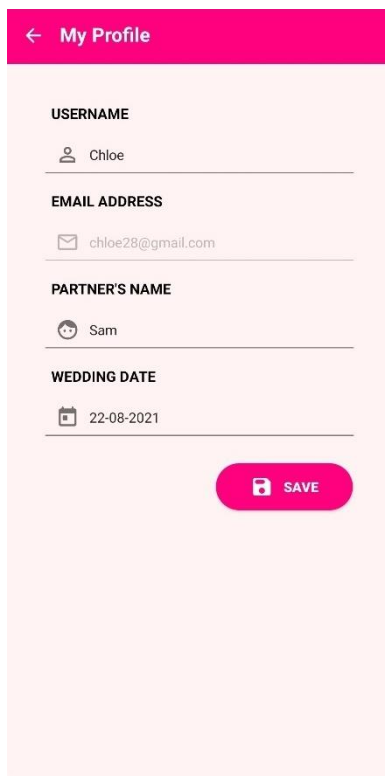


Figure 3.5.11: Edit profile page.

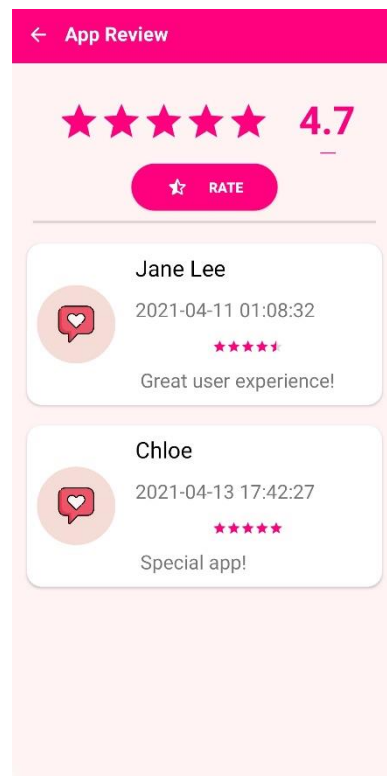


Figure 3.5.12: App review page.

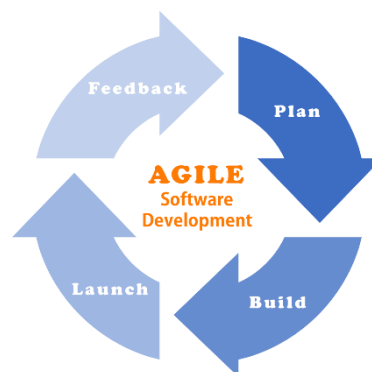
# Chapter 4 Design Specification

## 4.1 Methodology and Tools

### 4.1.1 Methodology and General Work Procedures

In this project, the methodology selected to develop the proposed application is Agile Software Development. This methodology is an incremental and iterative approach that is suitable and effective for mobile application development that possesses frequent changing demands and updates. Since our application targeted a wide variety of users, an adaptive methodology that receives reflections regularly from users will be helpful and essential for application improvement. Moreover, the Agile approach focuses on enhancing user experience and provides a high quality of product delivered to the users. Testing will be performed from time to time with the purpose of the application is able to meet the evolving needs and trends.

There are four phases containing in this approach, which are Plan, Build, Launch, and Feedback. These processes will be repeated executing in a cycle if there are any improvements and modifications made to the developed application.



*Figure 4.1.1: Agile Software Development approach.*

#### **Plan**

In the planning phase, the project scope and main deliverables are being identified. Then, a priority list of the functions to be developed must be created as well as the

timeline and schedule. The timeline is to determine the sequence of completion of the sub-modules. For instance, the predecessor task such as designing the user interface and building the app framework must be completed prior to implementing the workable function. Besides, some of the preliminary design and requirement study tasks are being done in this process too. As an example, the system design and list of user requirements will be constructed during the planning stage.

### **Build**

After completing the detailed planning with a realistic goal formed, this is the design and development stage where the actual construction and implementation of the application will be carried out. During this phase, the application will be built by coding using suitable tools. The main development tools involved in this project is Android Studio, Unity Game Engine and Visual Studio 2019 while the programming languages is including Java language and C# language. Besides building the functions of the application, an attractive user interface is needed to be designed to fulfil the user-friendly concept. This programming process is believed to consume the longest time in the entire process of project development.

### **Launch**

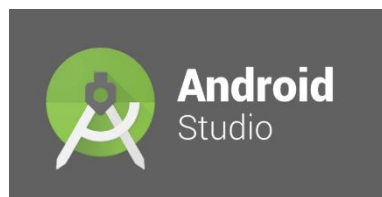
Launching is similar to the process of testing in the System Development Life Cycle (SDLC). The application will have a trial-run for users to test the functionalities of the software. By distributing the software to a group of users, both functional and non-functional testing can be performed to analyse whether the delivery fulfils the expectation and requirements. Therefore, the unit testing, integration testing and system testing will be carried out to ensure the modules developed is practical and serviceable. The error in coding part and defect of the application will be diagnosed as well. Moreover, usability testing is conducted to examine the user-friendliness of the developed application.

## **Feedback**

In Agile methodology, user experience is an important motive in software development. Hence, the feedback stage is the process of collecting the users' opinions regarding further improvements including errors discovered or performance issues of the application. The feedbacks are critical and useful in helping the application to enhance by solving the bugs or adding in new features. As a result, the Agile cycle will start over again from the planning to the feedback stage in order to update the application according to the criticism from users.

### **4.1.2 Development Tools and Technology**

#### **Android Studio**



Android Studio is a development tool for building the framework and some functional modules of the mobile application by using Java language. Besides, this tool allows the action of embedded unity game within native Android application by importing the Unity library into the Android project.

#### **Unity Game Engine**



Unity game engine is the main AR development tools used in this project. This game engine helps to combine the 3D models, coding scripts, and SDK into a single environment for developers to work in one place (Trivedi and Dubey, 2020). Unity is a robust engine that supports multiple OS platforms, many available SDK plug-ins, and



multi-language. As consequences, Unity provides real-time environment for creators to figure out incredible solutions and work flexible in a convenient approach.

### **AR Foundation and ARCore**



In this project, AR Foundation is selected as the framework to support AR functionality. This is a cross-platform API for building AR experiences which requires extension packages to communicate with Unity. Apart from that, ARCore is a versatile AR SDK that ease the portability with Unity to develop AR application. The combination of AR Foundation and ARCore Extensions package provides the useful features for creating AR functions on Android platform.

### **Microsoft Visual Studio**



Microsoft Visual Studio is a development tool released by Microsoft company. This software is chosen as the external script editor of Unity to code and compile the C# programming scripts in this project.

### **C# Programming Language**

C# (C-Sharp) is the core language for the AR development of the application. In order to work with Unity, C# is the most preferable language for developer to create the application. C# language is widely used to implement web applications, desktop applications or mobile applications and for general purpose. It provides an advance code editor tools and is mostly used by UI designer, integrated debugger and so on.

This object-oriented language is considered well-designed to create robust mobile application that perform under .NET Framework.

## **4.2 Requirement**

### **4.2.1 User Requirements**

- User shall be able to register for an account and store his/her account information into the system database.
- User shall be able to log in to the application by entering valid email address and password.
- User shall be able to logout from the application in order to keep his/her personal information secure.
- User shall be able to manage and update his/her profile details stored in the database.
- User shall be able to set the wedding date and partner's name in order to view the countdown of his/her wedding.
- User shall be able to manage the checklist by adding or deleting event items.
- User shall be able to manage the budget by entering the budget amount and recording down the wedding expenses.
- User shall be able to manage the guest list and track the attendance of invited guests.
- User shall be able to design the ceremony venue by using Augmented Reality view.
- User shall be able to place and transform the virtual decoration items onto the live camera feed.

### **4.2.2 Hardware Requirements**

The following tables are the system specification of hardware tools required to develop and run the application.

**A) Laptop***Table 4.2.2.1: Laptop model for development.*

Model	ASUS A456U
Operating System	Windows 10 Home (64-bit)
Processor	Intel® Core™ i5-7200U CPU @ 2.50GHz 2.71GHz
Memory (RAM)	12.0 GB
Storage	1.0 TB
Graphics	NVIDIA® GeForce® 930MX

**B) Mobile Device***Table 4.2.2.2: Phone model for development.*

Model	Poco X3 NFC
Operating System	Android 10, MIUI Global 12.0.8
Processor	Octa-core Max 2.30GHz
Memory (RAM)	6.0 GB
Storage	64.0 GB
Graphics	Adreno 618
Resolution	1080 x 2400 pixels, 20:9 ratio

**4.3 Specification****4.3.1 System Performance Definition**

An application can be evaluated as splendid only if it is able to meet both functional and non-functional requirements that being identified in advance. There are several targeted system performances recommended to be achieved in order to ensure the capability of the application developed.

### **1. Functionality**

The application should provide all the deliverables and features defined in scope. The objectives of this project can be achieved when the entire list of user requirements is being accomplished. For instance, the account management module, checklist, budget, guest list, countdown and venue design features need to be developed well.

### **2. Performance**

The reaction time and responsiveness of application is the major concern in performance metric of the application. When user interacts with the app, the speed of application responding to user inputs and accessing services must be efficient enough. For example, the ability to connect and sync with the online database in a fast manner reveals the ability of this mobile app. Besides, the memory usage of application should be optimised to perform high availability.

### **3. Usability**

The satisfaction of user experience is the key success of a mobile application. This requires a high learnability of application that users can figure out the control of UI by their own. Hence, the application being developed has to be user friendly with proper UI design. The ideal situation is user need not go through any tutorial before using the application. As a result, user is able to operate the application easily with excellent consistency of overall app's appearance.

## **4.3.2 Verification Plan**

A good verification plan is important to evaluate the performance of application and ensure that it meets the expected requirements successfully. If the application is not able to pass any of the software testing under verification plan, the defect of an application will be diagnosed, and certain improvements will be made to the system. The testing types can be separated under two categories, which is functional and non-functional testing.

### **1. Functional Testing**

This testing helps to verify that the application is practical and useful to the users. The features and modules will undergo a series of testing to ensure that they meet the specifications and requirements. Firstly, unit testing will be conducted to check the programming code part by part whether it gives the desired output or contain flaws. Next, integration testing is performed to test the integrated modules and support the error detection in different features. After completed the integration testing, system testing will be carried out to ensure the application's conformity with all technical specifications and user requirements.

### **2. Non-functional Testing**

This testing is executed to test on the specified system requirements that are isolated from the application's functionality. Usability testing checks the user-friendliness of the app by acquiring the feedback from user. The comfortable UI design with a good layout will contribute to positive user experience. Besides, intuitiveness is important for user to understand and perform interaction with the app without any guidance. Moreover, smooth application flow and quick response time should be ensured in order to increase the level of user satisfaction.

## 4.4 Timeline

A Gantt chart is illustrated to view the estimated timeline for this project in a clearer picture. The project is going to span 2 trimesters, which are October 2020 session and January 2021 session. As shown in Figure 3.4.1, Project 1 in October 2020 session is mainly covered the tasks in Initiation, Planning and Design phase. Meanwhile, Figure 3.4.2 shows that Project 2 in January 2021 session is focused on the deliverables working from development stage until the completion.

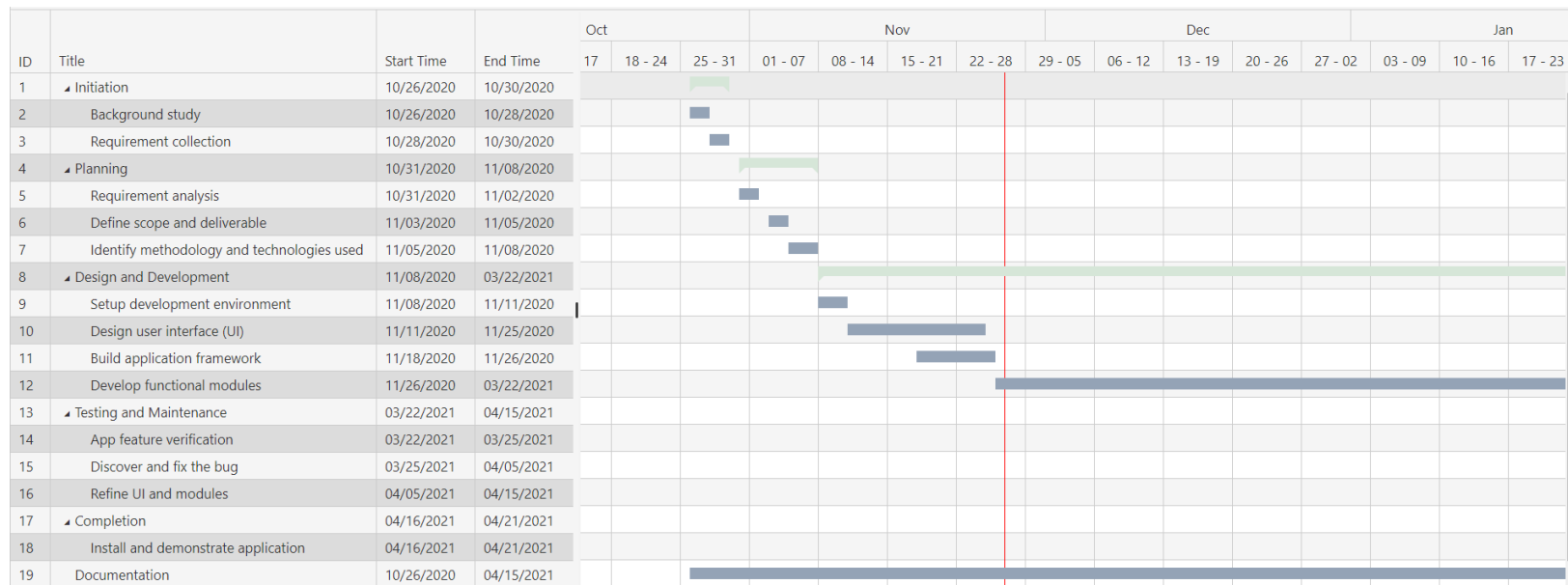


Figure 4.4.1: Gantt chart for timeline from Oct 2020 to Jan 2021.

CHAPTER 4: DESIGN SPECIFICATION

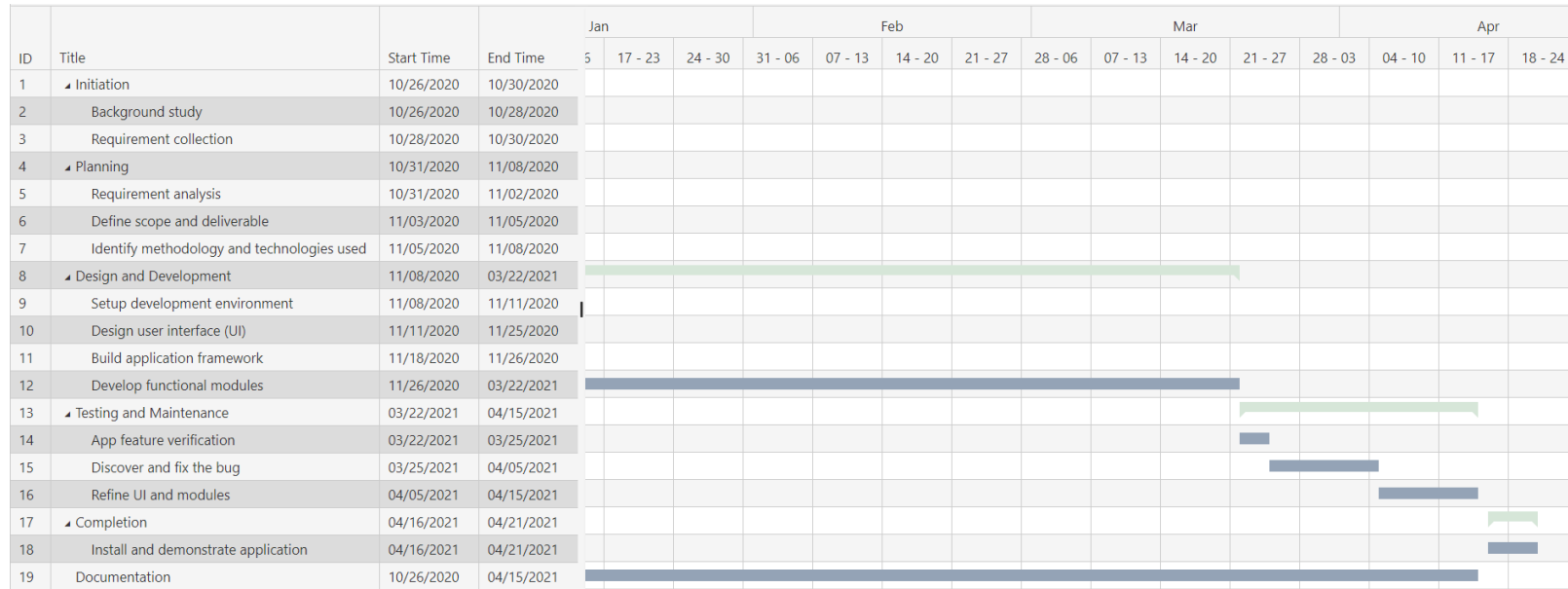


Figure 4.4.2: Gantt chart for timeline from Jan 2021 to Apr 2021.

# Chapter 5 Implementation and Testing

## 5.1 Implementation

### 5.1.1 Setup and Development in Unity Game Engine

As mentioned in the section of development tools and technology in Chapter 4, the AR functionality that allows user to design their wedding venue with virtual visualisation effect is being developed by using Unity Game Engine with AR Foundation framework and ARCore extension package. In this section, the basic setup and implementation of AR features inside the Unity will be presented. The main interface of Unity Game Engine is shown below.

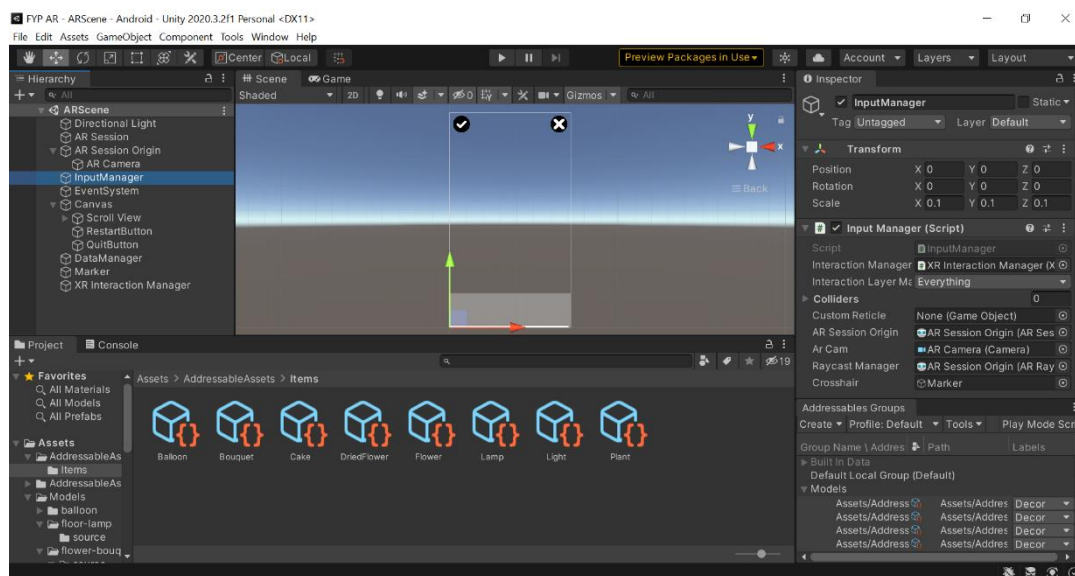


Figure 5.1.1.1: Unity Game Engine interface.

After successfully installed Unity Hub 2.4.3, the first step is to download Unity version 2020.3.2f1 with Android Build Support module. Secondly, a 3D project is created into the selected file path. Before started the coding and development, several packages are required to download in prior inside the Package Manager.



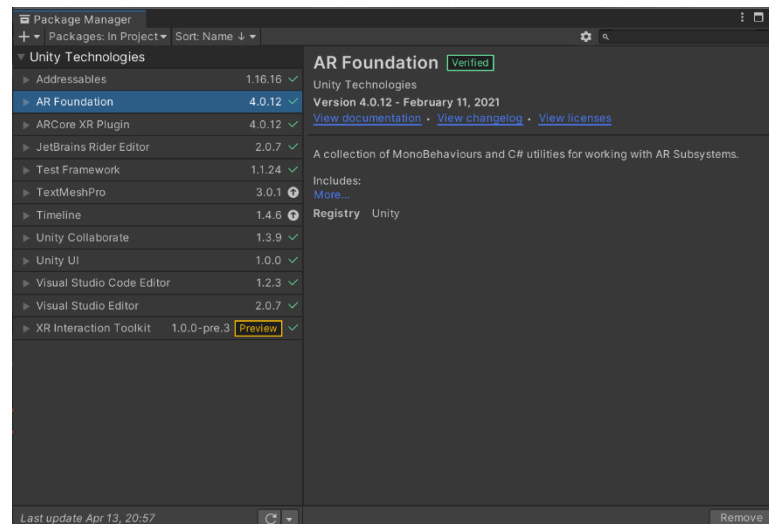


Figure 5.1.1.2: Package Manager interface.

Then, the preferences settings must be configured before starting the development. Visual Studio 2019 is selected as the external script editor and setup of android tools like the path of Gradle is reconfigured. In addition, the XR Plug-in Management in project settings is required to select the ARCore as Plug-in Providers.

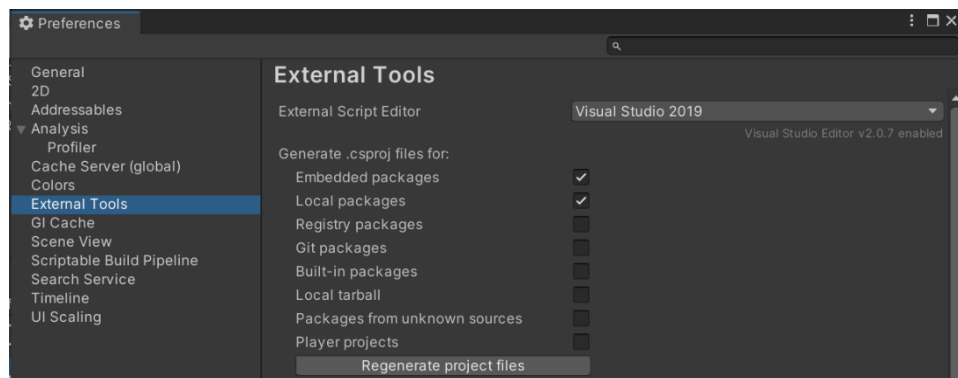


Figure 5.1.1.3: External Tools interface.

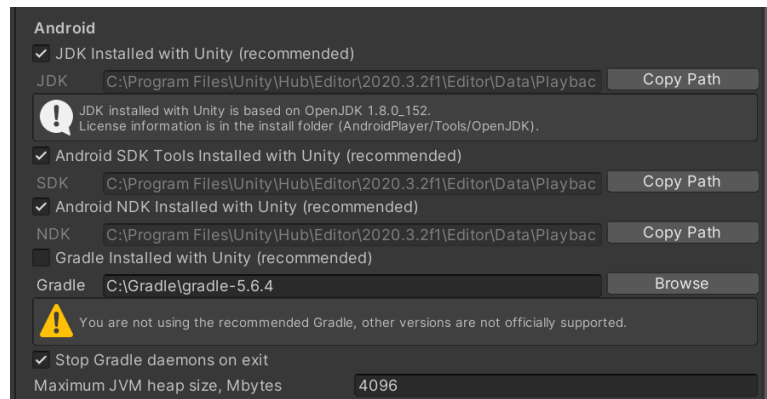


Figure 5.1.1.4: Setup of Android tools in Preferences.

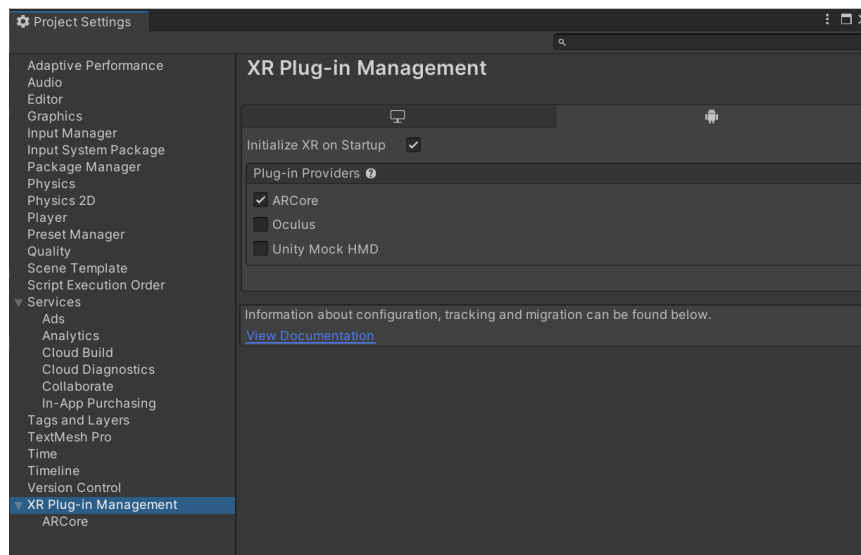
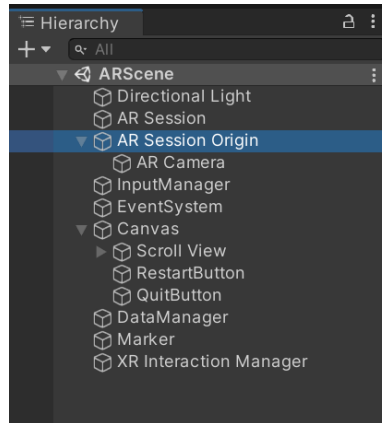
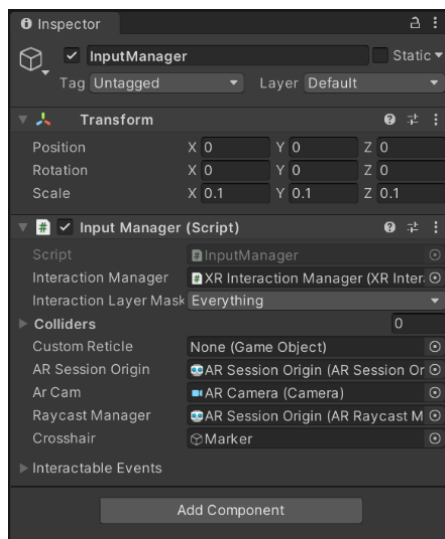


Figure 5.1.1.5: XR Plug-in Management interface.

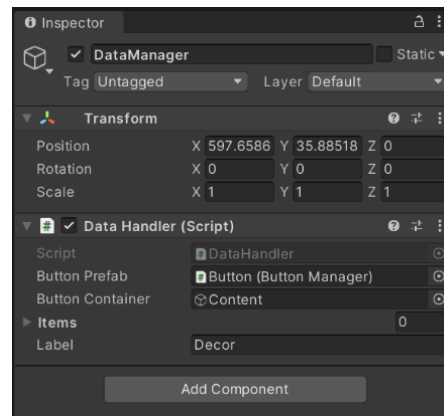
Next, the game objects like AR Session, AR Session Origin with AR Camera are added into the hierarchy to setup the basic AR scene. This step enables the support of AR on the target platform and perform automatic plane tracking and ray casting onto the real world in live camera feed. Besides, Canvas is used to store the UI components while Input Manager and Data Manager are containing the C# scripts which handle the functionality of selecting and placing 3D models of décor items.



*Figure 5.1.1.6: Hierarchy of ARScene.*

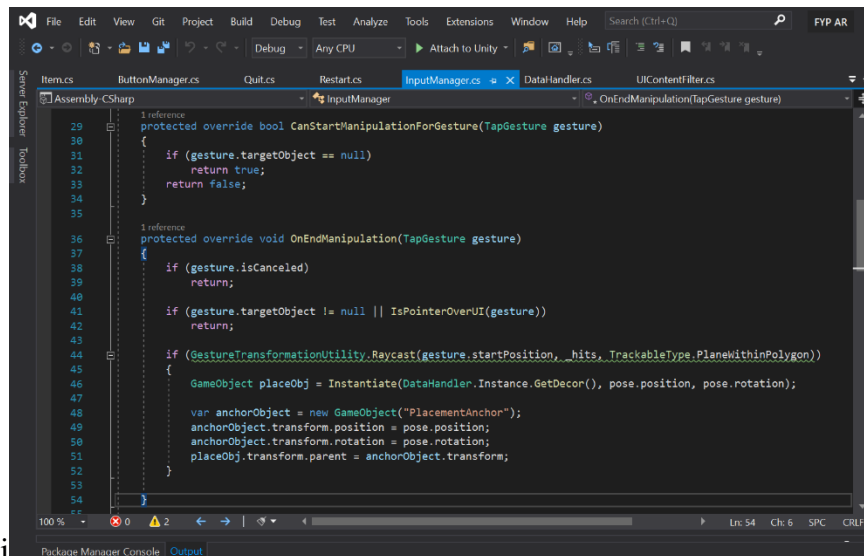


*Figure 5.1.1.7: Inspector of InputManager component.*



*Figure 5.1.1.8: Inspector of DataManager component.*

In Input Manager script, the crosshair-based interaction is created for ensuring the precise positioning of an augmented object onto the screen by user. A marker will be displayed and moving on mobile screen for user to determine the location of placing the 3D model. When users select a decoration object and tap on the plane, the 3D object will be instantiated.

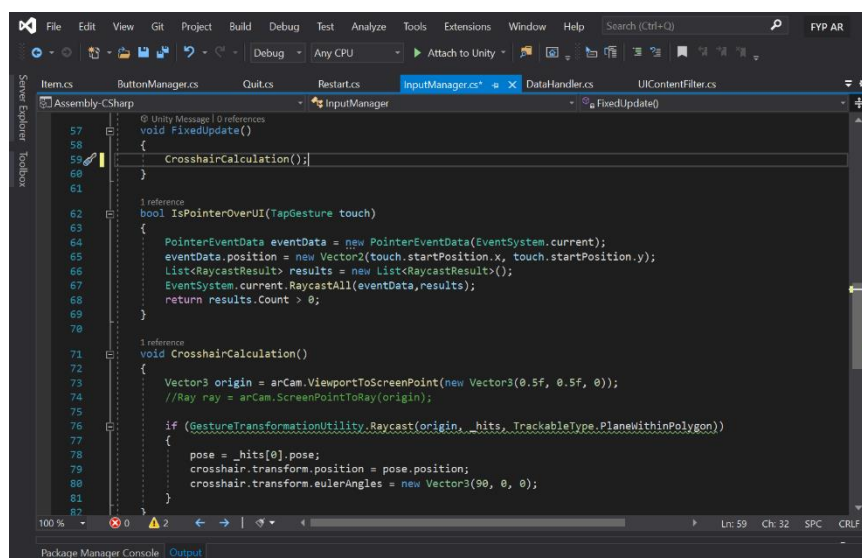


```

29 protected override bool CanStartManipulationForGesture(TapGesture gesture)
30 {
31     if (gesture.targetObject == null)
32         return true;
33     return false;
34 }
35
36 protected override void OnEndManipulation(TapGesture gesture)
37 {
38     if (gesture.isCanceled)
39         return;
40
41     if (gesture.targetObject != null || IsPointerOverUI(gesture))
42         return;
43
44     if (GestureTransformationUtility.Raycast(gesture.startPosition, _hits, TrackableType.PlaneWithinPolygon))
45     {
46         GameObject placeObj = Instantiate(DataHandler.Instance.GetDecor(), pose.position, pose.rotation);
47
48         var anchorObject = new GameObject("PlacementAnchor");
49         anchorObject.transform.position = pose.position;
50         anchorObject.transform.rotation = pose.rotation;
51         placeObj.transform.parent = anchorObject.transform;
52     }
53
54 }

```

Figure 5.1.1.9: Script of InputManager.cs about instantiating object.



```

57 void FixedUpdate()
58 {
59     CrosshairCalculation();
60 }
61
62 bool IsPointerOverUI(TapGesture touch)
63 {
64     PointerEventData eventData = new PointerEventData(EventSystem.current);
65     eventData.position = new Vector2(touch.startPosition.x, touch.startPosition.y);
66     List<RaycastResult> results = new List<RaycastResult>();
67     EventSystem.current.RaycastAll(eventData, results);
68     return results.Count > 0;
69 }
70
71 void CrosshairCalculation()
72 {
73     Vector3 origin = arCam.ViewportToScreenPoint(new Vector3(0.5f, 0.5f, 0));
74     //Ray ray = arCam.ScreenPointToRay(origin);
75
76     if (GestureTransformationUtility.Raycast(origin, _hits, TrackableType.PlaneWithinPolygon))
77     {
78         pose = _hits[0].pose;
79         crosshair.transform.position = pose.position;
80         crosshair.transform.eulerAngles = new Vector3(90, 0, 0);
81     }
82 }

```

Figure 5.1.1.10: Script of InputManager.cs about crosshair positioning.

In Data Handler script, the addressable assets which are the 3D decoration items will be loaded from Google cloud storage and form the buttons inside the scroll view. The Button Manager script works together with the Data Handler to link button images with specific 3D objects.

```

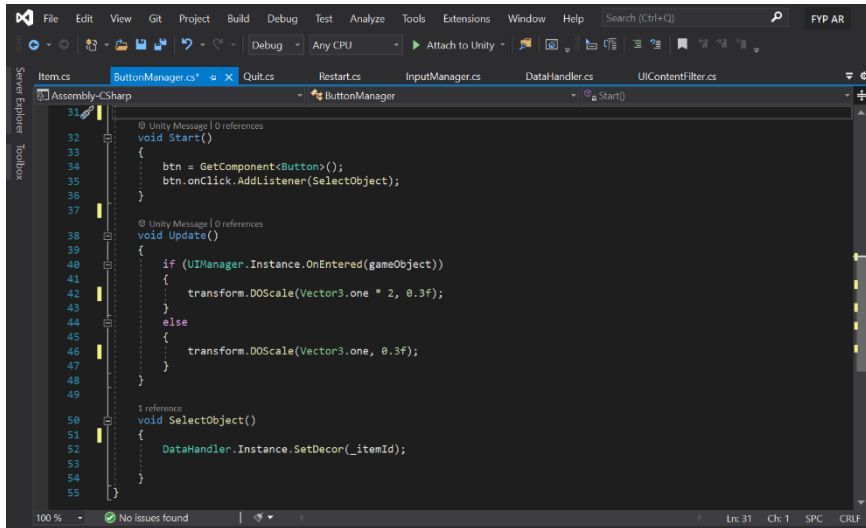
62     buttonContainer.GetComponent<UIContentFilter>().Fit();
63
64
65
66     1 reference
67     public void SetDecor(int id)
68     {
69         decor = items[id].itemPrefab;
70     }
71
72     1 reference
73     public GameObject GetDecor()
74     {
75         return decor;
76     }
77
78     1 reference
79     public async Task Get(String label)
80     {
81         var locations = await Addressables.LoadResourceLocationsAsync(label).Task;
82         foreach(var location in locations)
83         {
84             var obj = await Addressables.LoadAssetAsync<Item>(location).Task;
85             items.Add(obj);
86         }
87     }
    
```

Figure 5.1.1.11: Script of DataHandler.cs about loading asset from Google Cloud.

```

34
35     @ Unity Message | 0 references
36     private async void Start()
37     {
38         items = new List<Item>();
39         //LoadItems();
40         await Get(label);
41         CreateButtons();
42     }
43
44     1 reference
45     void CreateButtons()
46     {
47         foreach(Item i in items)
48         {
49             ButtonManager b = Instantiate(buttonPrefab, buttonContainer.transform);
50             b.ItemId = current_id;
51             b.ButtonTexture = i.itemImage;
52             current_id++;
53         }
54         buttonContainer.GetComponent<UIContentFilter>().Fit();
55
56     1 reference
57     public void SetDecor(int id)
58     {
59         decor = items[id].itemPrefab;
60     }
    
```

Figure 5.1.1.12: Script of DataHandler.cs about creating buttons.



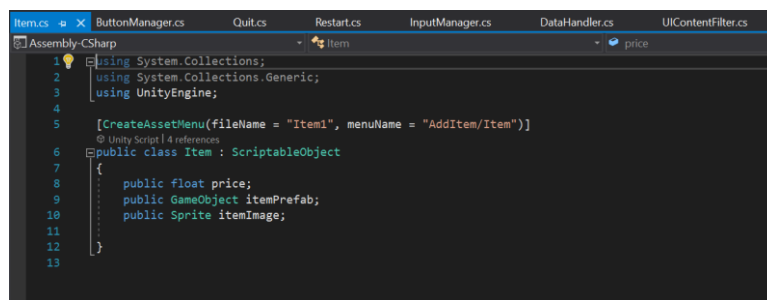
```

31
32 void Start()
33 {
34     btn = GetComponent<Button>();
35     btn.onClick.AddListener(SelectObject);
36 }
37
38 @ Unity Message | 0 references
39 void Update()
40 {
41     if (UIManager.Instance.OnEntered(gameObject))
42     {
43         transform.DOScale(Vector3.one * 2, 0.3f);
44     }
45     else
46     {
47         transform.DOScale(Vector3.one, 0.3f);
48     }
49 }
50
51 1 references
52 void SelectObject()
53 {
54     DataHandler.Instance.SetDecor(_itemId);
55 }

```

Figure 5.1.1.13: Script of ButtonManager.cs about linking object to buttons.

In order to load 3D object model by using addressable with Google Cloud Storage, a script called Item.cs is coded to ease the process of creating addressable items as scriptable objects to store the prefabs. After creating the decoration items with Sprite image and 3D prefab, the addressable assets are required to add into a group and run the default build script. The server data scripts created are then uploaded into the Google Cloud and users will be able to load the 3D objects from the server by active internet connection.



```

1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4
5 [CreateAssetMenu(fileName = "Item1", menuName = "AddItem/Item")]
6 @ Unity Script | 4 references
7 public class Item : ScriptableObject
8 {
9     public float price;
10    public GameObject itemPrefab;
11    public Sprite itemImage;
12 }
13

```

Figure 5.1.1.14: Script of Item.cs about creating scriptable object.

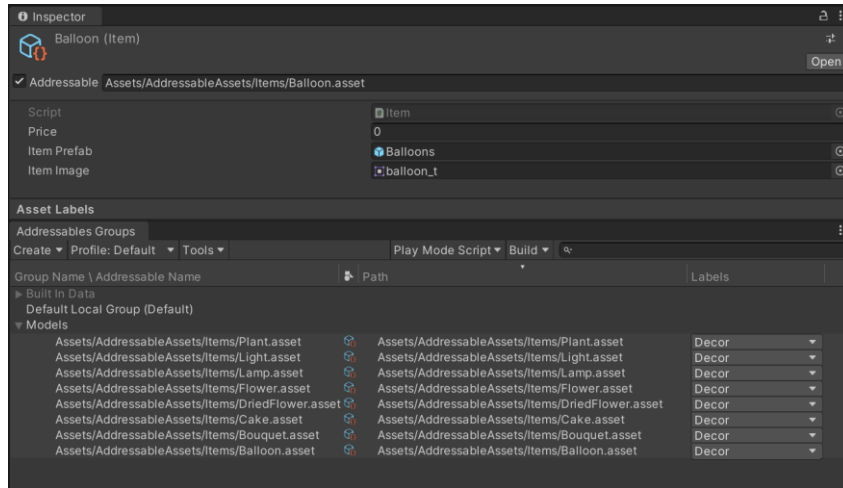


Figure 5.1.1.15: Inspector of Balloon item created and Addressables Group details.

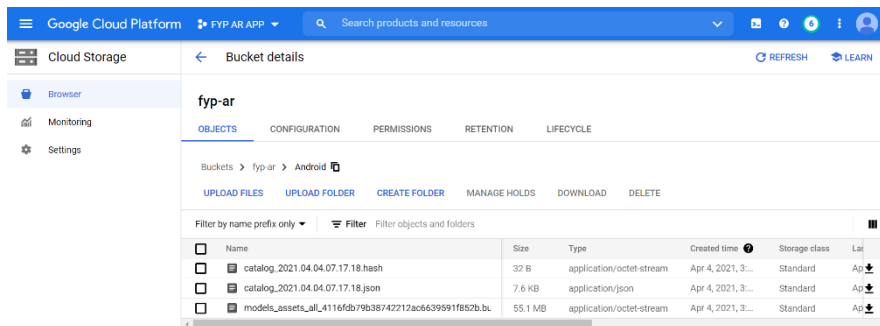


Figure 5.1.1.16: Server data scripts uploaded to Google Cloud Storage.

Other than that, the XR Interaction Manager is added into the project for performing interaction tasks of 3D objects with users. The interactable scripts are added as components on each and every prefab so that users can perform selection and transformation on instantiated objects such as translation, rotation, and scaling actions.

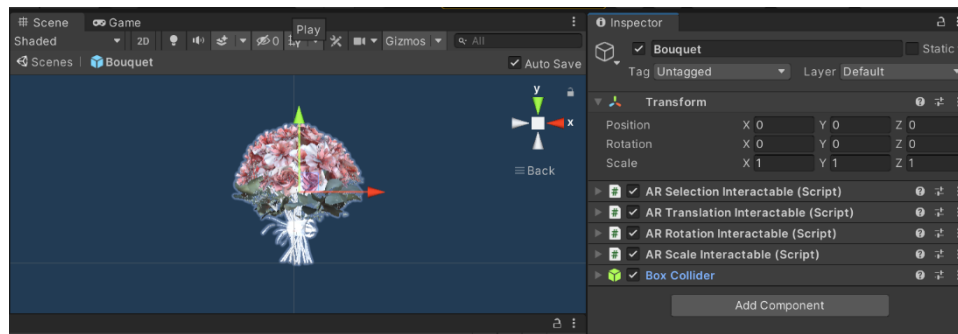


Figure 5.1.1.17: Inspector of Bouquet prefab.

## 5.1.2 Setup and Development in Android Studio

Other than AR venue design feature, the remaining functions related to wedding planning such as countdown, checklist, budget, guest list and account management modules are being developed in Android Studio by using Java language.

Firstly, an Android project is created with minimum SDK version of API 24. Then, the Android activities, layout files and resources are built accordingly. The .xml file is coded for the interface design while .java file is storing the class information and event handling logic in Android activity. To authenticate user by email address and store user's data in cloud, Firebase Authentication and Realtime Database are used in this project. In order to link our Android project with Firebase, some steps and configurations are required to be carried out.

After created a Firebase project, the Android app must be registered in Firebase console by using Android package name. Next, a Firebase configuration file is added into the project under Android Studio. Lastly, the dependencies of Firebase must be configured in the Gradle file and perform syncing.



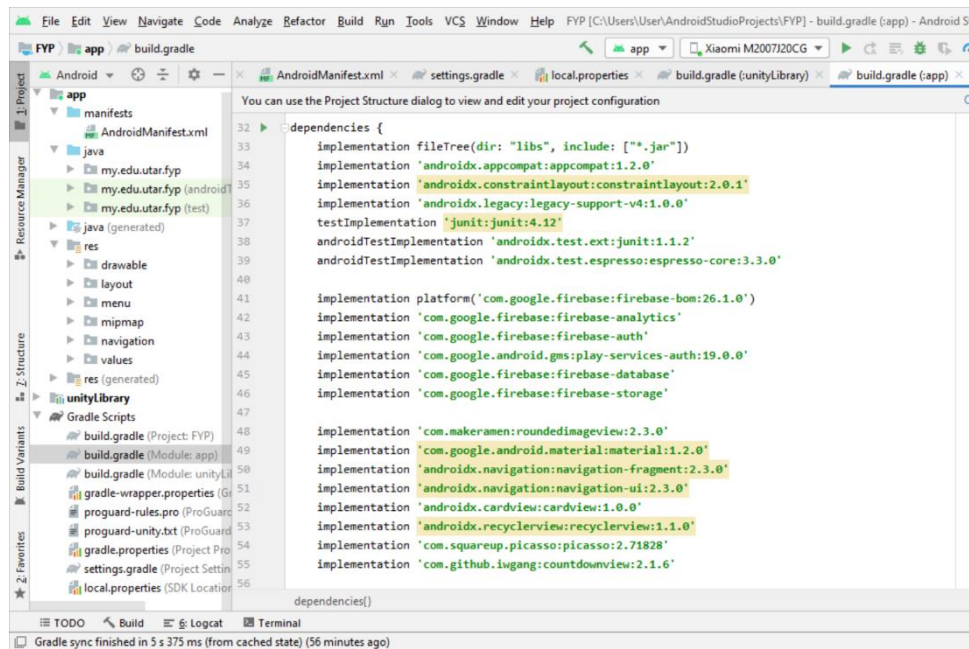


Figure 5.1.2.1: Configurations in build.gradle(:app) file.

To run and debug the application, the configurations in AndroidManifest.xml is important as it contains the basic information including the package name, application components and permissions request. Besides, the debugging mode must be enabled in Android device and connecting the phone via USB cable to the laptop. After selecting the deployment target device, the application will be executed on the plugged-in device.

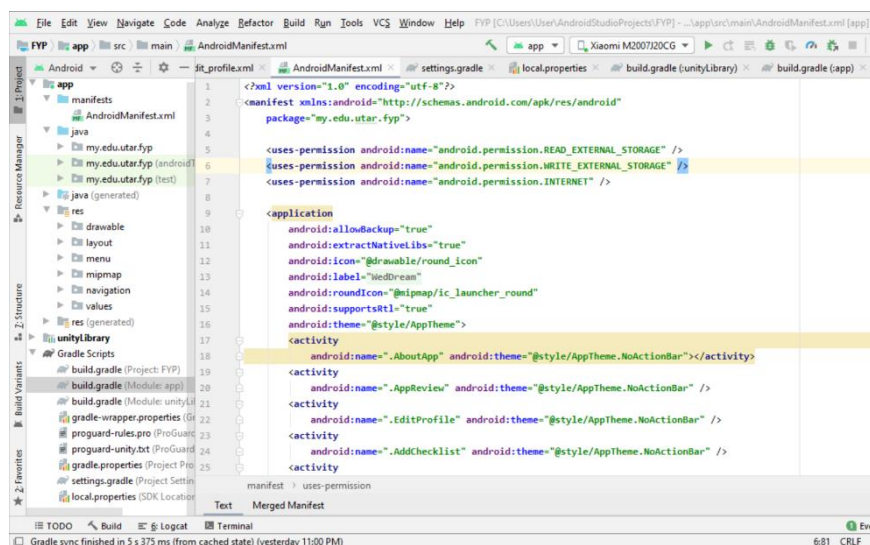
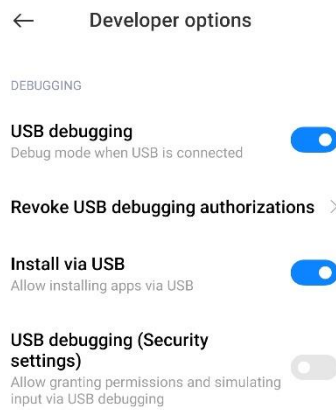


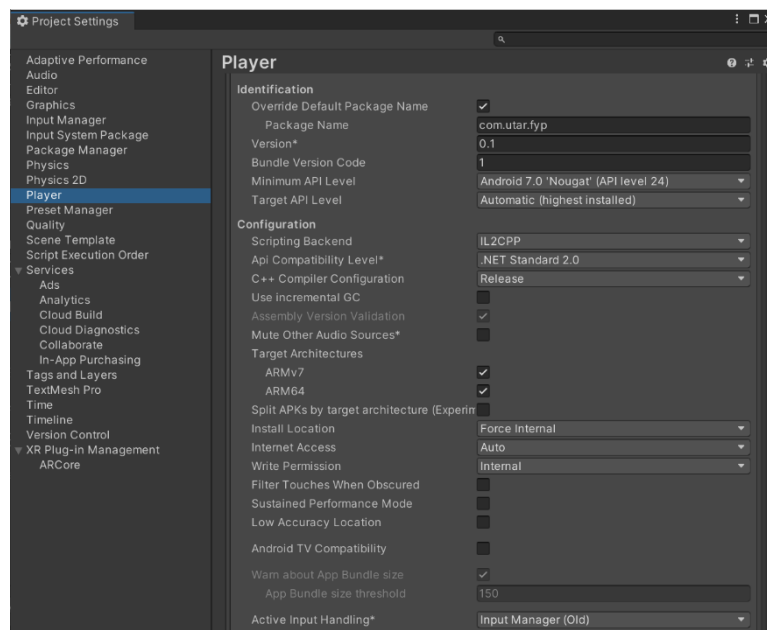
Figure 5.1.2.2: Configurations in AndroidManifest.xml file.



*Figure 5.1.2.3: Developer options in Android device.*

### 5.1.3 Integration of Unity Program into Android App

After finished the coding and development on Unity Game Engine and Android Studio, the Unity program is exported and embedded into native Android application built in Android Studio. The player settings and build settings have to be configured to export the Unity project.



*Figure 5.1.3.1: Player settings in Unity.*

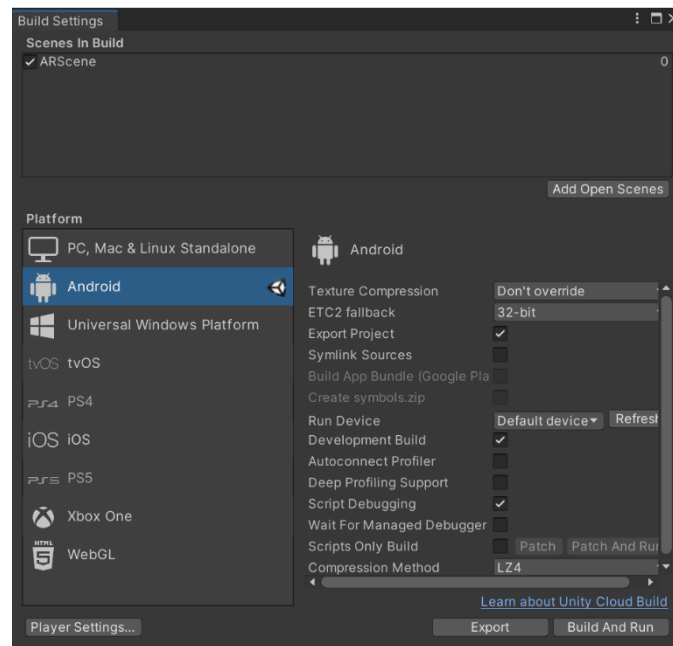


Figure 5.1.3.2: Build settings in Unity.

Then, the UnityLibrary folder inside the exported project is imported into the Android Studio as a library for embedding unity game within native Android application. The Gradle scripts including project settings (settings.gradle), root-level Gradle file (project-level build.gradle) and module's Gradle file (app-level build.gradle) are configured and synced.

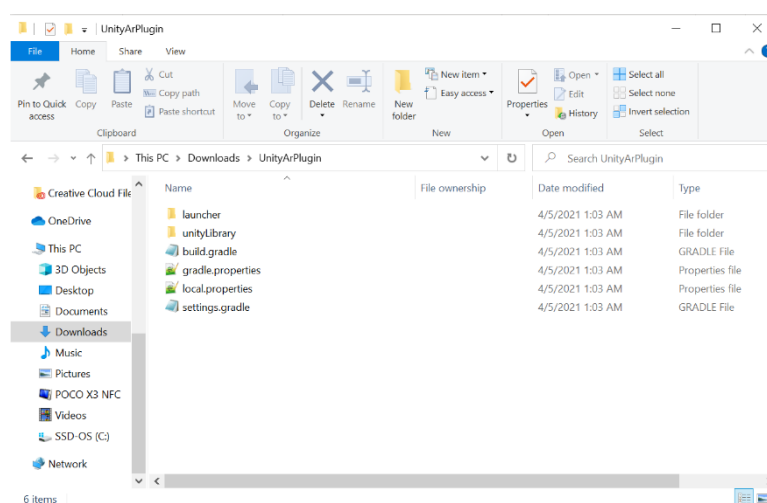


Figure 5.1.3.3: File structure of exported Unity project.

```

1 include ':app'
2 rootProject.name = "FYP"
3
4 include ':unityLibrary'
5 project(':unityLibrary').projectDir=new File('C:\\Users\\User\\AndroidStudioProjects\\FYP\\unityLibrary')
6

```

Figure 5.1.3.4: Configurations in settings.gradle file.

```

1 // Top-level build file where you can add configuration options common to all sub-
2
3 buildscript {
4     repositories {
5         google()
6         jcenter()
7     }
8     dependencies {
9         classpath "com.android.tools.build:gradle:4.0.1"
10        classpath "com.google.gms:google-services:4.3.4"
11        // NOTE: Do not place your application dependencies here; they belong
12        // in the individual module build.gradle files
13    }
14 }
15
16 allprojects {
17     repositories {
18         google()
19         jcenter()
20     }
21     flatDir {
22         dirs "${project(':unityLibrary').projectDir}/libs"
23     }
24 }
25

```

Figure 5.1.3.5: Configurations in build.gradle (project level) file.

```

28     }
29 }
30 }
31 }
32 dependencies {
33     |
34     //implementation 'com.google.ar:core:1.23.0'
35     implementation project(':unityLibrary')
36

```

Figure 5.1.3.6: Configurations in build.gradle (app level) file.

After syncing all the Gradle files, the Unity program can be executed in Android app by calling the UnityPlayerActivity class.

```

60         mParam2 = getArguments().getString(ARG_PARAM2);
61     }
62 }
63
64 @Override
65 public View onCreateView(LayoutInflater inflater, ViewGroup container,
66         Bundle savedInstanceState) {
67     // Inflate the layout for this fragment
68     View v = inflater.inflate(R.layout.fragment_design, container, attachToRoot: false);
69
70     btnDesign = v.findViewById(R.id.btnDesign);
71
72     //Go to Unity game activity when click on design button
73     btnDesign.setOnClickListener((view) -> {
74         Intent i = new Intent(getActivity(), UnityPlayerActivity.class);
75         startActivity(i);
76     });
77
78     return v;
79 }
80
81 }
82 }
83 }

```

Figure 5.1.3.7: Coding in Design fragment for calling Unity Player Activity.

## 5.2 System Testing

Testing phase is crucial in ensuring that the application developed is practical and meet all the functional specifications and user requirements. In this section, system testing will be carried out and the test cases are recorded under specific modules.

### 5.2.1 Account Management Module

Table 5.2.1.1: Test case for creating user account.

Test Case ID	TC01
Objective	To create a user account with data stored in Firebase.
Pre-requisite	User's device has active Internet connection.
Steps	1. Enter username, email address and password in sign up page. 2. Click on button to create account.
Expected Result	User's email is saved as identifier in Firebase Authentication and the profile data is stored in Realtime Database successfully.
Status	Pass

*Table 5.2.1.2: Test case for authenticating user.*

Test Case ID	TC02
Objective	To ensure the user authentication with Firebase work correctly.
Pre-requisite	User's account is created.
Steps	1. Enter valid or invalid email address and password in login page.
Expected Result	User will login successfully with valid account info and fail to login with invalid data.
Status	Pass

*Table 5.2.1.3: Test case for editing profile.*

Test Case ID	TC03
Objective	To verify the function of editing user profile data.
Pre-requisite	User's account is created.
Steps	1. Change the username and wedding info under settings page. 2. Click on the save button to upload the updated info.
Expected Result	The username and wedding info stored in Firebase Realtime Database is updated.
Status	Pass

*Table 5.2.1.4: Test case for input validation.*

Test Case ID	TC04
Objective	To ensure the input validation method work correctly.
Pre-requisite	The application is running.
Steps	1. Create account with unfilled column in sign up page. 2. Enter password which less than 6 characters.
Expected Result	User is not allowed to create account with incorrect input data. Error message will pop out to inform the user.
Status	Pass

This module is created with the combination of sign up and login page. When user perform registration and create for an account, his/her account details like username, email address and password are being stored into Firebase Authentication and Realtime Database. With the information stored in Firebase, user is able to login into the system with correct email address and password. If the input being keyed in is valid, the system will show a pop-up message for informing the successful login. User is not able to login to the system with incorrect password or inexistent email address. Besides the normal application flow, certain input validation method is being implemented to check the correctness of inputted data and handle the error condition. For example, user will not be allowed to complete the form submission in sign up and login page if there contains any unfilled column or invalid input format.

### 5.2.2 Countdown Module

*Table 5.2.2.1: Test case for viewing countdown.*

Test Case ID	TC05
Objective	To ensure the countdown feature work correctly.
Pre-requisite	User has logged in successfully.
Steps	1. Enter partner name and wedding date in countdown page. 2. Click on the save button to upload the wedding info.
Expected Result	The wedding info is stored in Firebase Realtime Database and the countdown time views successfully.
Status	Pass

This module is created to display the personal countdown to user's wedding day in a stylish interface. User is able to edit and update his/her partner's name and their wedding date into online database at any time. Then, user can view the time remaining to his/her important wedding in the format of days, hours, minutes, and seconds.

### 5.2.3 Checklist Management Module

*Table 5.2.3.1: Test case for adding item in checklist.*

Test Case ID	TC06
Objective	To add new item into the checklist.
Pre-requisite	User has logged in successfully.
Steps	<ol style="list-style-type: none"> <li>1. Enter the task title in checklist record page.</li> <li>2. Select the category that the task belongs to.</li> <li>3. Toggle on or off the completion status of task.</li> <li>4. Click the button to save the checklist record.</li> </ol>
Expected Result	The checklist item is uploaded to Firebase Realtime Database and displayed on the checklist page inside the app. The text of task is strikethrough if the completion status is true.
Status	Pass

*Table 5.2.3.2: Test case for changing completion status.*

Test Case ID	TC07
Objective	To change the completion status of particular item in checklist.
Pre-requisite	Item is added into the checklist.
Steps	<ol style="list-style-type: none"> <li>1. Tick and untick the checkbox next to the task.</li> </ol>
Expected Result	The completion status of selected item will change accordingly in Realtime Database and display in application.
Status	Pass

*Table 5.2.3.3: Test case for deleting item from checklist.*

Test Case ID	TC08
Objective	To delete the existing item from the checklist.
Pre-requisite	Item is added into the checklist.
Steps	<ol style="list-style-type: none"> <li>1. Press on the delete button next to the task.</li> </ol>
Expected Result	The record item will be deleted from Realtime Database and disappeared from the checklist in app.
Status	Pass



This module is created for users to record their tasks with completion status under built-in categories. Users are able to view their to-do lists and follow up the progress of their wedding preparation tasks. Besides, they can change the completion status of a task or even delete the items from the checklist by checkboxes and buttons provided.

#### 5.2.4 Budget Management Module

*Table 5.2.4.1: Test case for set the budget amount.*

Test Case ID	TC09
Objective	To set budget amount and view the balance in budget page.
Pre-requisite	User has logged in successfully.
Steps	<ol style="list-style-type: none"> <li>1. Enter the budget amount in budget page.</li> <li>2. Click on the save button to upload the budget amount.</li> </ol>
Expected Result	The budget amount is stored in Firebase Realtime Database and the total balance will display on sticky bar after subtracting the money amount of expenses.
Status	Pass

*Table 5.2.4.2: Test case for adding expense record.*

Test Case ID	TC10
Objective	To add new expense record into the list.
Pre-requisite	User has logged in successfully.
Steps	<ol style="list-style-type: none"> <li>1. Enter the expense title in budget record page.</li> <li>2. Select the category that the record belongs to.</li> <li>3. Enter the money amount of expense.</li> <li>4. Click the button to save the expense record.</li> </ol>
Expected Result	The expense record is uploaded to Firebase Realtime Database and displayed on the budget page inside the app.
Status	Pass

*Table 5.2.4.3: Test case for deleting expense record.*

Test Case ID	TC11
Objective	To delete the existing record from the expense list.
Pre-requisite	Record is added into the expense list.
Steps	1. Press on the delete button next to the record.
Expected Result	The expense record will be deleted from Realtime Database and disappeared from the expense list in app.
Status	Pass

This module is created to provide the financial monitoring function so that users can control their expenses according to budget amount. Users can set the budget and add expense records to view their total expenses and balance. Moreover, the expense record can be removed by user from the database.

## 5.2.5 Guest List Management Module

*Table 5.2.5.1: Test case for adding guest record.*

Test Case ID	TC12
Objective	To add new guest record into the list.
Pre-requisite	User has logged in successfully.
Steps	<ol style="list-style-type: none"> <li>1. Enter the guest name in guest record page.</li> <li>2. Select the group tag that the guest belongs to.</li> <li>3. Enter the total guest number.</li> <li>4. Toggle on or off the RSVP status of guest.</li> <li>5. Click the button to save the guest record.</li> </ol>
Expected Result	The guest record is uploaded to Firebase Realtime Database and displayed on the guestlist page inside the app. The amount of total invited guests, attending and pending guests are displayed on the top sticky bar. The text colour of guest number is pink for attending guest and grey for pending guest.

Status	Pass
--------	------

*Table 5.2.5.2: Test case for editing guest record.*

Test Case ID	TC13
Objective	To verify the function of editing guest record.
Pre-requisite	Record is added into the guest list.
Steps	<ol style="list-style-type: none"> <li>1. Change the details of guest record under edit guest record page.</li> <li>2. Click on the update button to save the updated info.</li> </ol>
Expected Result	The details of particular record will change accordingly in Realtime Database and display in application.
Status	Pass

*Table 5.2.5.3: Test case for deleting guest record.*

Test Case ID	TC14
Objective	To delete the existing record from the guest list.
Pre-requisite	Record is added into the guest list.
Steps	<ol style="list-style-type: none"> <li>1. Press on the delete button next to the record.</li> </ol>
Expected Result	The guest record will be deleted from Realtime Database and disappeared from the guest list in app.
Status	Pass

This module is created for users to manage their invited guest list and view the RSVP status of each guest. Users are able to add the guest record by entering guest name, group tags, guest number and RSVP status. After saving the record, they may view the total number of guests, and attending and pending guests amount. Besides, users are allowed to edit and delete the guest record whenever they want.

## 5.2.6 Augmented Reality (AR) Venue Design Module

*Table 5.2.6.1: Test case for placing 3D object.*

Test Case ID	TC15
Objective	To verify the function of placing 3D object.
Pre-requisite	Camera permission is allowed, and device has active Internet connection.
Steps	<ol style="list-style-type: none"> <li>1. Select an item by pressing the button inside the scroll view.</li> <li>2. Tap on the area of automatically generated plane on screen.</li> </ol>
Expected Result	The 3D object will be instantiated on the crosshair marker point.
Status	Pass

*Table 5.2.6.2: Test case for selecting 3D object.*

Test Case ID	TC16
Objective	To verify the function of selecting 3D object.
Pre-requisite	The 3D object is instantiated on camera view.
Steps	<ol style="list-style-type: none"> <li>1. Move the crosshair marker to the position of particular item.</li> <li>2. Tap on the screen to select the object.</li> </ol>
Expected Result	The 3D object is selected by user for further transformation.
Status	Pass

*Table 5.2.6.3: Test case for moving 3D object.*

Test Case ID	TC17
Objective	To verify the function of moving 3D object.
Pre-requisite	The 3D object is selected.
Steps	<ol style="list-style-type: none"> <li>1. Drag and move the selected object to desired position.</li> <li>2. Release the finger from screen.</li> <li>3. Press the (✓) button on top left corner.</li> </ol>
Expected Result	The 3D object will be translated to the new position.
Status	Pass

*Table 5.2.6.4: Test case for scaling 3D object.*

Test Case ID	TC18
Objective	To verify the function of scaling 3D object.
Pre-requisite	The 3D object is selected.
Steps	1. Pinch to scale the size of selected object. 2. Press the (✓) button on top left corner.
Expected Result	The 3D object will be scaled to the new size.
Status	Pass

*Table 5.2.6.5: Test case for rotating 3D object.*

Test Case ID	TC19
Objective	To verify the function of rotating 3D object.
Pre-requisite	The 3D object is selected.
Steps	1. Move finger left and right on the area around to rotate the selected object. 2. Press the (✓) button on top left corner.
Expected Result	The 3D object will be displayed in new direction adjusted by user.
Status	Pass

*Table 5.2.6.6: Test case for exiting the AR view.*

Test Case ID	TC20
Objective	To verify the function of exiting AR view.
Pre-requisite	The AR scene is launching on device's camera view.
Steps	1. Press the (✕) button on top right corner.
Expected Result	User will exit the AR view and return to the design interface in app.
Status	Pass

This module is developed to provide an augmented view for users to design their wedding venue with built-in decoration items. To activate this feature, user must enable the camera permission and install with latest version of Google Play Services for AR app. After entering the AR scene, users can see the crosshair marker and automatic plane formation. Then, users may select their favourite décor items to be placed onto the live camera feed. The virtual 3D objects can be selected, scaled, translated and rotated freely by user's gesture.

## Chapter 6 Conclusion

### 6.1 Project Review

In a nutshell, the main purpose of this project is to provide an interactive wedding planner app with AR venue design feature for couples to plan and design their big day. In order to achieve the goal, a number of existing systems are being reviewed to understand their strengths and weaknesses. After studying the similar apps available in market, it is obvious that AR technology is not being implemented into current wedding planning app to provide visual effects in venue design. Without a doubt, this will increase the financial burden of the low-income clients who are not capable to afford the designer's consultation fee. Moreover, in the absence of visual effect, people may encounter the situation where the design outcome does not meet their desires. The action of revising design plan will definitely cost extra time and money.

To solve the problems mentioned above, this application has combined the basic planning functions and AR venue design feature into a single application. Android Studio is being utilised to build the framework of mobile app and other functional modules by using Java language. For instance, account management module, countdown module, checklist manager, budget tool and guest list management module. Then, C# language is used to implement the AR functionality with the help of AR Foundation, ARCore and Unity Game Engine. The AR venue design feature is significant to provide a virtual view of ceremony decoration plan to user by adding or transforming digital decoration items onto the live camera feed.

As a result, the integration of AR technology into this proposed application is a practical contribution to the community. Apart from that, the performance gain from this project is believed to provide useful insights into mobile augmented reality. This will certainly be a significant step towards achieving a better future for the wedding planner application in the market.

## 6.2 Implementation Issues and Challenges

The main challenge of this project is to implement the Augmented Reality (AR) technology in the wedding planner application. Since this is the first move of merging AR venue design feature and basic planning features into a single application, several implementation issues are faced throughout the application development.

First of all, one of the difficulties faced is to cope with a number of unknown development tools like Unity game engine and AR Foundation framework. At the beginning, the computer specifications are not meeting the minimum hardware requirements of the software. Consequently, this problem has procrastinated the progress of installing software and setting up the development environment. Besides, a basic understanding on the tools is required in order to make good use of the software. Hence, a period of time is necessitated to get familiar with the functionality provided by going through some online tutorials.

Moreover, the mobile device used to run and test the application is required to be installed with the latest version of Google Play Services for AR app. This application helps to unlock the AR experiences built with ARCore. Unfortunately, the problem faced is incompatibility of current phone model with the app version. To solve the difficulties, an ARCore supported device, Poco X3 NFC phone is being borrowed from family member.

Other than that, C# (C-sharp) programming language is the core language to develop the AR function in Visual Studio and import the script into Unity platform. However, this language is not included in the teaching syllabus throughout the study of bachelor's degree. As a matter of fact, learning a new language as a beginner is demanding plenty of effort and time. As a result, self-study and good time management is the key point to overcome the challenges and accomplish the application development.



### **6.3 Novelties and Contributions**

The novelty and major contribution of this project is to realise the integration of AR technology into a wedding planner app. The developed application allows user to design their wedding venue with visual effect and plan the ceremony with functional modules. The embedded AR scene feature within the app provides a virtual fitting room to place the 3D decoration items onto the real-world environment in mobile screen. Besides, they are able to interact with the instantiated objects by selecting the 3D items and perform transformation such as scaling, rotation and translation. The idea of involving AR technology in wedding planning app will certainly give user a better experience on visualising their design plan and check if the design meets their expectations beforehand. This saves their costs and times on purchasing unsatisfied decoration items and refine their design plan.

### **6.4 Future Work**

Without a doubt, the project objectives are successfully met where the implemented application has achieved the goals of providing basic features of wedding planner app and the venue design function using AR technology. Nevertheless, due to the time constraint, this project contains certain limitations that can be improved in future. Firstly, the 3D decoration objects placed in AR scene are able to undergo transformation but not the deletion. For the future work, the application will provide users with the function of removing objects from the AR view. In addition, the essential future direction is to increase the number and variety of decoration items provided. As for now, the decoration items are limited and focused only on western style wedding. In future, the 3D objects will be provided in a more abundant way.

Furthermore, the application should be able to provide a feature for users to save their design plan. For example, after users finished their design in AR view, they can save their design as a photo which exported to their gallery or album. Then, they may view back their previous decoration whenever they want. Lastly, the collaboration feature that allows linking of more than one accounts are useful for the partner or family to manage the tasks together with users.

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# Appendix A Biweekly Report

## FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

<b>Trimester, Year:</b> Y3S3	<b>Study week no.:</b> 2
<b>Student Name &amp; ID:</b> Leong Jia Xuan (17ACB01592)	
<b>Supervisor:</b> Ms. Lai Siew Cheng	
<b>Project Title:</b> Wedding Planner Application Using Augmented Reality	

### 1. WORK DONE

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

- Continue the development of application from preliminary work in FYP 1.
- Refine the design of UI (user interface).

### 2. WORK TO BE DONE

- Complete the upload and retrieval of data to and from Firebase Realtime Database.
- Start to develop other functional modules in app.

### 3. PROBLEMS ENCOUNTERED

- No problem encountered in the last fortnight.

### 4. SELF EVALUATION OF THE PROGRESS

- The progress is fair.

Supervisor's signature

Student's signature

A

## FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

<b>Trimester, Year:</b> Y3S3	<b>Study week no.:</b> 4
<b>Student Name &amp; ID:</b> Leong Jia Xuan (17ACB01592)	
<b>Supervisor:</b> Ms. Lai Siew Cheng	
<b>Project Title:</b> Wedding Planner Application Using Augmented Reality	

### 1. WORK DONE

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

- Finish the implementation of checklist and budget management modules.
- Successfully develop the built-in categories by using spinner component in Android Studio.

### 2. WORK TO BE DONE

- Develop the AR venue design function.

### 3. PROBLEMS ENCOUNTERED

- No problem encountered in the last fortnight.

### 4. SELF EVALUATION OF THE PROGRESS

- The progress is considered acceptable.



Supervisor's signature



Student's signature

## FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

<b>Trimester, Year:</b> Y3S3	<b>Study week no.:</b> 6
<b>Student Name &amp; ID:</b> Leong Jia Xuan (17ACB01592)	
<b>Supervisor:</b> Ms. Lai Siew Cheng	
<b>Project Title:</b> Wedding Planner Application Using Augmented Reality	

### 1. WORK DONE

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

- Start to build AR feature using Unity Game Engine.
- Install AR Foundation and ARCore packages in Unity Package Manager.
- Build the AR scene and add UI components together with game objects.

### 2. WORK TO BE DONE

- Code the C# scripts in Visual Studio 2019 to manage the controls of input and 3D objects.

### 3. PROBLEMS ENCOUNTERED

- The version of Unity installed previously is not compatible with AR Foundation and ARCore tools, hence the installation and upgrade to version 2020.3.2f1 is required.

### 4. SELF EVALUATION OF THE PROGRESS

- The progress is quite good.

Supervisor's signature

Student's signature

C

## FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

<b>Trimester, Year:</b> Y3S3	<b>Study week no.:</b> 8
<b>Student Name &amp; ID:</b> Leong Jia Xuan (17ACB01592)	
<b>Supervisor:</b> Ms. Lai Siew Cheng	
<b>Project Title:</b> Wedding Planner Application Using Augmented Reality	

### 1. WORK DONE

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

- Continue the development of AR feature in Unity.
- Build the crosshair-based interaction by using marker to position 3D objects.
- Code the C# scripts to manage the input manager and data handler.

### 2. WORK TO BE DONE

- Download 3D models of wedding decoration items from internet.

### 3. PROBLEMS ENCOUNTERED

- No problem encountered in the last fortnight.

### 4. SELF EVALUATION OF THE PROGRESS

- The progress is a bit slow as other functional modules haven't completed.

Supervisor's signature

Student's signature

D

## FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

<b>Trimester, Year:</b> Y3S3	<b>Study week no.:</b> 10
<b>Student Name &amp; ID:</b> Leong Jia Xuan (17ACB01592)	
<b>Supervisor:</b> Ms. Lai Siew Cheng	
<b>Project Title:</b> Wedding Planner Application Using Augmented Reality	

### 1. WORK DONE

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

- Download the 3D models and import into Unity as prefabs.
- Build and store the addressable items to Google Cloud Storage.
- Complete the implementation of AR design feature.
- Integrate the Unity program into Android Studio.

### 2. WORK TO BE DONE

- Develop the remaining functional modules in app.
- Continue writing the report of this project.

### 3. PROBLEMS ENCOUNTERED

- The current phone model is not supported with Google ARCore.

### 4. SELF EVALUATION OF THE PROGRESS

- The progress is quite good.



Supervisor's signature



Student's signature



## FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

<b>Trimester, Year:</b> Y3S3	<b>Study week no.:</b> 12
<b>Student Name &amp; ID:</b> Leong Jia Xuan (17ACB01592)	
<b>Supervisor:</b> Ms. Lai Siew Cheng	
<b>Project Title:</b> Wedding Planner Application Using Augmented Reality	

### 1. WORK DONE

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

- Finish developing the guest list management module.
- Implement the edit profile and app review functions under settings page.
- Complete the development of whole application.

### 2. WORK TO BE DONE

- Complete the project's documentation which is the report writing part.

### 3. PROBLEMS ENCOUNTERED

- No problem encountered in the last fortnight.

### 4. SELF EVALUATION OF THE PROGRESS

- The progress of system development is fair but have to speed up the progress of report writing.

Supervisor's signature

Student's signature

# Appendix B Poster

**UTAR** Bachelor of Computer Science (HONS)  
Faculty of Information and Communication Technology

## WEDDING PLANNER APPLICATION USING AUGMENTED REALITY

STUDENT: LEONG JIA XUAN | SUPERVISOR: LAI SIEW CHENG

### INTRODUCTION

- Native mobile application built for Android platform that provides basic wedding planning functions and virtual venue design feature using Augmented Reality (AR) technology.

### METHODOLOGY

- Agile Software Development approach  
Plan → Build → Launch → Feedback
- Development Tools

### APP OVERVIEW

- Account Management Module
- Countdown Module
- Checklist Management Module
- Budget Management Module
- Guest List Management Module
- AR Venue Design Module

### FINAL OUTCOME

#### COUNTDOWN INTERFACE

CountDown

Chloe & Sam  
22 / 08 / 2021

130 days 06 hours 28 mins 21 secs

#### AR VENUE DESIGN FEATURE

AR Venue Design Feature

# Appendix C Plagiarism Check Result

The screenshot shows the Turnitin Feedback Studio interface. On the left, the 'ABSTRACT' section contains the following text:

This project is intended to develop a wedding planner application with integrated Augmented Reality (AR) technology. The main purpose of developing this mobile app called "WedDream" is to realise people's dream wedding by providing them with a number of functional features. Before defining the project scope and requirements, several applications like The Big Day, LadyMarry and MyWed that available in the market are selected to be studied. This action contributes into the inspiration and motivation of WedDream app. In order to improve the performance of existing wedding planner applications, this project has merged the basic planning features and AR venue design function into a single application. The fundamental modules implemented is including the checklist, budget, guest list and countdown features. To develop an interactive and practical application, Agile Software Development approach is adopted due to its effectiveness in coping with the frequent changing demands. In this project, Android Studio is chosen to build the framework of mobile app and other functional modules by using Java language. Nevertheless, the AR venue design module is being developed with Unity game engine along with AR Foundation framework and ARCore Extensions package which supports the AR functionality. In addition, the core language for implementing AR technology is C# programming language. As a result, this project is believed to assist users in planning their big day and design a fantasy wedding venue according to their desired style.

On the right, the 'Match Overview' panel displays a similarity score of 4%. Below the score is a list of 8 matches, each with a rank, source, and similarity percentage:

Rank	Source	Similarity
1	Submitted to Segi Univ... Student Paper	<1%
2	www.makeuseof.com Internet Source	<1%
3	Submitted to SAE Instit... Student Paper	<1%
4	scholarworks.rit.edu Internet Source	<1%
5	Submitted to University... Student Paper	<1%
6	Submitted to University... Student Paper	<1%
7	Submitted to Central Q... Student Paper	<1%
8	Submitted to University... Student Paper	<1%

Rank	Source	Similarity
1	Submitted to Segi Univ... Student Paper	<1%
2	www.makeuseof.com Internet Source	<1%
3	Submitted to SAE Instit... Student Paper	<1%
4	scholarworks.rit.edu Internet Source	<1%
5	Submitted to University... Student Paper	<1%
6	Submitted to University... Student Paper	<1%
7	Submitted to Central Q... Student Paper	<1%
8	Submitted to University... Student Paper	<1%
9	Submitted to Anglia Ru... Student Paper	<1%
10	Submitted to INTI Inter... Student Paper	<1%

Rank	Source	Similarity
11	Submitted to University... Student Paper	<1%
12	Submitted to BPP Colle... Student Paper	<1%
13	Submitted to The Unive... Student Paper	<1%
14	Submitted to City Unive... Student Paper	<1%
15	Submitted to University... Student Paper	<1%
16	Submitted to Grenoble ... Student Paper	<1%
17	Submitted to Universiti ... Student Paper	<1%
18	Submitted to Universiti ... Student Paper	<1%
19	library.binus.ac.id Internet Source	<1%
20	network.bepress.com Internet Source	<1%

Rank	Source	Similarity
20	network.bepress.com Internet Source	<1%
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## APPENDIX C PLAGIARISM CHECK RESULT

Turnitin  
Originality Report

Processed on: 14-Apr-2021 23:02 +08  
ID: 1559072011  
Word Count: 11571  
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FYP Report 2  
By Leong Jia Xuan

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ABSTRACT This project is intended to develop a wedding planner application with integrated Augmented Reality (AR) technology. The main purpose of developing this mobile app called "WedDream" is to realise people's dream wedding by providing them with a number of functional features. Before defining the project scope and requirements, several applications like The Big Day, LadyMarry and MyWed that available in the market are selected to be studied. This action contributes into the inspiration and motivation of WedDream app. In order to improve the performance of existing wedding planner applications, this project has merged the basic planning features and AR venue design function into a single application. The fundamental modules implemented is including the checklist, budget, guest list and countdown features. To develop an interactive and practical application, Agile Software Development approach is adopted due to its effectiveness in coping with the frequent changing demands. In this project, Android Studio is chosen to build the framework of mobile app and other functional modules by using Java language. Nevertheless, the AR venue design module is being developed with Unity game engine along with AR Foundation framework and ARCore Extensions package which supports the AR functionality. In addition, the core language for implementing AR technology is C# programming language. As a result, this project is believed to assist users in planning their big day and design a fantasy wedding venue according to their desired style.

Chapter 1 Introduction 1.1 Problem Statement This project is 22

- < 1% match (student papers from 29-Nov-2020)  
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<b>Universiti Tunku Abdul Rahman</b>			
<b>Form Title : Supervisor's Comments on Originality Report Generated by Turnitin for Submission of Final Year Project Report (for Undergraduate Programmes)</b>			
Form Number: FM-IAD-005	Rev No.: 0	Effective Date: 01/10/2013	Page No.: 1 of 1



**FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY**

<b>Full Name(s) of Candidate(s)</b>	LEONG JIA XUAN
<b>ID Number(s)</b>	17ACB01592
<b>Programme / Course</b>	BACHELOR OF COMPUTER SCIENCE (HONOURS)
<b>Title of Final Year Project</b>	WEDDING PLANNER APPLICATION USING AUGMENTED REALITY

<b>Similarity</b>	<b>Supervisor's Comments (Compulsory if parameters of originality exceeds the limits approved by UTAR)</b>
<b>Overall similarity index:</b> <u>  4  </u> %  <b>Similarity by source</b> Internet Sources: <u>  2  </u> % Publications: <u>  0  </u> % Student Papers: <u>  3  </u> %	
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<b>Parameters of originality required and limits approved by UTAR are as Follows:</b> (i) Overall similarity index is 20% and below, and (ii) Matching of individual sources listed must be less than 3% each, and (iii) Matching texts in continuous block must not exceed 8 words <i>Note: Parameters (i) – (ii) shall exclude quotes, bibliography and text matches which are less than 8 words.</i>	

Note Supervisor/Candidate(s) is/are required to provide softcopy of full set of the originality report to Faculty/Institute

*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.*

*Lai*

\_\_\_\_\_  
Signature of Supervisor

Name: Lai Siew Cheng

Date: 16/4/2021

\_\_\_\_\_  
Signature of Co-Supervisor

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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
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#### CHECKLIST FOR FYP2 THESIS SUBMISSION

Student Id	17ACB01592
Student Name	LEONG JIA XUAN
Supervisor Name	TS LAI SIEW CHENG

TICK (✓)	DOCUMENT ITEMS
	Your report must include all the items below. Put a tick on the left column after you have checked your report with respect to the corresponding item.
✓	Front Cover
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✓	Abstract
✓	Table of Contents
✓	List of Figures (if applicable)
✓	List of Tables (if applicable)
✓	List of Symbols (if applicable)
✓	List of Abbreviations (if applicable)
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<p>I, the author, have checked and confirmed all the items listed in the table are included in my report.</p> <p style="text-align: center;"></p> <p>(Signature of Student) Date: 14/04/2021</p>	<p>Supervisor verification. Report with incorrect format can get 5 mark (1 grade) reduction.</p> <p style="text-align: center;"></p> <p>(Signature of Supervisor) Date: 16/4/2021</p>
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