QUEST AI GAME

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Introduction

With the continued growth of mobile gaming, developers are left to produce games that capture all aspects of our imagination. It however requires a unique gaming experience to keep users interested in the game. Creating a game has been an interest of mine especially since I have noticed on numerous occasions getting disappointed with the games I play. Some games are too hard, or some just make me lose interest. It takes a very unique game to capture the interest of our generation.

1.1 Aims and Motivation

The aim of this project is to utilise all the skills and techniques I have learnt in various modules of my degree. Having learnt several gaming techniques I wanted to create a game which would be both amusing and challenging. I have found that many games don't capture the user for long periods of time and to create a successful game it is essential that the user is felt challenged and is enjoying their time. QuestAI was created to change the gaming experience. It does this by creating a unique gaming world, where the user is left to wander through the interchanging platforms which form a maze.

1.2 The Project and Required Tools

The implementation of QuestAI will need to be split into two phases with the aim of having a full working game.

For the front end of my project I 'd need to create my world and characters to do this I'd need to use applications like Unity or Android Studio as they're the main platforms people use to create mobile games. Using these platforms would help me to integrate different features into my gameplay while using C# as my main language to implement the feature

1.2.1 Techniques

List of technical that might be explored as part of the project.

- Game AI: This module helped me to understand how to create an AI which could be useful when creating a maze game and want an AI enemy to follow the user or shoot them.
- Data visualisation and the web

- 3D virtual environments and animation: This module helped me to understand how to use Unity and learning how to create 3D World which would be useful for my platforms.
- Using diagrams such as UML to get a better understanding about the app.
- Using GitLab to manage the data.

1.3 Section Overview

Chapter 2 – This chapter will show a background research I done before creating my game. I will look at existing games and define my objectives of the project.

Chapter 3 – This chapter will focus on the system diagrams and prototypes.

Chapter 4 – This chapter shows the implementation of my game.

Chapter 5 – This chapter involves the testing of my project.

Chapter 6 – This chapter concludes the project. I talk about the System success, failures and also a self-evaluation.

Chapter 7 – This chapter includes the bibliography.

Chapter 2

Background Research

This chapter deals with the work that is needed before I start designing and implementing my application. I also reflect on the tools that I intend on using and explain why any can't be used for this project if that is the case.

2.1 Motivation and Justification

I have always respected the work of indie developers. Their work has always been so unique and of a different calibre of what is available on the marketplace. This was the main reason and motivation for my project. I want to use my creativity and skills to create a game that shows both my talent and capability of my coding knowledge.

Living in a world where technology has become so advanced, it is very easy to fall into the high-tech mindset. Mobile devices are now being used more frequently by the younger generation with ages going to as low as 4 and 5. With games being at the forefront of these young kids, it is inevitable that they will be demanding games of more value and interest and a more enjoyable experience. It is vital that any game I do decide to create will be suitable for both children and young adults.

2.2 Existing Systems

Looking at both the Apple Store and the Google Play store, multiple games are being developed and downloaded but do not capture a good gaming experience for the users. This was clearly identified by reading the reviews and ratings of the game.
As I am intending to create a game for the indie market, I thought it was good to download and play a number of them. I highlighted both good and bad features during the game play.

2.2.1 Monument Valley

Monument Valley is an indie puzzle game that is developed for iOS. It's a very creative game where the user has control over princess Ida and helps navigate through the maze of optical illusions to fulfil the quest. Throughout the game the user is presented with various puzzles whilst showing beautiful scenes. This game has seen a lot of good reviews and many people have enjoyed this game for both themselves and their kids. One downside for this game is that firstly there is a charge to play. And secondly, after completing a certain number of levels, the user must purchase additional levels in order to carry on. This can cause the user to not enjoy the game play as much.

2.2.2 Rise Up

Another game that inspires my project is Rise-Up which is an android game, where the user controls a shield to prevent the balloon from popping. This app is a simple but a time-consuming game which makes the user experience great, every level is more complex and harder, by making the objects move a certain speed to try hitting the balloon. This was a very different game I had come across as I was unable to predict what scenario I would have to face next, which really got me interested and hooked on the game.

2.2.3 Super Mario Run

Super Mario is one of the most played games due to its popularity and age. It is a simple yet effective game and mostly everyone of various ages can enjoy the gameplay. The game works by allowing the user to control the character. Tapping the screen makes Mario run forward. It is up to the user to choose what objects to use when playing the game to collect coins.

2.2.4 Sonic Dash 2: Sonic Boom

Sonic is also a very popular game on the market. This game involves the user being able to choose a character. The character runs on a track to collect coins on each level. Whilst on the track the character faces various obstacles and can also benefit from the special powers. This is a thrilling game and the reviews support this. The colours and detail also make the game have a special edge.

2.2.4 Helix Jump

Helix Jump is a mobile game where the user guides a ball through a tower, by rotating the tower so it fit through the gap and dodge hitting a coloured block.

2.2.4 Uno

Uno online is a mobile card game that allows the user to play with other people and the goal is to get rid of your card before your opponents. This game could be useful by creating a game that allows the user to play with his friends/family.

2.3 Focus Group

Before I started creating my game, I wanted to get some feedback so I decided to talk to a few selections of my target audience I talked about potential game ideas and listened to their feedback and listed what was good and what was not.

Good Idea	Bad Idea
Making a puzzle game that allows the platform to move make the game more interesting which could be a good feature for the project.	Making a game where the character runs on a track and collect coins on a quest has been done like Sonic Dash this could be the type of game to be made.
Allowing the enemy to shoot while the platform is moving could be a good feature for the project.	
Changing the player by making a coin shop so the user could buy different outfits or other characters for your game	
Changing some platform colours once the user hit a button.	
Make a game that allows the user to play with other users (Bluetooth connection, WIFI connection)	

2.4 Technology Research

I began using android studio which is a script-based application. I wanted to see if this would be a better option to create my game however I was having some problems loading the project. this lead to be very time consuming so I decided to use Unity. Unity breaks down the coding experience by allowing you to use scripts to create the game which also provides with templates for games which was a helpful feature in learning techniques to develop my game.

For user testing, I had to use Unity Remote 5 application on my mobile phone, which enabled me to connect to Unity remotely so that I could watch it live to see if the game works on my phone, and I also tried it on different devices to see if I would have any problem with screen resolution or other bugs.

I also implement C # scripts for my user movement and platform rotation for my game as Unity mainly uses scripts to attach it to the scene's GameObject in order to work. It was difficult to go through this process because I didn't use C# language before, so I had to do some research on this coding process.

2.5 Project Aims and Objectives

This project consists of integrating one main component to create an effective, functioning game. The main component would be responsible for displaying the game on the device and ensuring that the input function works, allowing the user to control the game character.

2.5.1 App Front End Aims

The front end will be responsible for displaying our game visually across various devices. We want to make sure after using the app, that the user is satisfied. Its main objectives are:

- Allow easy navigation throughout using the app.
- Making the character move while playing the game.
- Ensuring that each level work.
- Making sure that the platforms move when touching a trigger.

2.5.2 App Back End Aims

The back end will be responsible for creating the game function. Its main objectives are:

- Making the character move while playing the game.
- Ensuring that each level work when going to the end of the platform.
- Making sure that the platforms move when touching a trigger.
- Making sure that the user can’t drop off the platform.

Chapter 3

System Design

It is essential that before starting to code a game, a thorough design process is carried out. The design process involves detailing each part of the proposed system and will also demonstrate what features are required in order for the game to work as expected. This section will define each requirement and also display these requirements and design features with the use of various diagrams.

3.1 System requirements

It was vital that before creating our game, our requirements were split into more small and controllable tasks. I decided to split my requirements in to a functional and non-functional category. These tasks now describe what my game should do and how my game will work.

3.1.1 Functional Requirements

Functional requirements describe what our game should do:

- The user should be able to interact with the character
- The user should be able to progress in the game
- When the character stands on the platform button, the platform should change direction.
- When the character hits a wall, they should not be able to go forward

3.1.2 Non-Functional Requirements

Non-Functional requirements describe how our game should work:

- When the user completes a level, the character should move to another level
- When the level is complete, the next level should load within 3 seconds.
- The game should run smoothly without any crashes
- The game should not lag

3.2 System Diagrams

For my project designing the system seems to have been a good approach. This was purely because the game had several features that worked with another.

Thus, the creation of an object diagram made it easier to understand which part is connected and this was useful to programme the game.

3.2.1 User Case Diagram

Use case diagrams are widely linked to a behaviour diagrams used to describe the process (use cases) that some system or protocols (subject) should do and the method defining how the goal is reached.

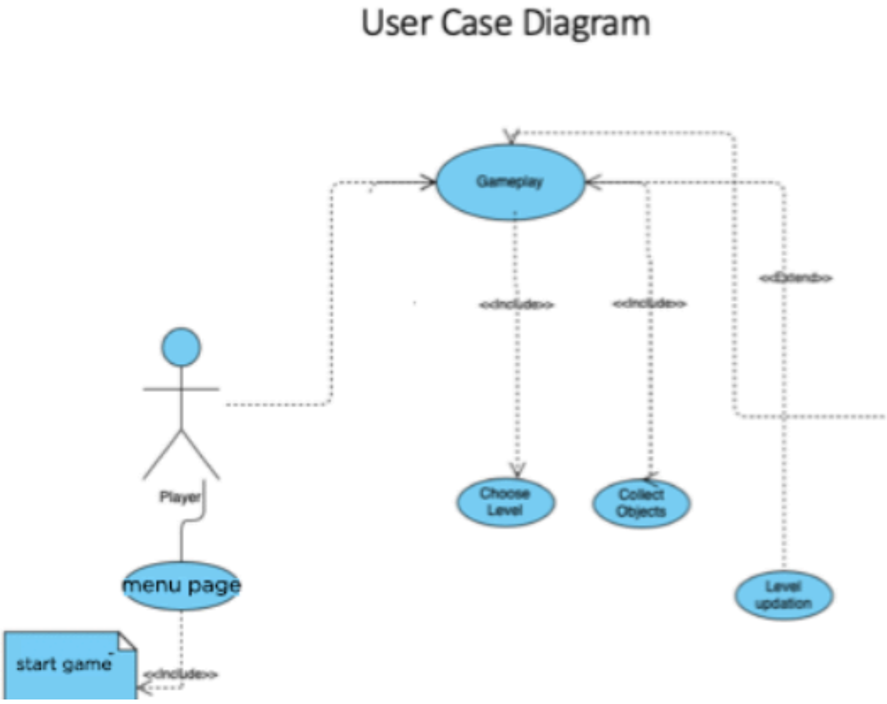


Figure 1 Use Case diagram

As you can see in Figure 1 it shows that the user is firstly presented with 2 options, either view the menu or start the gameplay. On the Gameplay section you can see that it allows the user trigger object by moving platforms or collecting object and once the user is completed with the level it will update and go to the next level.

3.2.2 Sequence Diagram

A sequence diagram shows interactions between objects arranged in sequence of time. It shows the objects and classes involved in the scenario, and the sequence of messages exchanged between the objects needed to perform the scenario 's functionality.

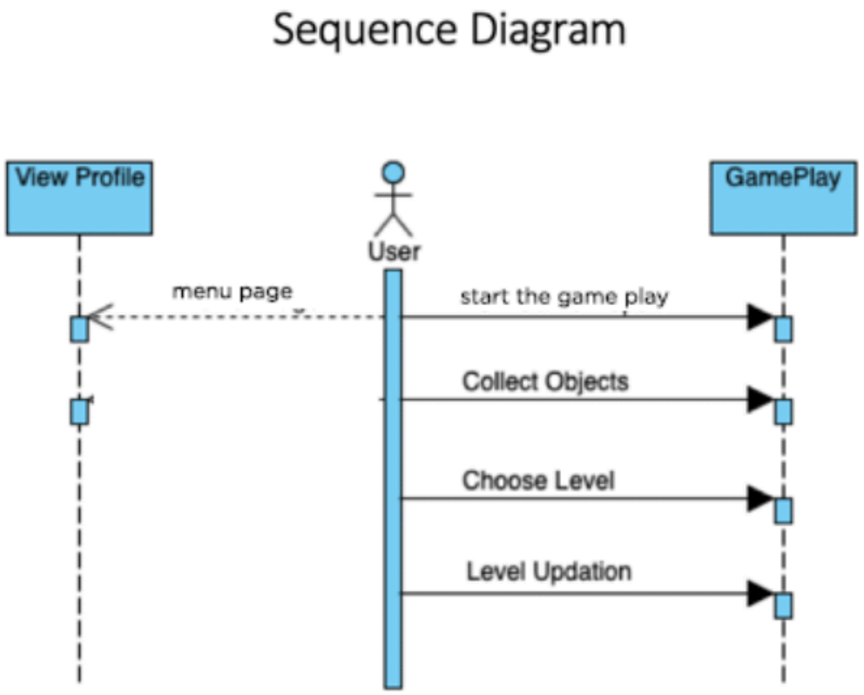


Figure 2 Sequence Diagram

As can be seen in Figure 2 it shows that 2 options are presented to the user, either view the menu or start the gameplay. On the Gameplay section you can see that by moving platforms or collecting object it allows the user to trigger object, and once the user has completed the level it will update and go to the next level.

3.3 Designs

Before I decided to start coding, I thought it would be useful to plan out exactly how I wanted my game to look. I created 3 design and then showed it to my focus group and got a lot of feedback.

3.3.1 Prototype

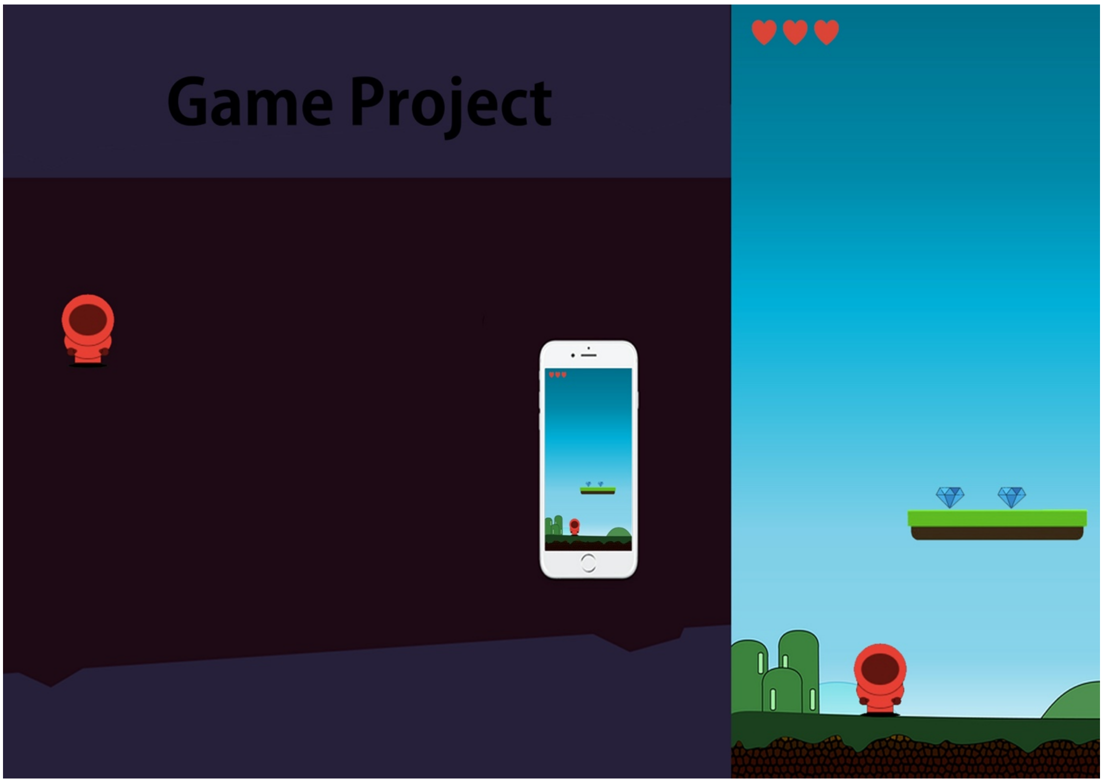


Figure 3 prototype 1

I created a Mario based game for my first prototype where the character goes around each level and collects objects like diamonds that are going to be on different platforms so it's hard for the user to collect them. I also added a live bar as I wanted to add enemies to my prototype as they are going to try to kill the user by shooting at him.

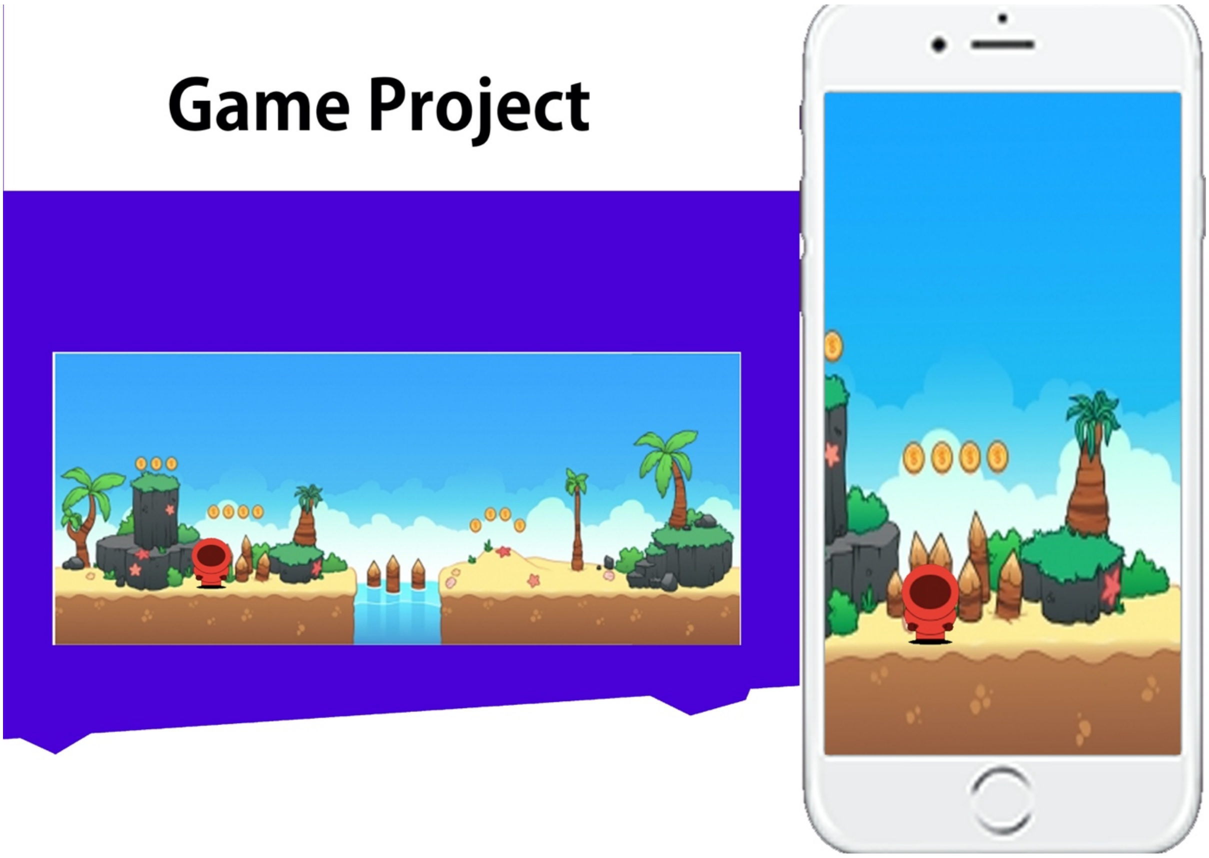
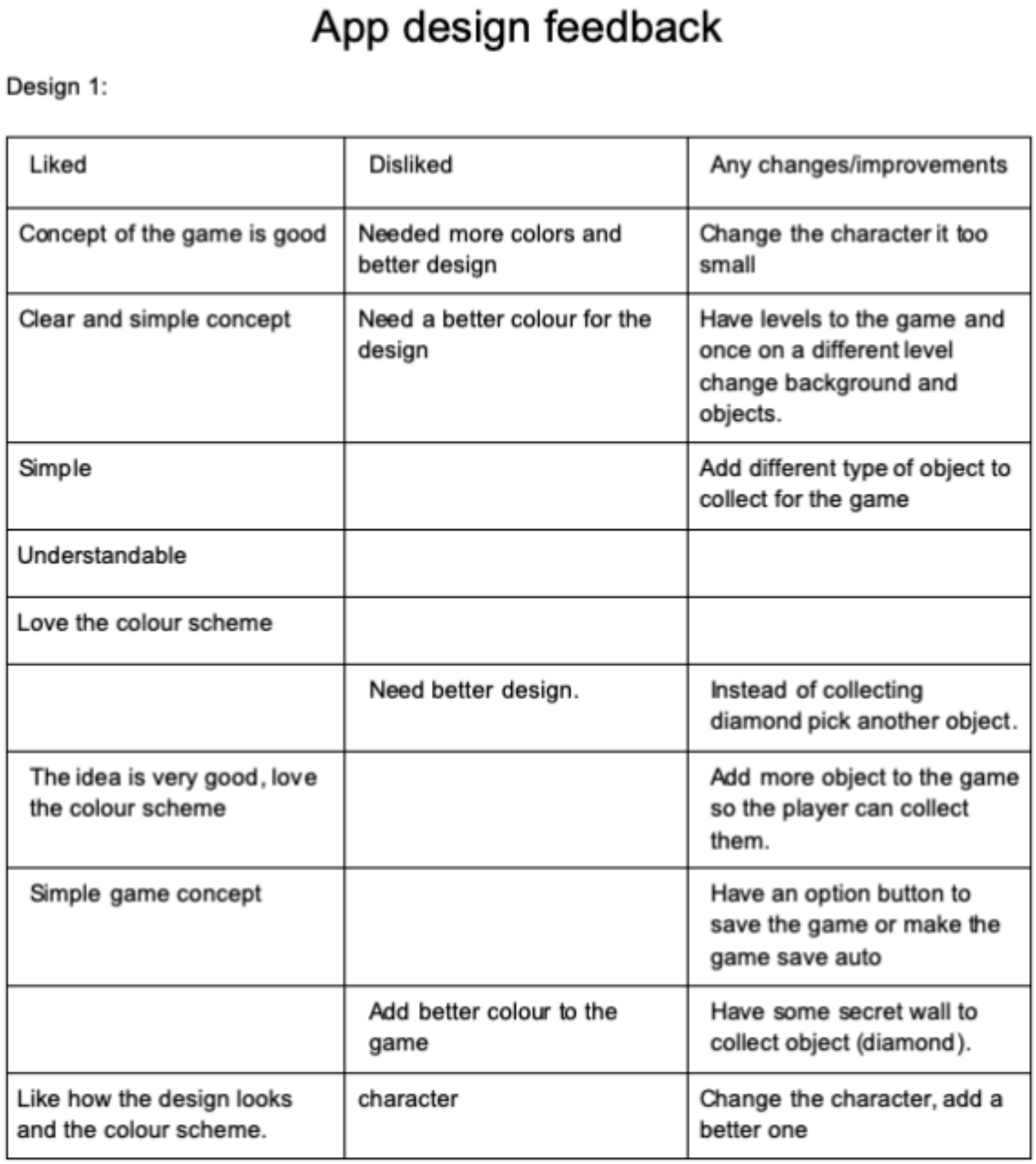


Figure 4 prototype 2

I created a mobile platform game for my second prototype where the user could move around the game and has to collect objects like coins, some of the object is in a hidden layer that makes it difficult for the user to find it and it will be timed. The faster you pick up the object and finish the better you get a better score.

3.3.2 App Design Feedback

I wanted to get some feedback from my focus group about the two prototypes before I started my final prototype as you can see below that is the feedback I got from them.



App design feedback

Design 1:

Liked	Disliked	Any changes/improvements
Concept of the game is good	Needed more colors and better design	Change the character it too small
Clear and simple concept	Need a better colour for the design	Have levels to the game and once on a different level change background and objects.
Simple		Add different type of object to collect for the game
Understandable		
Love the colour scheme		
	Need better design.	Instead of collecting diamond pick another object.
The idea is very good, love the colour scheme		Add more object to the game so the player can collect them.
Simple game concept		Have an option button to save the game or make the game save auto
	Add better colour to the game	Have some secret wall to collect object (diamond).
Like how the design looks and the colour scheme.	character	Change the character, add a better one

Figure 5 app design feedback

3.3.2 Final Prototype

I wanted to think of a better idea for my final prototype as my two prototypes didn't get that much good feedback so after talking to my focus group I wanted to make a game that would make it harder for the user to get out of the maze as the platforms moves whiles going through the maze.

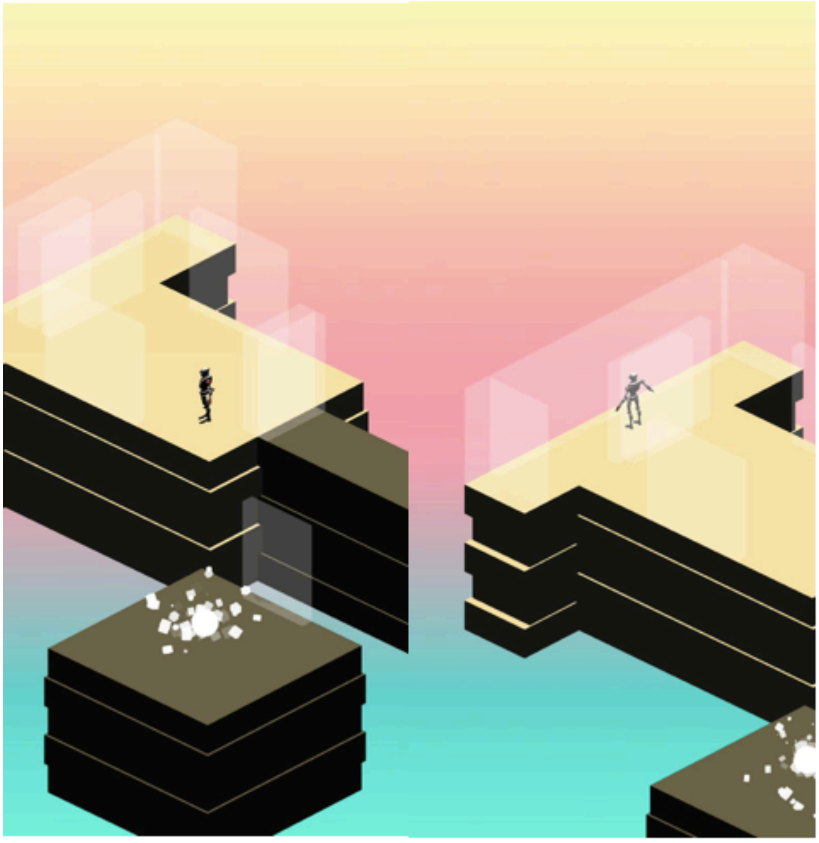


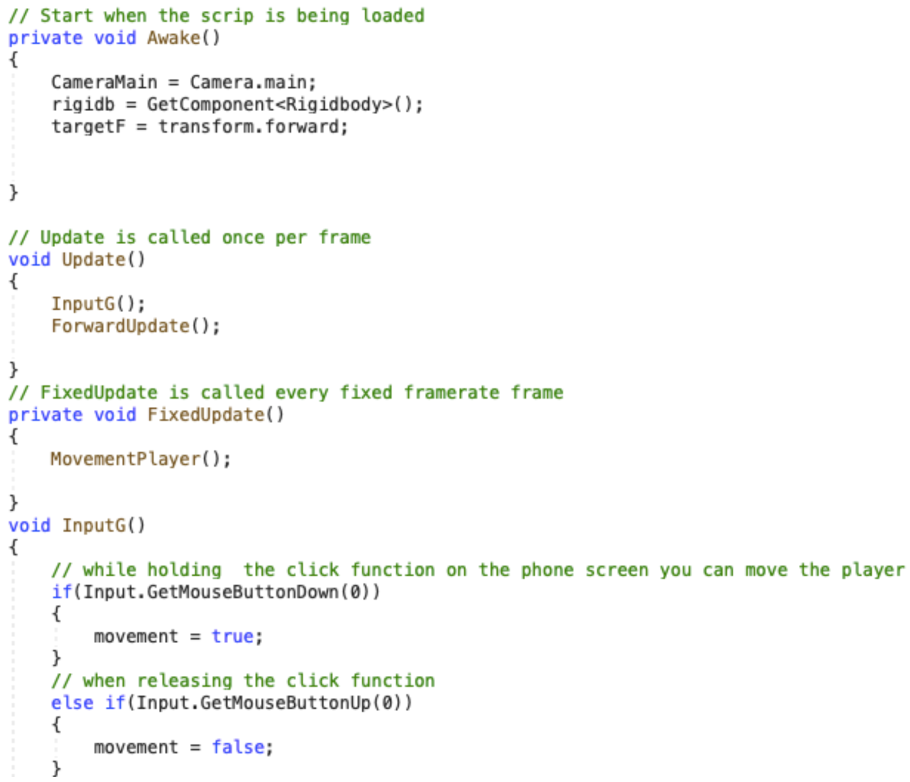
Figure 6 final prototype

Chapter 4
Implementation

This chapter addresses the implementation of my code by reflecting on which tools and scripts I used to make this game and explaining what each code does.

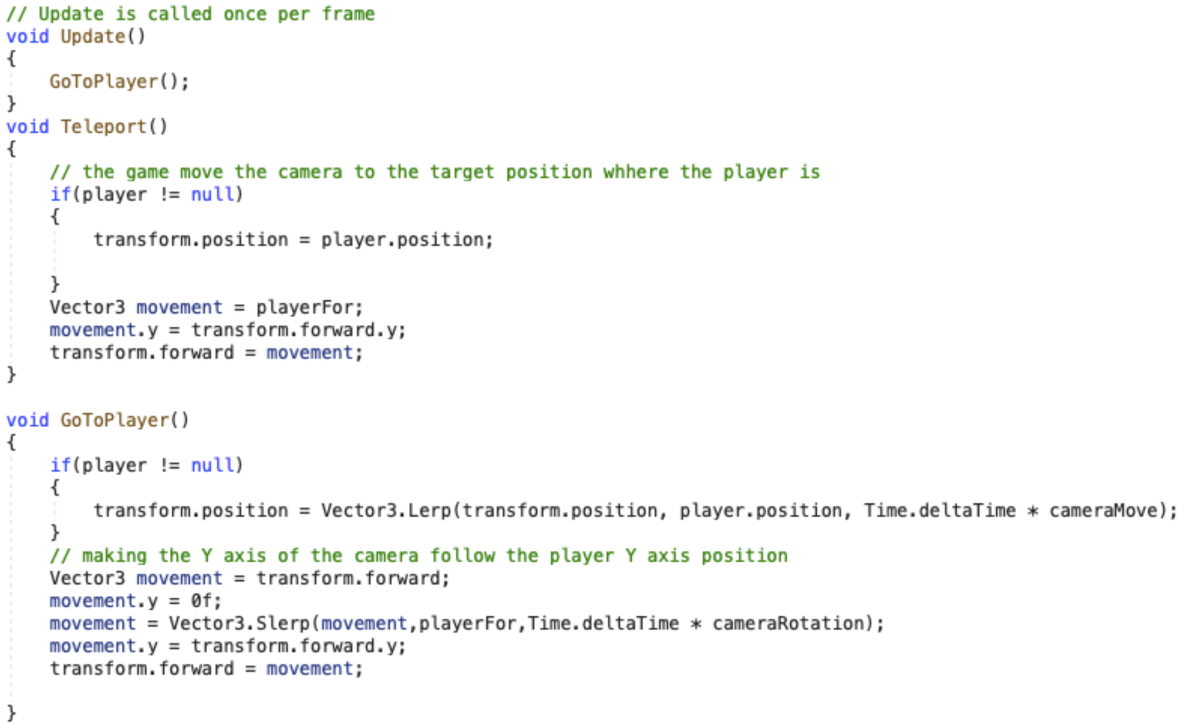
4.1 Implemented Character Movement

I needed a moving character for my project where the user could control it, using C # script you can see that I created 4 void method where the method of void awake is used when the game is running. For the void InputG method you can see how the character will move around the platform once the user presses and moves their finger on the phone.



```
// Start when the scrip is being loaded
private void Awake()
{
    CameraMain = Camera.main;
    rigidb = GetComponent<Rigidbody>();
    targetF = transform.forward;


}

// Update is called once per frame
void Update()
{
    InputG();
    ForwardUpdate();

}
// FixedUpdate is called every fixed framerate frame
private void FixedUpdate()
{
    MovementPlayer();

}
void InputG()
{
    // while holding  the click function on the phone screen you can move the player
    if(Input.GetMouseButtonDown(0))
    {
        movement = true;
    }
    // when releasing the click function
    else if(Input.GetMouseButtonUp(0))
    {
        movement = false;
    }
```

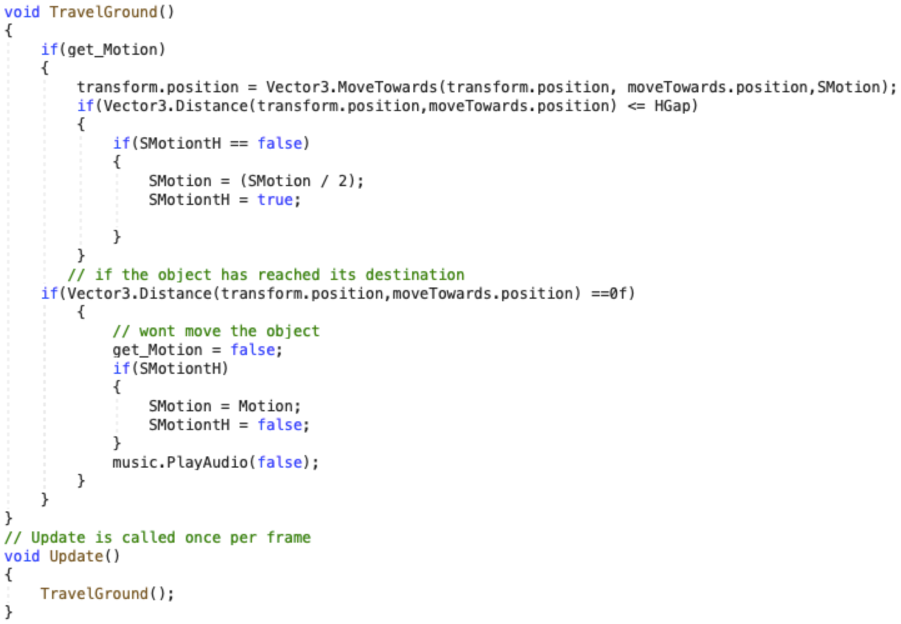
For the user to move the character he need to be able to see the robot. As you can see below I created three void method which is used for making the camera follow the robot whiles moving around the platform. You can see on the void teleport method that game object should be followed by the target position if not the object won’t work.



```
// Update is called once per frame
void Update()
{
    GoToPlayer();
}
void Teleport()
{
    // the game move the camera to the target position whhere the player is
    if(player != null)
    {
        transform.position = player.position;

    }
    Vector3 movement = playerFor;
    movement.y = transform.forward.y;
    transform.forward = movement;
}

void GoToPlayer()
{
    if(player != null)
    {
        transform.position = Vector3.Lerp(transform.position, player.position, Time.deltaTime * cameraMove);
    }
    // making the Y axis of the camera follow the player Y axis position
    Vector3 movement = transform.forward;
    movement.y = 0f;
    movement = Vector3.Slerp(movement,playerFor,Time.deltaTime * cameraRotation);
    movement.y = transform.forward.y;
    transform.forward = movement;

}
```

4.2 Implemented Platform Movement

I wanted to make my platform move for my game once the user is close to the platform or when the platform changes when it collides with a button. This is a useful tool to use for a puzzle game as it is more difficult for the user to reach the end of the maze. The TravelGround method is used to work out the position of the platform and making it move smoothly to the end stop. The end stop is an object that goes along with the platform, but there will also be a timer method that will allow the platform to move away at a certain time.



```
void TravelGround()
{
    if(get_Motion)
    {
        transform.position = Vector3.MoveTowards(transform.position, moveTowards.position,SMotion);
        if(Vector3.Distance(transform.position,moveTowards.position) <= HGap)
        {
            if(SMotiontH == false)
            {
                SMotion = (SMotion / 2);
                SMotiontH = true;

            }
        }
       // if the object has reached its destination
    if(Vector3.Distance(transform.position,moveTowards.position) ==0f)
        {
            // wont move the object
            get_Motion = false;
            if(SMotiontH)
            {
                SMotion = Motion;
                SMotiontH = false;
            }
            music.PlayAudio(false);
        }
    }
}
// Update is called once per frame
void Update()
{
    TravelGround();
}
```

Chapter 5
Testing

For my project there was three test phases that was applied, White Box testing during system implementation development, Black Box testing and post-implementation user testing.

5.1 White Box

White Box is a program management method that analyses whether the internal structure and implementation programmes function properly and are performing properly. Therefore, the tester is familiar with white box testing of programme implementation. White box testing is conducted throughout development of the system.

The table below shows the main function of my application that are being tested

Function/ Components	Input	Outcome	Pass /Fail
RobotMovement() movementSpeed	Allow the developer to change the speed of the character	It allows the developer to increase the movement of the character when it being dragged.	PASS
FloorAudio() Background Audio Source	Allows music to be played once the game starts.	It allows music to be played once the game starts.	PASS
RobotMovement() Animation & Animator	Make the player have an animation when moving.	The user can move the character but don't have any animation	FAIL
FloorAudio() Movement Audio	Making a movement audio when the player moves	It plays the sound when the player is moving	PASS
MovingPI() Rotating Platform	Set up x,y,z axis value so the platform can rotate	Changing the y value of the platform so it can rotate 180 angle	PASS

MovingPI() Rotating Platform timer	Setting up a timer when the platform rotates	set up a timer when the platform rotates	PASS
MotionFloor() Move towards	Move the platform towards an object	Move the platform towards an object	PASS
MotionFloor() Move towards timer	Setting up a time for the platform to move off	Setting up a time for the platform to move off	PASS

5.2 Black Box

Black Box Testing is an app-tested method which does not analyse a programme's internal structure / implementation as to whether the process is operating properly. Therefore, the tester requires no coding skills or system knowledge to test the program. Unlike the White Box Testing, the Black Box test is carried just after software development and mainly focuses on the overall system itself rather than individual programme pieces.

Explanation	Expected Outcome	Process	Actual Outcome	Pass /Fail
Test to see if the character is able to move around the platform	When the user touches the screen, the character should move	For this process the user needs to move his hand around the screen to move the character	When the user touches the screen, the character should move	PASS
Test to see if audio works when playing the game	the background music should be playing when the game starts.	For this process the user needs to play the game and not be on the home screen.	the background music should be playing when the game starts.	PASS
Test to see if the character get an animation while moving it around	Should have an animation when the user moving the character	Need to use the animation and animator sector to create an animation then link it to the object(character) .	The animation didn't work for when the user moves the character	FAIL
Testing to see if the platform can rotate	Making the platform Rotate when the user triggers a button on a platform	Once the player go hit the button the platform should rotate in a certain angle	Making the platform Rotate when the user triggers a button on a platform	PASS

5.3 User Testing

User Testing is often used to guide of understanding of the system recognition to get a better understanding of system acceptance. User test feedback will be used to enhance performance, design problems, and user experience in future developments or feature enhancements before the app is marketed on different platforms such as Apple Store and the Google Play store.

As Covid 19 started in the user testing process, I was unable to get feedback from any user testing. Since I wanted five candidates to run the game in a small room that would have been more beneficial to me because I wanted to get feedback face to face.

Chapter 6
Conclusion

This chapter will examine the methods of success, failures and future developments for my project QuestAI. Additionally, the chapter would also give a brief knowledge and experience acquired from this module.

6.1 System Success

Overall evaluation of my project shows it a somewhat a success, I have met most of initial requirement and I have competed the task that was required for this project. I did get a lot of feedback at the start of my project with my focus group. Also, I made sure that the system would work on different android devices.

6.2 System Failure

If I had gained a better way for user testing, I would have improved my game by getting feedback verbally, but since we were in the 19 stages of Covid, I couldn't get candidates to run the game.

6.3 Future Developments

QuestAI as a finished application is not quite ready to be released on the Apple Store or the Google Play store. The game overall design is stable. Most important components are all in place. New advanced elements can be added to satisfy any further specifications that could occur in the future such as adding enemy that to the world that could hurt the user or use trigger to change the colour of the platforms.

6.4 Self-Evaluation

I managed to create a sable and complex indie game for this project on my own. I would have needed help to make a project in the past but making this project gave me a better understanding and gained knowledge of C#. It was difficult to learn how to create 3D modules from scratch in Unity, non the less this project was very enjoyable experience. It has allowed me to improve on my problem-solving skills, self-reliant
learn new skills.

Chapter 7

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