

Project on Knowledge Products Development

CCIT4080

Final Report

Group 1

Mobile application for entertainment:

Uncivil Arboretum

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A. Executive summary

We started the project ‘Uncivil Arboretum’ because we observed that people dislike ‘uncivil’ behaviours, such as being noisy in public, littering and some other actions. So, we decided to create a game in which citizens can have fun and reflect about those impolite behaviours.

After setting the theme and the style we are going to do, we started designing different objects, such as background, sprites and user interface. After the designing parts, we start building the scripts and the user interface, and try to interact with each other. Finally, with many debugging processes, the game is done.

The benefits Uncivil Arboretum can give are numerous. For example, you can get enjoyment from the game as planting and harvesting with visible income provides the feeling of gaining achievements , and users can spend their spare time on it. Moreover, the major benefit of this game is that the game can let people reflect about the uncivil activities in daily life, thinking more about whether they are right or not, and what can be done to prevent those actions from happening.

Finally, the Uncivil Arboretum has many special features. One of the features is that, we build our original characters by ourselves, they are all in pixel style and will not be found on the Internet. Moreover, in this game, players are in fact the villains to the society as helping ‘uncivil’ plants is equal to supporting impolite actions, so users may gain some strange satisfactions that is not moral in real life.

B. Introduction

a. The background

Uncivil behaviour mainly means showing a lack of respect for others and positioning oneself over others. The different types of uncivil behaviour could be encountered anywhere in society. For example, littering on the street, talking loudly in quiet places and using growling devices in the theatre. Those behaviours were disliked by most of the citizens. However, normal citizens would not take revenge according to their morals. The uncivil behaviour would be normalised while it conducts continuously, also the normal citizens would follow the rude behaviour and tend to be uncivilised people. The uncivilised people could not realise their mistakes because of a lack of criticism. In the end, it would be a vicious loop according to the actions and the events that occurred above. We aim to release the stress created in daily life and bring a chill atmosphere for players. The game is mainly delivered to the people who are being trapped and annoyed by the uncivilised people. Before developing the game, we researched on the internet for some inspiration. The concept and the atmosphere brought by the Idle game matched the target for our project.

b. The problems

We start to think about how to develop the game after we come up with the ideas, however, several questions pop up into our mind. We are highly concerned about the gaming experience after playing the game and what player could be rewarded from the game. Our ideal outcome from this game is to stop the vicious circle, obviously the problem would not be simply tackled through this game. Therefore, we tried to deal with the problem from the fundamentals - education and ameliorate the behaviour of uncivilised people; And release the stress from ordinary citizens. The quality of the game is also a point we worried about. Since all of us do not have a solid experience in developing games. In addition, we struggled to balance between interesting and the message deliverable.

c. The purpose of the project

Our group valued the message delivered to players and the game's experience. To maintain a multiversal target group for the project, we developed and thought on the different side about various perspectives. The target groups could simply be divided into 2 groups - moral citizens and uncivil citizens. Firstly, the moral citizens could be entertained and release stress after playing the game. Secondly, for the uncivilised people, we aim to provide an opportunity for reflecting on ourselves. In addition, we hope to reduce the initiatives to behave badly in the public after self-reflection. Since the game could attract a wild range of users and a high flexibility to create more original objects

C. The Team

a. Member and major task

After semester 2, we have completed the project. The duties and responsibilities are shown on the table below.

Role/Task	Chung Hing Yi, Karen	Ho Yee Ching, Stali	Lam Chi, Edwin (Group Leader)	Lam Chun Ngok, Anson
Development of menu				✓
Development of game body	✓		✓	
Development of AR		✓		
Integration of each parts	✓			
Background Story design			✓	
Adapt to Android	✓	✓	✓	✓
Graphic design	✓		✓	
Debugging	✓	✓	✓	✓
Research	✓	✓	✓	✓
Documentation	✓	✓	✓	✓
Report	✓	✓	✓	✓
Video recording	✓	✓	✓	✓

Table 1

D. The Project

a. Initiation & Planning

Name of the game

The name of our game is 'Uncivil Arboretum'. According to the Cambridge Dictionary, uncivil means lacking in courtesy and not civilized; And arboretum means the plants and trees. When we mention 'Plants', we could think about 'Benefits to humans' and 'Natural'. The other meaning of uncivil is not civilized and the alternative meaning of natural is also not civilized. It means Natural is equal to not civilized and uncivil. Moreover, the imagination of 'Plants' is beneficial to humans, but the image of the 'Plants' in the game is rude and not beneficial to players. The plants in the game have their own emotions and movements, they are also being rude to others.

Background Story

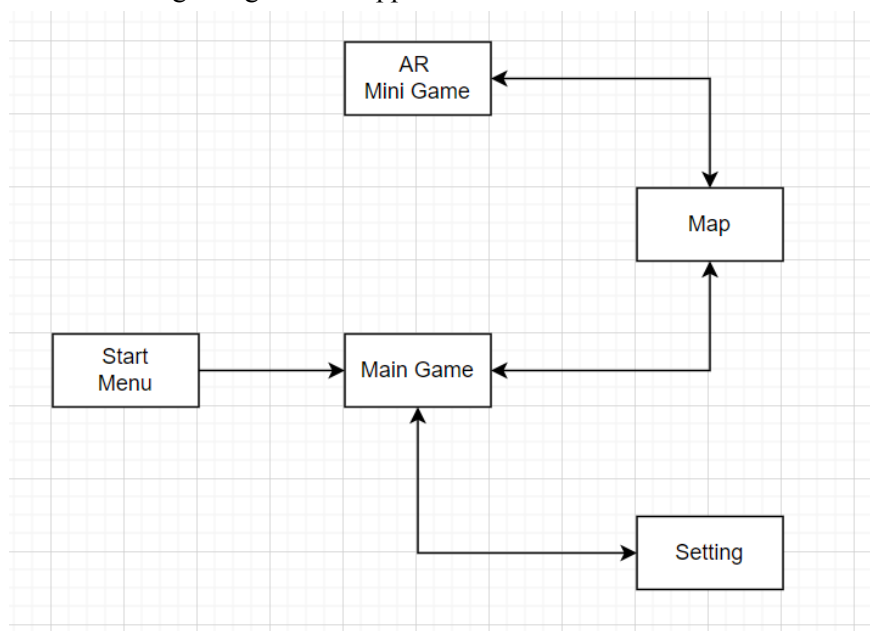
In 2422, people on Earth civilised everywhere on Earth. and the plants become extinct. However, A botanist has found some seeds from the fridge 2000 years ago. He realised that plants cannot survive in 2422 as they cannot protect themselves. He added the 'Uncivil' genes to the plants, and the plants start moving and act like uncivil humans. The botanist decides to help the plants, by keeping them planted and get 'Angry Point' (AP) to upgrade the devices.

Plants

Plants take time to grow up. However, a long duration for plants being in the pot, would turn into a good carrot which gives 0 AP and becomes useless. The plants could transfer into AP. The facilities could be upgraded and the new simulation background could be unlocked by using AP. Every new simulation background has a new background and plants.

App Plan

The basic design diagram the app was shown below:



b. Game Making

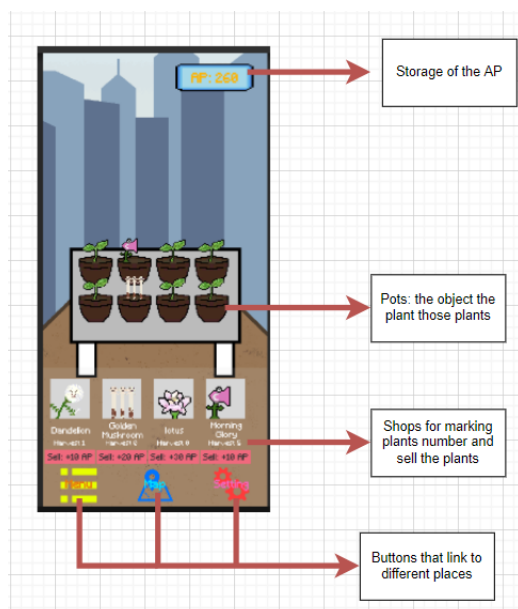
i. Game Body

Demonstration

The demonstration of the game is uploaded to this websites: https://youtu.be/bW5R_-T3KAU .It included how every part of the games works.

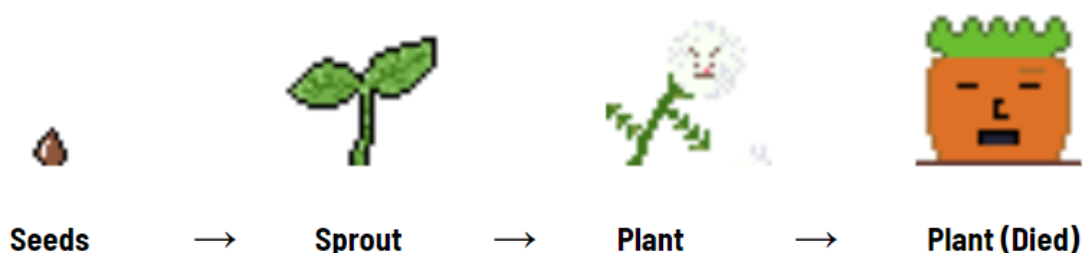
User Interface

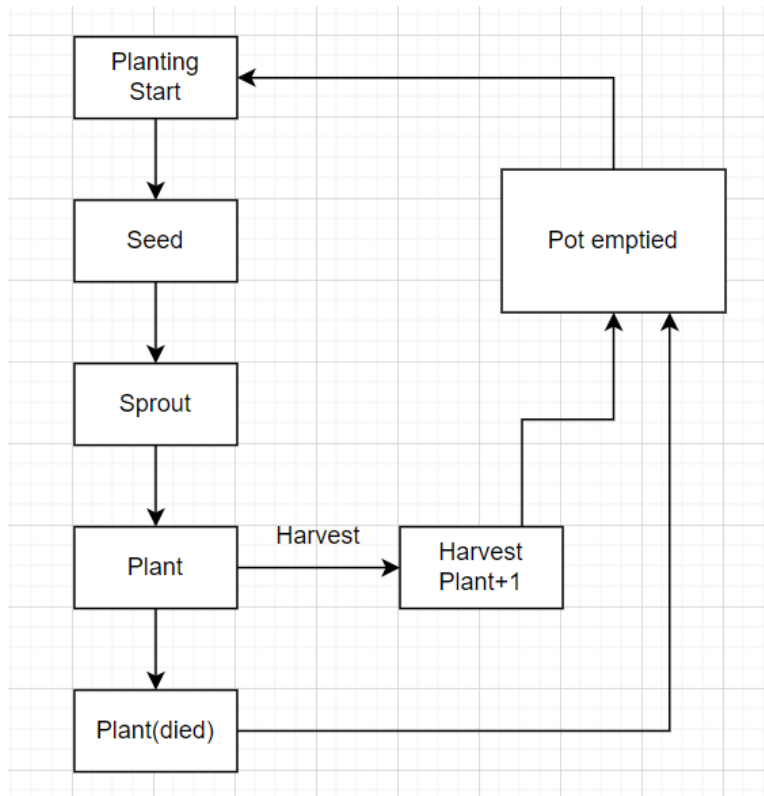
The user interface are divided into 4 parts: Storage of the AP, Pots, Shops and Buttons. Firstly, for the storage of AP, it was used to display the AP of players own. The AP would gain after selling the plants or the AP would decrease while unlocking the new scene. Secondly, the pots were used to grow the plants. Players could tap on the pot once the plant grows. Thirdly, the shop was used to sell different types of plants for gaining AP. Lastly, The options below could lead players to different places.



Plants

Plants would grow in 4 stages. To grow the plant, we are required to tap on the pot. The process of growing the plant from seed would take a few seconds (from the 1st stage to 3rd stage). After the seed grows into a plant, players are required to tap on the pot again for collecting them. However, as the time goes by and without collection after growing up into a plant, it would become a carrot which is the 4th stage of growing. The image below shows all stages of the process for the plant growing.





Resources

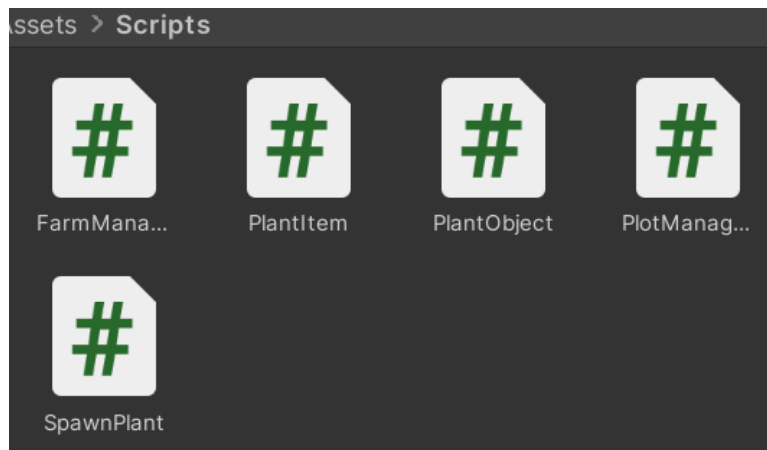
There are two kind of resources in the game: plants and angry point

For plants, it was used to trade AP. Plants contain different values such as their growing time between stages, value to angry point, and their numbers of stages.

The main usage for angry point is used to upgrade different features and unlock maps. It could gain by selling plants in shop.

Development

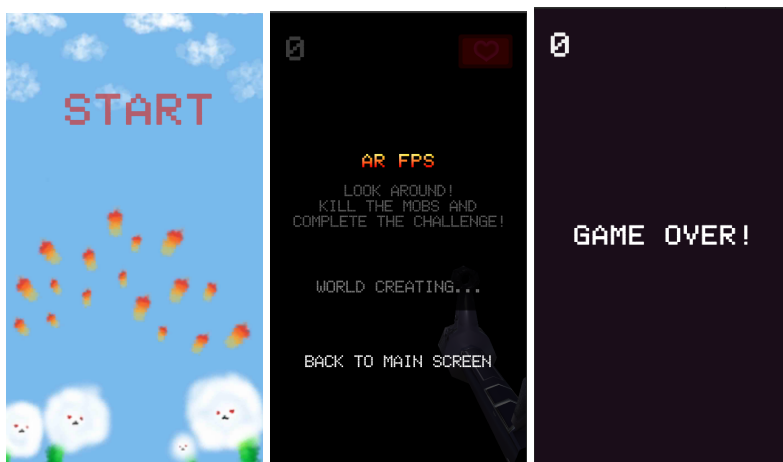
The pots and the plants were setted as prefabs. After that, the plants were controlled by using C# scripts. Moreover, the new object type was setted for storing all data related to the plants. For example, the script 'PlantObject' is used to store the variables related to different types of plants, such as their name, icons and values; the script 'PlotManager' is to control the plant activities in the pots, such as when clicked to the pot, the seeds will come out and starts growing.



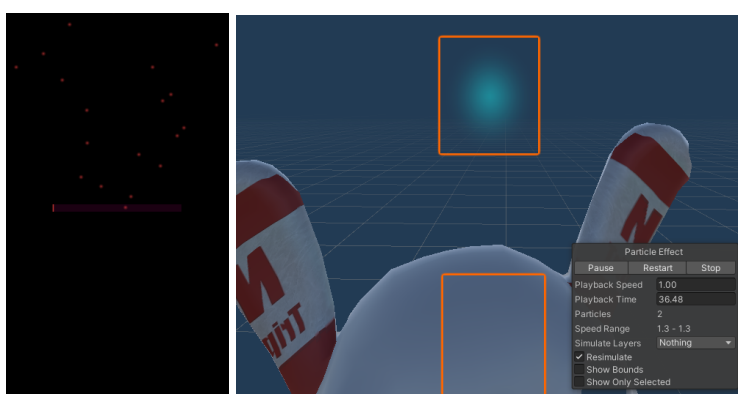
ii. AR Part

Design

Three windows are mainly separated in the AR shooting game. In the beginning, players would see the menu. Players could tap anywhere on the screen for loading the game scene. However, when you enter the AR part for the first time, the system may request you to open the camera, and you need to go back to the menu and join again in order to sense the camera. When the game loaded in or out of the menu scene, a loading screen would appear. After loading into the next scene - the main body of the ar shooting game, a pre-gaming window would pop out and wait for the confirmation by the players before the game starts. If players fail to complete the challenge, a 'game over' window would appear and loop back to the menu scene. The photos of the menu scene, pre-gaming window and 'game over' scene are attached below.



Particles are added to the loading scene and the 3D objects. On the loading screen, some red particles float up to the top of the screen. For the enemies' objects, the particles would pop out when they get hit or killed. Moreover, different types of objects have decent color particles on their head.

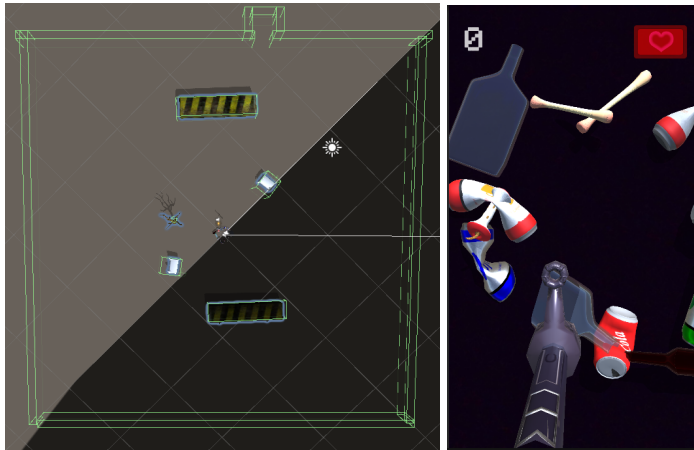


Sound effects and background music are added into the game. Once the enemies got hitted or dead, a related sound effect would start. The background music begins after the game starts.

Game

The setting inside the game could be divided into two parts, the walls and the barriers. Firstly, the invisible walls are used to prevent the 3D object running out of the map. And the barriers are not only used for decoration, they also have the same usage with the walls.

For the user interface in the game, the top left corner is the scores of the players and the top right corner is the health bar of the player. Players would fail from the game, if the health goes to zero and have not earned enough score for entering the next stage. A metallic gun is setted in the middle of the screen. When the players tap anywhere on the screen, the bullets would shoot forward.



#The 3D objects are downloaded on the internet.

Player

The script for the damage for each bullet, cool down time between each shot and the range of the gunshot are shown below. The damage will be set according to the difficulty. The gun could shoot 100 float numbers far from the target and the duration between each shot is 1.5 seconds.

```
public int damagePerShot = 20;
public float timeBetweenBullets = 0.15f;
public float range = 100f;
```

Raycast is a Physics function. The ray would project into the scene and give back a boolean value once it hits the target. When the ray hit the object successfully, the information of the hit would be returned. Such as the distance between the origin and target. The raycast was used to determine whether the object was hit or not. To prevent one bullet from hitting multiple targets, the raycast would stop chasing when it hit a target.



Enemy

Enemies would move toward the players (the red circle shown on the right photo). The spawning time for different types of enemy is different. The enemy with blue particles spawn every 3 seconds. And all enemies have the same health value and damage cause. Enemies attack players when the player has health to lose.



```
void Attack ()
{
    // Reset the timer.
    timer = 0f;

    // If the player has health to lose...
    if(playerHealth.currentHealth > 0)
    {
        // ... damage the player.
        playerHealth.TakeDamage (attackDamage);
    }
}
```

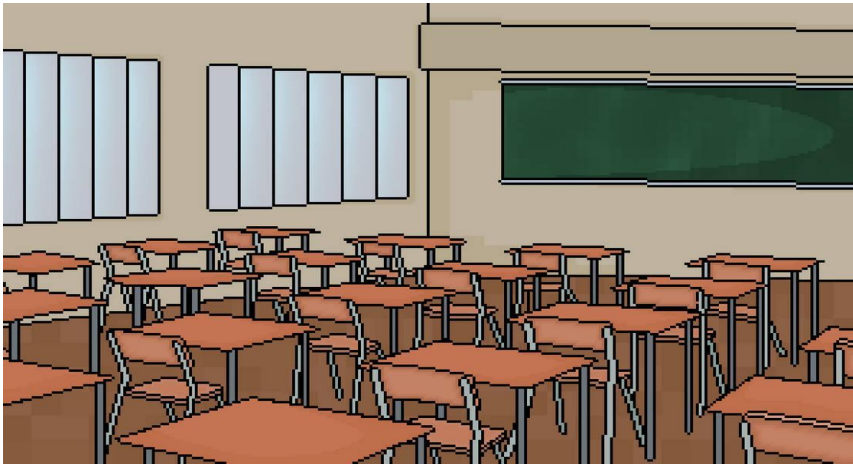
Development

The C# scripts were mainly used for controlling player, enemy and the changes of scene. Moreover, the layers were settled to enable some features. For example, enemies must be set as 'Shootable' to enable the hitting box (Collider). The colliders are mainly used to prevent the objects from standing in the same places. We used box colliders or sphere colliders instead of mesh colliders. Since the box collider could be modified by ourselves.

Layers	
Builtin Layer 0	Default
Builtin Layer 1	TransparentFX
Builtin Layer 2	Ignore Raycast
Builtin Layer 3	
Builtin Layer 4	Water
Builtin Layer 5	UI
Builtin Layer 6	
Builtin Layer 7	
User Layer 8	Floor
User Layer 9	Shootable
User Layer 10	LightMask
User Layer 11	Invisible
User Layer 12	PlayerBody

iii. Design

Design Scenes:



School



Cinema



Street

We have chosen pixel as our theme after bringing out 3 major benefits for our game. The first reason is that it is easy for us to handle. We are able to draw all items by using Aseprite and it's simple to handle. Apart from that, we tried to make our game more unique by distinguishing our features with the usage of pixels. There are Cinema, Street and also School Scenes for different situations and game experiences.

As we wanted to be more creative and attractive, we have self-designed our plants and creations in different scenes (School, Street, Cinema). There will be four unique plants in different scenes. All the designs of the plants and some of the scenes are hand-drawn by Aseprite.

Street Scene:



Morning Glory: We take it to be the common plant design in our game at the beginning. Considering the streets always have lots of noise, we created this plant to represent the people who make noises over the world.



Dandelion: It is another common plant design we have considered. This plant appears for people who litter around the world and destroy our hygiene in our society.



Golden Mushroom: This plant will only appear on Street Scene. It represents people in real life who block the road by standing in one line horizontally, causing disturbance to others and annoyance.



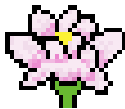
Garden Nicotiana: The last plant in Street Scene is smoking. There are many people smoking while walking on the road. They do not pay any attention to the passerby.

Cinema Scene:

There are four plants designed in the Cinema scene. Each plant has its own message.



Bad Rose: One of the creations in the Cinema Scene. It is constituted for people who hit others' chairs by kicking. All of its actions are bad as its name mentioned.



Lotus: Another plant that only exists in the Cinema Scene. The major reason for creating this plant is to be sarcastic to people who use too much perfume or are smelly in their body.



Yam: The job of this plant is to bring annoying behavior to others while watching movies, e.g. block other vision or sight while watching movies. It has a big size in the actual game.



Light Carrot: Last plant in the Cinema Scene, this is a plant for representing people who use shining devices while watching movies, e.g. using mobile phones.

School Scene:



Pea-Rider: This design is to represent free-riders in our daily academic life. It is a great opportunity to “kill” free-riders in the game. We may express our emotion to free-riders we met in the real life into the game.



Seaweed: Representing people who always make “fake friends” and socialize with others. However, it is not an actual friendship, they just look to be popular..



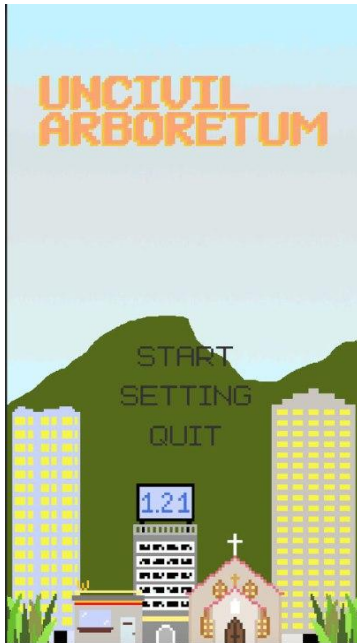
Grapes: Representing a big group of people that will isolate the others and form their own groups. Doing stuff within the group and bullying others.



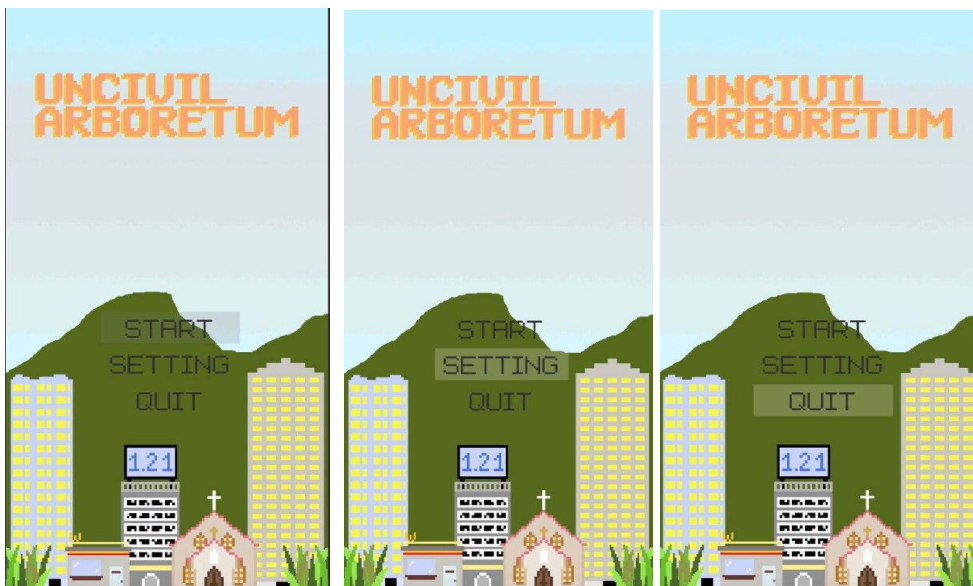
Rose: Rose has a lot of thorns on its stem so as to protect itself, but it may hurt others. It represents the people who hurt others by words.

iv. Others

Menu:

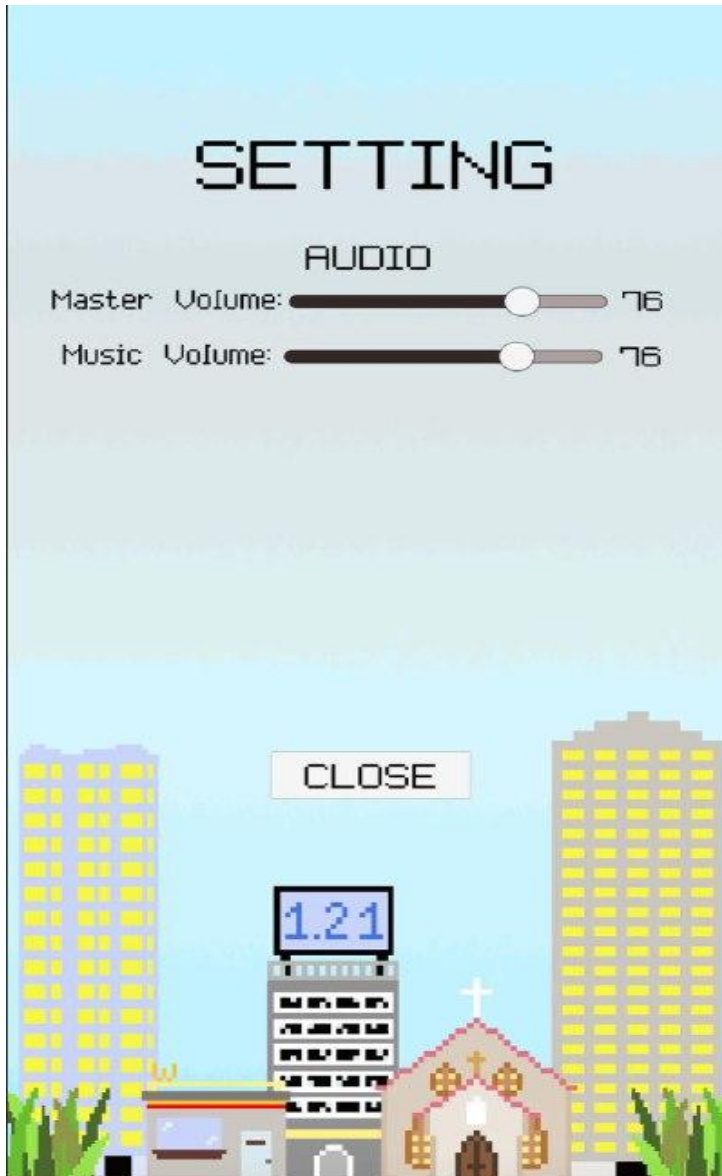


Three options are created in our menu. To begin with, titles and the background images are drawn by ourselves and also the pixel words in our title “Uncivil Arboretum”. Words like Start, Setting and Quit are also pixel words and downloaded from the internet.



In order to make it more neat and user-friendly, when players touch the area of the start/setting/quit button, it will have a gray box behind to show the selection of the users.

When players press the Start button, it will lead to our game immediately. Apart from that, when players want to change the settings, we have provided a setting option for players to customize their settings.



We have provided for users to customise their volume (Shown in the Picture above) by pulling left or right. Moreover, we have also designed a background music to make it more interesting and also prevent dull to users. Users can also pull the bar to fix the volume of the background music. Close option is also provided. it will lead back to the main menu.

```

SceneLoader ▶ LoadMap()
1  using System.Collections;
2  using System.Collections.Generic;
3  using UnityEngine;
4  using UnityEngine.SceneManagement;
5
6
7  public class SceneLoader : MonoBehaviour
8  {
9
10     //Enter the Street scene
11     public void StartGame()
12     {
13         SceneManager.LoadScene("Street");
14     }
15
16     //Exit the game
17     public void QuitGame()
18     {
19         Application.Quit();
20         Debug.Log("Quitting");
21     }
22
23     //Enter the Settings
24     public void OpenSetting()
25     {
26         PlayerPrefs.SetInt("lastScene", SceneManager.GetActiveScene().buildIndex);
27         SceneManager.LoadScene("Setting");
28     }
29
30     public void LoadLastScene()
31     {
32         SceneManager.LoadScene(PlayerPrefs.GetInt("lastScene"));
33     }
34
35     public void LoadMainMenu()
36     {
37         SceneManager.LoadScene(0);
38     }
39
40     public void LoadMap()
41     {
42         PlayerPrefs.SetInt("lastScene", SceneManager.GetActiveScene().buildIndex);
43         SceneManager.LoadScene(2);
44     }
45
46     public void LoadScene(string sceneName)
47     {
48         SceneManager.LoadScene(sceneName);
49     }
50 }
51

```

Above is the script for the results when users clicked those options. Play leads to the loading scene of our own map design "Street. Options will lead to the option created above. and quit will close our game.

E. Future Development

Gameplay:

We hope that there could be more characters and also scenes created in the game that can totally increase the attractiveness of our game. Online ranking system for different plants. In the following, there will be new system and gameplay feature can be added:

1. Idle Game - AP can gain automatically with plants , its efficiency can be advanced by adding more plants of the same type.
2. Upgrade our system to make it more complete , the probability of getting plants with higher AP can be changed by upgrading the equipment in the same scene so that the game won't bring uninteresting feelings to players.
3. Organize and increase the plants in the store to allow players to have more plants to harvest.
4. Turn all plant sprites into animations instead of pictures to make it more glamorous and also more realistic.
5. Add a tutorial in the game so that it can provide guidance to new players.
6. More AR features in different places - Displace a 3D object with some related information and adding original 3D object into the game.

User-Friendly Part:

There are a lot of improvements that could be done by creating more user-friendly functions. Provide a comfort-zone for players to play more games more easily.

1. Create a one click harvest function to collect all plants immediately so that it can reduce player time to collect one by one.
2. Create a Scroll bar in our shop so players are able to view more shop items in the future.
3. Illustrated guide for different plants so players can know more about the game.
4. Real time can be shown on top of the game.
5. More props could be added to the game (E.g. props that can increase the speed of harvesting or more rewards after collecting plants)

Decoration Part:

1. Different pictures/ setups can be added in the background to make it more gorgeous.
2. Create different message boxes to describe each object in the game.