Project for Gesture Based UI Development – 45%

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***Purpose of the application***

The purpose of the application was to develop a virtual reality game in virtual reality with the use of the oculus quest 2. The game is a farming game. The player will be able to grow vegetables and sell the grown vegetables to the customer. The idea behind the game was to allow the user to get comfortable and learn how to use the virtual reality headset and controllers.

Layout:

When starting up the game the user will be greeted at the screen below. This will give the user 2 options, one to start the game and the other to turn the sounds of the game on and off. The background is made up of some of the prefabs and assets that are used in game.

**\*\*screenshot here of menu here\*\***

When selecting the sound option, the user is brought to a new scene with 2 buttons labelled on and off. These do exactly what is says on the tin, simply turning the sounds on or off.

When the user selects the start option in the main menu, the game will start. The user is then transported to the game scene where the game begins. The aim of the game is to essentially grow vegetables and sell them to non-playable characters.

To do this, the player must do the following:

* Go to the table at the front of the farm.
* Pick up the hoe
* Pick an area in the patch of grass to create an area to grow vegetables
* Use the hoe by swinging it to create said hole
* Pick up a seed from the table at the front of the farm
* Go to the patch that has been dug up and plant the seed

From this point the plant needs to be essentially looked after. One way of making sure that the plant grows is to water it. The user can pick up the watering can and water the plants.

**\*\* check what happens next \*\***

When the plant is fully grown and has formed into a vegetable that is sellable, a plant will appear from the ground. The user can then pick the vegetable from the plant. Once the vegetable has been picked, the player can bring it to the table at the front of the farm. Here is where they can then sell it to the non-playable characters.

Below is a look at the environment of which the game is set.

**\*\*screenshot here of game here\*\***

***Gestures identified as appropriate for this application***

There are several gestures used in the application. Using the controllers with the VR set made it very easy to identify potential gestures as it would be almost exactly as if it were real life.

Because of the application being developed for the VR hardware – Users can use virtually any hand gesture they wish to do so – The player movement is not inhibited in any way, and the user can choose their gestures freely.

However, there are a few functionally distinct “trigger” gestures the application listens for to provide functionality to certain actions the player takes, which will be outlined below.

1. The hoe digging gesture – The player must hit the ground, with the top (head) part of the hoe to dig a pile up. There are certain conditions that must pass for the action to be performed successfully.
   1. The velocity at the point of impact must be greater than 15 Unity units, meaning small arm movements won’t trigger the mud pile
   2. The hoe tool must be currently grabbed by the user, simply dropping the hoe on the ground with high enough velocity won’t perform the action.
   3. The hit contact point must be within 3 Unity distance units of the tool head, hitting the ground with the handle won’t do.
   4. The hit-game object must be of layer “TerrainDiggable”, you won’t be able to dig on any other game object.
   5. The hit contact point must pass a collider check – You won’t be able to create a new mud pile if there are any entities of layer “Entities” within that sphere collider check – This ensures the mud-piles cannot be overlaid on top of each other, as well as ensures proper clearance around the mud piles.
2. Teleporting – The player has a RayInteractor component attached to his right controller, meaning, a visual ray is shooting out of the controller – The player must reach out and on the ground in the direction he wishes to move to, then the player should press the primary button (A on oculus) to teleport – The teleport location will be the hit point of that ray, but only if it’s hitting a valid Teleportation mesh (There’s only one in the whole game, limiting the play area)
3. Planting the seeds – The player is completely unrestricted in the way they wish to plant the seed. They could pick up a seed, drop it, throw it, put it on the mud pile, and it’ll be considered planted – Hell, you can even put the seed on the ground, and use the hoe as your golf stick to punt the seed into the mud pile. That’s the freedom of VR.
4. Picking up items – Reach out, bend down, and pick up the item using the grip button – You can then juggle it, put it down, throw it – whatever the user desires. Some items have dedicated hold-points that the hand snaps to improve user experience. For example, when picking up the gardening can, the gardening can reposition itself so that the users’ hand is on the handle.
5. Gardening can usage – You can pick up the gardening can as usual, except its usual interaction only occurs when the gardening can is being actively held AND is tilted over.
6. Interacting with UI elements – Very similar to teleportation, reach out towards the UI button in the world, and let the ray hit the UI element, then pull trigger to interact with the element.

***Hardware and Software used in creating the application***

***Architecture for the solution***

Diagram

Description automatically generated

The architecture of the solution is simple and effective for the project. Visual studio/ Visual studio code, whichever your IDE of preference, connects and interacts with the Unity game engine. The unity game engine then interacts and is made use of by the Oculus Quest 2. Some of the relevant libraries that were used in creation of the game were:

**\*\* list of libraries\*\***

***Conclusions & Recommendations***

Overall, the project was a great success. The team worked was extremely organised and efficient in completing the project. We communicated very well which led to work being done at a very quick pace and any issues that were encountered were solved immediately. The Oculus quest was an extremely fun way to develop a game and we learned a lot of new things about it and how it can be used. Below is a link to the GitHub repository for the project.

<https://github.com/R4K0/ATU-VRShop>