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Report for First 3D Scene
3D Graphics & Animation

The scene 'Classroom' has the following aims: 1/ to a 3D scene using basic graphics techniques, laying object out using transforms; 2/ to create at least 1 moving object that uses keyboard input to move an object (or the camera) using transforms; and 3/ to implement a third person camera that follows a moving object.

The scene presented is formed by a Room Structure containing the floor, ceiling, and the four walls. The setting is displaying nine student offices created as prefabs, aligned on the left, right and center side of the setting. Each student office is formed by one seat (formed by two cubes) and a table created from four cubes. The Teacher's office is located in front of the class, represented by a prefab made from the same chair as the students, and a desk similar to the one used by the students in terms of material, but wider and with a different structure creating the impression of storage on the left and right. In terms of lighting of the scene, there are multiple sources of light:

- 10 points of lights displayed under capsules representing light sources;
- The directional light placed at the main entry, with a focus on the room;
- An area light which is located on the wall where the Teacher's office is found, positioned next to a cylinder which creates the impression of a source of light. This draws attention to that place, which is the intention.

In terms of cameras present in the Scene, there is a Main camera and also a third person camera. The main camera action is not the one which is active during the Play mode, this being replaced by the action of the third person camera. In terms of focus, the main camera is on the Student ghost character and the third person camera is on the Teacher ghost character.

The two characters present in the scene are complementing each other and are ghosts. The concept of the scene is that since a lot of schools have chosen remote education lately, now we can find in the scene's classroom two ghosts: one of a student and one of a teacher. They have the following features:

- The Teacher ghost is following the Student ghost's movements and mimicking them, considering that they are ghosts;
- Both characters are moving along the classroom not taking into consideration the action of objects or of the walls. They can move along the scene like ghosts would.
- They are both constructed with similar design and colors: the Student ghost is a capsule having a nose and eyes and the Teacher ghosts has a sphere as a head and a cylinder as a body, together with eyes. The eyes of the Teacher ghost are not aligned entirely on the axis with the eyes of the Student ghosts, though it follows it entirely in terms of movement. This is to show some sort of debilitation specific to the character's personality: it's meant to do its job as a ghost and follow the other - however, it does not have the same energy and enthusiasm as the Student ghost.

Overall, the user in play mode has the experience of a frontal view of the Student ghost. Given the implementation of the Third person camera, this is shifted to the Teacher ghost, as a third person present in the scene. To notice though is that because their moves are both coordinated and dedicated by the same script, they are both being shown in the camera view in Play mode. The user can move them using user input coming from the keyboard.

In terms of keyboard input that makes the characters move, this is being done using transforms. The Ghost Student has added as a Component a Player movement script and the Ghost teacher has a Third person movement script - both are identical and are the ones presented during the course (in the 2.401 Unity Basic Movement section). There is also a script uploaded in the Main camera, cameraPosition (presented in the course) which aims to follow the Ghost Student - however, this is not influencing the movement, nor does it have actual effects in the user experience, considering that the Active camera is the Third person camera. Regarding the script which is using transforms in order to set keyboard input and make the characters move, it has the following components:

- In the Update() function:
    - The values which are being taken as input are the ones specific to the vertical and horizontal axis and contributing to the movement and turning of the object.
    - Then using the Translate and Rotate commands in the transform library, which takes a vector, Vector3, it creates movement without involving physics. The Vector 3 has three axes: x, y and z. The use of Time.deltatime makes the game frame rate independent and this is being used every time movement is being involved. Multiplying Time.deltatime with movementSpeed and respectively rotateSpeed in both cases, as shown in Figure 1, to the Vector3's relevant values for the movement and the rotation will create the movement effect we are looking for.
    - The character also jumps, when the Space button is being pressed. The if statement which creates this movement is using the Translate command in order to determine movement if the relevant button is pressed.

```
void Update()
{
    float movement = Input.GetAxis("Vertical");
    float turn = Input.GetAxis("Horizontal");

    transform.Translate(new Vector3(0, 0, movement) * movementSpeed * Time.deltaTime);

    transform.Rotate(new Vector3(0, turn, 0) * rotateSpeed * Time.deltaTime);

    if (Input.GetButtonDown("Jump"))
    {
        transform.Translate(new Vector3(0, 1f, 0));
    }

}
```

Figure 1

The third party camera is implemented using the Cinemachine package available in Unity, which was installed with this purpose. It follows the Teacher character, but also captures the movement of the Student character, given the coordinated move between the two. There is a CinemachineBrain present in the Main camera's inspector. It is set on the Teacher character and is marked as being the Live camera, though the Main camera is set on the student character. The third person camera is set to both Follow and Look at the teacher character and it's showing that its status is Live.

Project links:

Project Link: https://hub.labs.coursera.org:443/connect/sharedajwtbemh?forceRefresh=false

Project Link with the complete path:
https://hub.labs.coursera.org:443/connect/sharedajwtbemh?forceRefresh=false&path=%2FvMBxTlyvUcM5DXb37Upsye6EhaJPW4z7oTLHiHdIrBJcLsAIkbpg8LFmKA6qdMB0%2F