Lebanese American University
School of Arts and Sciences
Department of Computer Science and Mathematics

CSC458– Game Programming - Project 1 (a group project)

Date assigned: Sunday 27th of February 2022 – 11:45 PM
Date Due: Sunday 20th of March 2022 at 11:45 PM.

Objectives:

To test students' knowledge of the following Unity topics:

Movement and rotation via any method[1]	Using the Terrain tool in Unity/ using Textures
Collisions and Triggers.	Populating the game with beautiful assets from online stores such as the Unity Asset Store or other places + correct citations
Instantiating and Destroying game objects.	Particle Systems
UI in Unity	Animations
Serialization of variables & classes.	Scene management
Camera follow - 1st person perspective[2]	Coroutines
Sounds	Raycasting
User Input from the Keyboard and the Mouse.	Game Design Document & Technical Design Document

The game submitted must be a 3D game using the Unity 3D template.

General Rules

- Late submissions are not allowed. This is **a group assessment**. Maximum number of students forming a group is 4. You can do the project alone or with 2 or 3 students if you like. In all cases, whether alone or with other students, you must fill in your full name and the full names of your team group members in the Excel sheet shared and you must reserve a group number.
- **Cheating or copying** other students' work will get all the involved students a zero grade. I do not care if someone copied your work or who copied from whom. The project assignment should be unique. It is statistically impossible that two groups in the class would end up doing the same project or have the same or similar code.
- **Any form of plagiarism or academic misconduct is prohibited. I have a zero-tolerance policy concerning this**. Copying code found elsewhere or changing it a bit and then claiming it to be yours will get you a zero grade immediately. **Using anything which you did not create yourself, MUST be cited and/or credited adequately** in a separate MS Document which you include in your submitted Unity project zip file. Using a game asset, any form of code (small or big in size), pseudocode, ideas, techniques,

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[1] Either via the transform component, Physics Rigidbody component, character controller component or Navigation Mesh Agent or using ready-made standard character controller such as Unity Standard Asset: First Person Character Controller

[2] Using any technique, you find suitable (Cinemachine, Constraint components, via C# code etc…) or ready-made standard character controller such as Unity Standard Asset: First Person Character Controller.

from any public or private source, online or in any other form, from a video on YouTube or from a Udemy/Coursera/Skillshare course or similar platforms or from a book or article etc… without citing the exact source adequately in your accompanying report **will get a zero on project 1 for all group members.** This is literally the definition of plagiarism.

- The **Unity code/project submitted should not appear elsewhere**, **nor should be a previous submission to a different or to the same course in any previous semester or in any other university or academic institution,** nor should be a project done elsewhere in the industry, nor done for a client, nor made before for any other reasons that I did not state. If we discover this is the case, you will get a zero grade immediately and an expulsion from the entire course on first offence.
- Please refer to the student code of conduct in the syllabus.

What do I need to submit?

Each group member MUST submit the following: (please include the group number in all the MS Word documents):

1. **Citations and Contributions (as an MS Word document)**: In this document, you must include all the references of anything & everything that is not your own creation. There must be a contributions section in this document, which should be written by each group member. In this section, you have to state exactly what is your contribution and that of each group member. Make sure that the contributions are relatively equal since this will affect your grade if you do not contribute much.
2. A **Game Design Document (as MS Word Document)**: must be submitted. It is document about game mechanics, levels, Genre, theme and other. It should not be more than 2 pages.
3. A **Technical Design Document (as MS Word Document)** containing flowcharts or sequence diagrams and important class diagrams with explanation of the most pertinent code.
4. **A Unity project with all the files & folders except the "Library" and "UserSettings" folders**. Please only delete these 2 folders after you finish completely your Unity game. Unity engine should be closed when you delete these folders. Why? these folders i.e. "Library" and "UserSettings are auto generated by the Unity Editor when you open the project. This is in order to make sure that the folder size of your Unity project remains small. Always make sure you backup your game on a regular basis.

Put all the above in one single folder and create a zip file with **your full name the way it appears on Banner** (FirstName-LastName.zip) and upload it to LAU blackboard. If you are doing the project alone: you still need to submit all the documents & the Unity project files as detailed in the points above but there no need of course to include the contributions section in the Citations MS Word Document since you are doing the project alone. In this case, just include the citations in the citations MS Word document.

NB: If project 1 final file size is still large (after you have removed the Library and UserSettings folders) & you cannot upload it to BB, please upload it to OneDrive or Google Drive or similar services and share the link only with the lecturer and/or with the TA before the deadline.

All group members MUST demo their project in front of the lecturer or the TA or both otherwise you will get a zero grade as I have to check that it is actually your own work not someone else work. If you do not understand your code or some feature in your game, this means that you did not write it or this could mean that you did not do the project or part of it. Don't let me think this way. You can learn to do things from the web. Nobody reinvents the wheel but do not use something in your project that you do not understand. There are no pedagogical benefits in doing this anyway. If you do this, it will negatively affect your grade. Penalty of not understanding code could reach deduction of 45% of the total grade. Bear in mind that a true creator always knows well his/her own creation.

The project is an opportunity for you to learn new things so please impress me! Make sure you do a good project so you can impress prospective employers and so that you can put it in your GitHub/bitbucket profile or portfolio.

Please read the requirements slowly and carefully. Your project 1 MUST adhere to the following requirements to get the full grade – each point is assigned a certain weight of the total grade.

NB: I did not specify dimensions nor quantities of ammo or similar concepts when I mentioned requirement concerning game features and things like that. Please use what you find convenient in terms of quantities and dimensions.

Requirements

- The genre for your game will be **a First-Person Shooter**. This is a very classical genre with plenty of material available online. We covered and we will cover topics pertaining to this genre. Please pay attention and make sure you do nor commit academic misconduct or plagiarism. No need to plagiarize and thus take zero.
- You have the freedom to pick a theme from a list of themes that I will give to the class. The theme will govern literally the assets chosen in your game world. Example: choosing the Medieval Europe theme means that maybe you will use a bow and arrow as a shooting mechanism and the environment could a castle in a forest or a medieval town etc… The theme will open new ideas, elements, and gameplay mechanics. Themes could be Zombie apocalyptic, medieval Europe, modern, Word War 2 or World War 1, Alternate Reality, futuristic, sci-fi, fantasy, Ancient Arabia, Ancient Babylon, Ancient Egypt, Roman Empire, outer space, cyberpunk, Aztec culture (forests & Pyramids) etc... Please check the full list of themes shared on BB. I need to see different themes chosen by different groups so please include the theme in the shared Excel Sheet and avoid repetitions as much as possible. I will provide you with a list of themes to choose from.
- The game will have only one level in project 1. You can add more meaningful complete levels to get bonus grades.
- The map of the world should be created using the Terrain tool in Unity. You can also include buildings. Esthetically pleasing terrains with different terrains features and painted vegetation or using different textures (desert, Rocky Mountains etc…) will get higher grade on this requirement.
- The map of the world should contain monuments and features that are pertinent to your theme.
- Models and other assets can be acquired from free resources online as long as you mention their sources.
- The game world map will feature several elements such as ammo pickups, monuments, obstacles and others according to the theme chosen. Esthetically pleasing games will get additional grades.
- Movement and rotation of your character should be in the **First person perspective only**. You can use any movement/rotation method that you want including using components such as transform, rigidbody or character controller. You are even allowed to use readymade First person character controllers such as the one that is available in Unity Asset store: Starter Assets - First Person Character Controller (Unity Technologies). Input should only be via Keyboard and mouse.
- Your game must contain good amount of collision logic and triggers. Triggers can be used to set hidden game objects which when you pass though trigger something: turn on/off lights or set an explosion or sound an alarm. It is up to your imagination!
- You need to instantiate and destroy objects. This could be things you shoot at in order to blow them and make them disappear or this could be enemies you kill or anything else.
- When you shoot, there should be a small SFX (sound effect) played according to your theme. You might be shooting arrows, spears, bullets, lazer, Dartguns, poison darts etc… Grab some good SFX from online stores and use them. I need to see you control SFX via C# code.

- You need to have an intuitive UI that shows the score, health and ammo. You need to be able to have more than 1 weapon and be able to change the weapons easily via certain Keyboard keys. Each weapon has a type of ammo and an initial quantity of ammo. Ammo boxes of each type of weapon should be scattered in the environment. You player can pick these pickup boxes and thus increase the ammo count of the corresponding weapon. Hint: Check Brakeys Health bar YouTube video that explains how to create a health bar. Change it a bit to suit your own theme. This would flex your muscles in UI design in Unity.
- I need to see you use Raycasting to implement an effective shooting mechanism.
- You need to create enemies of some sort depending on the theme you choose. Suppose if the theme is apocalyptic, you can have your enemies look like zombies that will attack you when you are in their attack range and when you shoot at them directly. Enemies must decrease your health when they attack you. Add an attack animation to your zombies so that the attack looks realistic.
- Killing an enemy increases the score. When your health reaches 0 you die. On death, a UI menu should appear asking you whether to play again or to quit. These should be as buttons. Pressing play again reloads your scene, quitting exit the whole game. If you kill all your enemies a similar UI menu should appear which should congratulate you, show you your score and ask you whether you want to play again or quit.
- Your game should contain particle system(s) in a meaningful way. Ideas: You can create a nice small effect particle system that appear briefly when bullets or lazer hit an object at the location of the hit or create a particle system for explosions or a fountain or anything really. Please I need to see that you are controlling the particle system via C# code in order to get the full grade of this requirement.
- I need to see that you have used coroutines at least once in meaningful way to get the full grade of this requirement. Recall from the lecture on Coroutines that they are used to do tasks that spread over time or across different frames such as dimming slowly a light or fading slowly a color or moving an enemy slowly. There are many places where you can use these in your FPS game.
- I need to see a good number of serialized variables so that your game can be tweaked from the Unity Editor (via inspectors).
- Good coding style/ good usage of comments/ DRY code/good overall program hygiene. Kindly add to the serialized variables in the inspector tooltips (recall attribute Tooltip) to explain briefly what these variables change so that the TA would understand what your serialized fields actually do in the Inspector.

Remember a project such as this aims to teach you things that might not be covered yet in class. Although we will try to cover the topics, we might not cover everything.

Good Luck!