Initial Architecture Document

Team Number: 3

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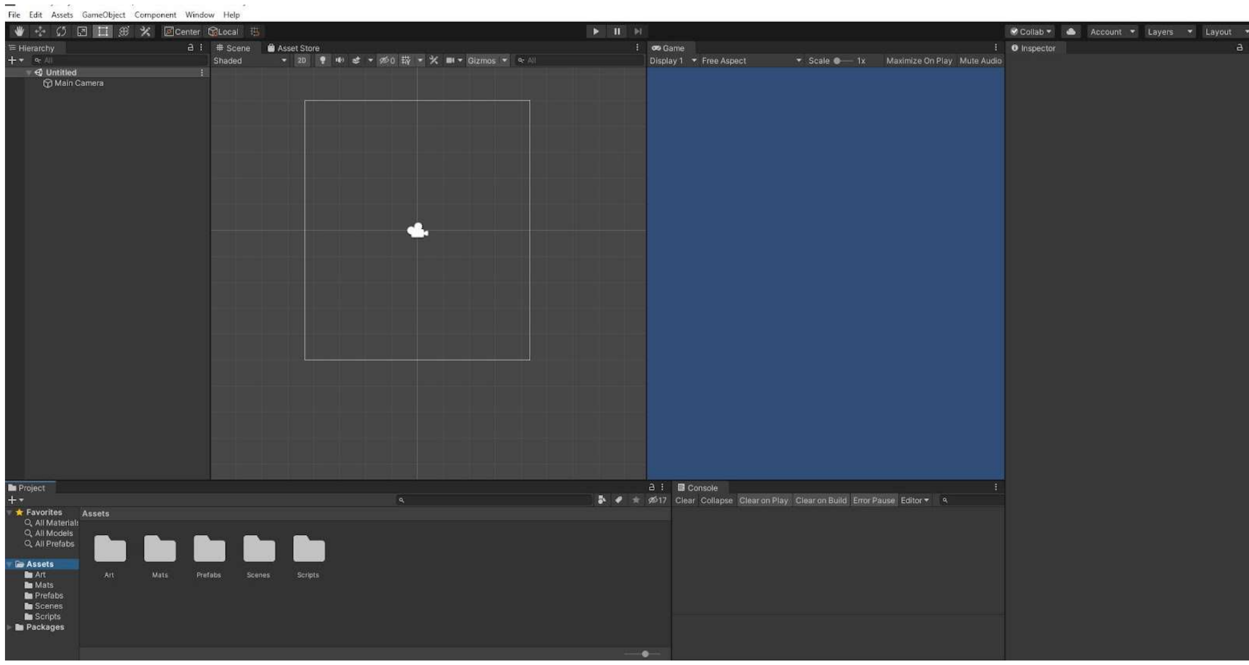
Project Name: Lidar Game

Project Synopsis: First-person video game designed around Lidar detection physics

Architecture: We will be creating a game using Unity Engine.

The architecture section is split into 7 essential sections of our project:

1) Tech Stack
   - We will use Unity Engine to create our game, more specifically making use of the language C# and version 2019.4 of Unity.



We will use GitHub to work on the game and push or pull each other's progress. Unity itself has a GitHub plugin, so that will be the way we push and pull. For character models we will make use of Blender, a free 3 dimensional modeling software. For the music and background ambience we will use Ableton Live Standard, a music composition program, alongside a few third party plugins to enhance the sound such as PG8-x, Serum, and S-Gear. For the actual coding itself we will be utilizing the popular IDE Visual Studio Code (which, by the way, is my favorite platform to code on).

2) Research
   - We will make great use of online tutorials on how to use Unity, as many of our team members are unfamiliar with it. Specifically, there is a YouTube channel called "Sebastian Lague" who's tutorials will be of great help. Of course, the Unity API will also be of great help, and we will study it before commencing any intense coding sessions.
3) Development
   - We will make use of many different classes, most likely a class for UI, a User class, a Game class, an Environment class, and a class for Raycasting. The Raycasting class will be the selling point of our game and what makes it unique. The point of the game is to send out many rays from a Lidar gun the player will be holding which will draw a small circle upon any impact with the environment (including enemies, although enemies will have red circles drawn on them). This is how the player will view the environment, and allow the environment to be traversable.

     The lidar gun will need to have several different modes coded into it, allowing for different concentrations of rays shooting out, as well as the amount of spread and pattern of shots. The player will be a robot, so normal human senses will for the most part be omitted, which will lighten up the workload on the coding slightly. Because of this, we will also code the movement to be much more stiff, and things like that to give a more robotic feel to the gameplay, see more in the gameplay section.
4) Environment
   - The environment will be centered mostly around the layout of a map, as the only visuals the map will be given will be small dots realized by the Lidar gun. This means that the visuals are not as important, and good level design will be the

focal point of our efforts. Similarly, we will sprinkle hints into the environment that can be uncovered through Lidar that will foreshadow the fact that the player has been hunting humans all along, which will be the main twist of the game.

5) Main Menu
   - The main menu of “Lidar Game” will be the opening scene of our game. It will have multiple options posted on a box menu style. There will be settings titled: “video settings”, “controls”, and “play”. This will allow the user to click on one of the options to choose it. Opening video settings will allow the user to customize the graphic settings of the game based on the user’s preferences. If the user clicks on “controls” it will bring them to a second menu where the user can fully customize the in game controls of the main player that will be spawned in also known as the first player or user. There will be an array of controls that the user can edit, currently we are planning on only utilizing a keyboard and mouse so only those two controllers can be edited however if in the future we add support for a controller that is hand held such as ones from the Play station 5 or the X box series X then we will add editable controls for those as well. There will be an option for the user to click “back” which will take the user to the original menu. If the user clicks “Video settings” the user will be prompted inside a graphic settings menu. The graphic settings are fully customizable including but not limited to the resolution, frames per second (FPS), brightness and more. The user will have an option in the bottom right to click “back” which will take the user back to the main menu and once again prompt the original settings and allow the user to click on it. This is stable until the user clicks “play” which will take the user out of the main menu loop and allow them to spawn into the environment and begin playing the lidar game.

6) Game play
   - The gameplay fully consists of a first person experience for the user. A first person game is when the player is in a point of view (POV) of the character and has a heads up display (HUD, see section below for HUD description). The user will also have their arms and hands out in the view, or weapon if that is what the user decides to hold. This is essentially what a person also sees in the real world. The plot of the game has not been fully written yet however we are taking inspiration from horror video games on the internet that are popular currently and centering around the lidar game mechanic. The plot is not decided however we do know that the story will be set in a post apocalyptic setting where the user is a machine / cyborg that is hunting down the last humans.
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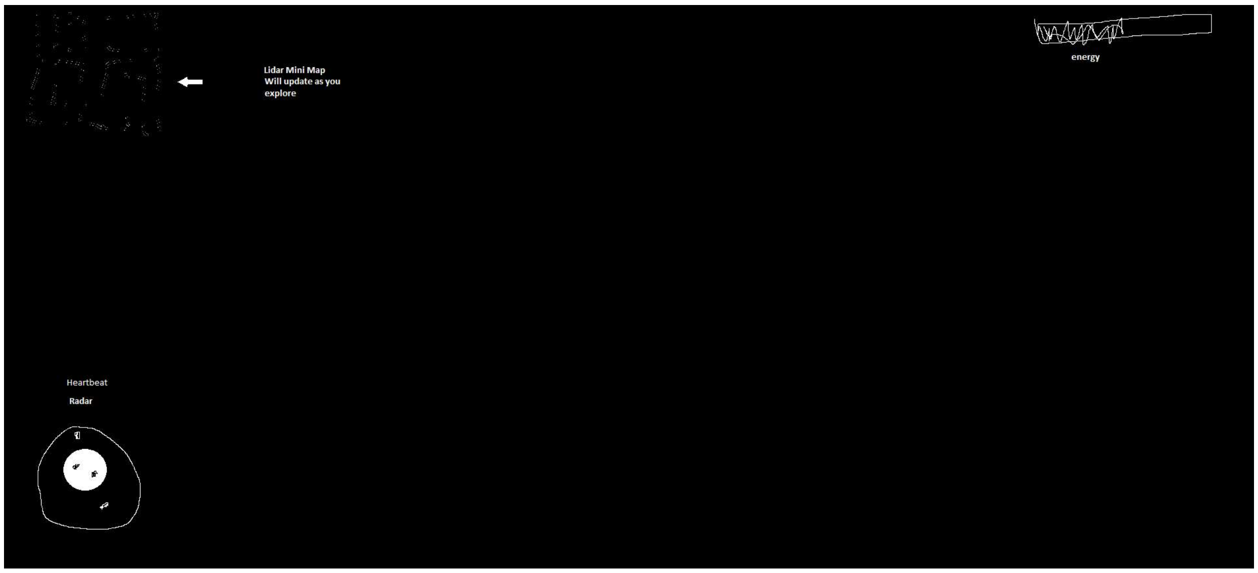
7) HUD

- The head's up display was briefly mentioned earlier but this will be a detailed explanation of the final component of the gameplay of lidar game. The Head's Up Display (HUD for short) is what the user sees in their POV. This is usually in First-person games where the user needs a way to see their character's attributes or elements so a head's up display will allow for a dynamic viewing of these elements. One example of this would be if the user had a weapon the HUD would show the amount of ammo remaining the clip the user was currently firing. This ammo count could be shown at the bottom right for example, and would dynamically change as the user shot. A similar sort of graphic or visual can be used for many elements in the game. Here is an example of the HUD below


Lidar Mini Map
Will update as you explore
energy
Heartbeat
Radar