

Computer Games Development SE607

Technical Design Document

Year IV

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# Technical Design

The purpose of this document is to communicate effectively the technical details and design decisions of the system/algorithm to the readers.

It could include software architecture, algorithm design, class specifications, pseudo code, etc. with tools such as UML, Class Diagram, CRC Cards.

**Overview**

The upcoming virtual reality (VR) game that is soon to hit the market is of the survival genre. This means that players will have to be on their toes as they try to fend off attacking monsters that lurk in every corner of the game. It is important to note that players will have to use all their survival instincts to emerge victorious from this game.

In addition to the monster attacks, players will also experience hunger and thirst mechanics in the game. It is imperative that players keep their characters well-fed and hydrated throughout the game in order to avoid succumbing to the harsh environment. Failure to keep up with these mechanics could result in players losing the game.

One of the most exciting features of this game is the temperature system. The players will experience a constantly changing temperature that they will have to adapt to. As the player tries to survive in a frozen land, it will constantly snow, and players will need to find ways to stay warm in order to avoid hypothermia. There will be some structures and areas that players can explore in this open-world game.

The primary objective of the game is to craft and repair the plane that the player arrived in, which crashed onto the frozen island. The frozen island is surrounded by a vast, never-ending ocean. The island has many unknown features that players can explore as they try to find their way out of the situation they have found themselves in.

To add more challenges to the game, a day and night cycle has been incorporated. During the night, the game becomes more challenging, and players will need to adapt to survive. The temperature drops significantly during the night, which increases the risk of hypothermia. Players must ensure that they have adequate clothing or means of warmth to survive through the night.

Players will be able to control only the main character of the game and the plane that they will craft at the end of the game. This means that the player will have to use all their wits to survive in the game and emerge victorious. Overall, this is a game that will put players to the test and challenge their survival instincts, while also providing them with a thrilling and exciting gaming experience.

The game will also be multiplayer so anything that players would be able to do in single player they can have twice amount the fun in multiplayer by connecting with their friends.

**Programming Languages**

The programming Languages that I will use is C#, this language will be used in Unity Engine.

**Technology**

-HTC Vive VR headset, The HTC Vive is a virtual reality (VR) headset developed by HTC and Valve Corporation. It was first released in 2016 and quickly gained popularity as one of the leading VR headsets on the market. The Vive allows users to fully immerse themselves in virtual environments and interact with objects and characters as if they were real.

The Vive uses a combination of high-resolution displays, precise motion tracking sensors, and handheld controllers to create a fully immersive VR experience. The headset features two OLED displays with a combined resolution of 2160 x 1200 pixels and a refresh rate of 90Hz. This high resolution and refresh rate helps to reduce motion sickness and provides a more realistic and comfortable VR experience.

In addition to the headset, the Vive also comes with two motion controllers that are tracked in 3D space, allowing users to interact with objects and characters in the virtual environment. The Vive also uses a system of base stations that emit laser beams to track the position and movement of the headset and controllers, allowing for precise and accurate tracking.

The Vive is compatible with a wide range of VR games and applications available on the SteamVR platform. It also supports room-scale VR, allowing users to move around and interact with their virtual environment in a larger physical space. Overall, the HTC Vive is a powerful and immersive VR headset that offers an unparalleled VR experience.

- Mirror Networking is a Unity networking solution that provides an easy-to-use, high-performance, and reliable networking infrastructure for developing multiplayer games and applications. It is a flexible and lightweight networking solution that allows game developers to create and manage multiplayer games with ease.

Mirror Networking is built on top of Unity's low-level Transport Layer API and provides a higher-level API that simplifies the development process. It uses the client-server model of networking, where a client connects to a server to play the game or participate in the application. The server is responsible for managing the game state and communicating it to the clients.

-Unity is a cross platform game engine that was created by Unity Technologies, it was released on June 2005, over the years the game engine has been build upon and expanded into a solid game engine that helps to create games. It supports a variety of platforms such as mobile, console, desktop and VR. Inside Unity you can create both 3D and 2D games as well as interactive simulations and any other experiences that a developer can think of.

While making a game in unity everything can be customized by custom scripts that user can write using any IDE that user is used to or wants to use such as visual studio.

The scripts that are written must be written in C#.

**Feature List**

Plane controller(flying plane)

3D VR gameplay

Large scale world

Enemies

Day and Night Cycle

Weaponry

Multiplayer

Survival aspect.

**Script List**

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| **PlayerVRRR** | This script allows the player to be controlled through the VR headset. |
| **Player Controller** | This script allows for the movement of the player such as position changing with the VR touchpad. Also sends sync variables to the server. Also allows players to enter and exit the plane. |
| **DayNightCycle** | This script allows for the continuous day and night cycle, also this script manages number of days, months and years that passed in game. Also allows for different seasonal changes to occur. |
| **MoonModule** | This script controls the moon and the intensity of the light that comes form the moon when its night time. |
| **SkyboxModule** | This script controls the colour change through the gradient and this can be customized to any linking. This can different seasonal tint changes to occur when implements. |
| **GunController** | This script is a highly customizable script which allows any object to become a weapon when script is attached. All properties can be changed into any preference. |
| **Simple attach** | This allows for a single object to be attached to one of the hands of the player in VR so that multiple objects cannot be attached at same time. |
| **SkellyController** | This is the controller for the skeleton AI. |
| **SkellyTrigger** | This controls whether the AI should chase the player or not. |
| **BearController** | This is the controller for the Bear AI. |
| **BearTrigger** | This controls whether the AI should chase the player or not. |
| **ColliderFollowController** | This allows for the VR camera to be followed by the player collider in order for player not to be able to clip through walls. |
| **planeAOETrigger** | This allows for the plane to enable the script of the player getting inside the plane. |
| **PlanePilot** | This script allows the player in VR to control and fly and rotate a plane using the joystick touch pad. |
| **bulletMove** | This allows for the bullet projectile to move when instantiated into the world. |
| **HealthBar** | This script makes sure that when players health goes low it updates the values on the UI. |
| **HungerBar** | This script makes sure that when players hunger goes low it updates the values on the UI. |
| **WaterBar** | This script makes sure that when players water goes low it updates the values on the UI. |
| **StaminaBar** | This script makes sure that when players stamina goes low it updates the values on the UI. |
| **GameManagerMP** | This has multiplayer sync vars for the server. |
| **BasicNetManager** | This inherits some behaviours from mirrors library and allows the players to connect and disconnect from servers |
| **Canvas UI** | This allows for the canvas to show on screen when the host decides to host the game. |
| **Player** | This allows for the players to have temp player scripts attached to them when they join someone’s lobby to ready up for the game. |
| **PlayerUI** | This allows for the player to be able to see the ready button, of them and their player number and other players that are in the game. Also allows for player to click the button to ready up for game. |
| **Throwable** | This allows for any object to be picked up and be thrown around, this would be used for any object that we want player to interact with. |
| **Interactable** | This has to be attached to any object that we a want player to be able to interact with. |
| **Network Identity** | This gives all the multiplayer objects an network identity with and asset id which then each object has a different id. |
| **Network Transform** | This is attached to any object that will move in order to be able to be recognized by the server to be then able to show other players in real time if that specific object moves around. |
| **Velocity Estimator** | This helps the bouncy balls to have estimated velocity when moving around so that all the players will see the same thing. |
| **ChangeIP** | This script displays our current ip on screen,When we type in ip to connect to the function makes sure the ip is updated in code, allows players to connect to typed in. |

A screenshot of a video game

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Description automatically generated A screenshot of a plane

Description automatically generated with low confidence A screenshot of a video game

Description automatically generated with medium confidence A close-up of a computer screen

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Description automatically generated with low confidence A picture containing text, screenshot, line, font

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# References

* Unity XR Input, Unity Technologies (2023) [Online] Available at: <https://docs.unity3d.com/Manual/xr_input.html> (Accessed:24-04-2023)
* Input for OpenVR controllers, Unity Technologies (2023) [Online] Available at: <https://docs.unity3d.com/560/Documentation/Manual/OpenVRControllers.html> (Accessed:24-04-2023)
* William, How to Perform VR Interaction With Objects [Unity Tutorial] (2023) [Online]Available at: <https://arvrtips.com/vr-interaction-with-objects/> (Accessed:24-04-2023)
* Green Hell VR on Steam (2023) [Online] Available at: <https://store.steampowered.com/app/1782330/Green_Hell_VR/> (Accessed:24-04-2023)
* Open Source Networking for Unity (2023) [Online] Available at: <https://mirror-networking.com/> (Accessed:24-04-2023)
* Verior Pies, ParrelSync: (Unity3D) Test multiplayer without building (2023) [Online] Available at: <https://github.com/VeriorPies/ParrelSync> (Accessed:24-04-2023)
* CRC Card Maker (2023) [Online] Available at: <https://echeung.me/crcmaker/> (Accessed: 25-04-2023)