CYBERSPACE

Submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering Degree in Computer Science and Engineering

By

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHOOL OF COMPUTING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
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APRIL - 2023

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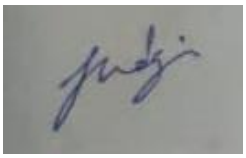
BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Levin McLeish.M (39110566) and Lakshmanan.M (39110561)** entitled **"Cyberspace"** under my supervision from January 2023 to April 2023.



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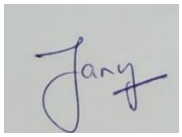
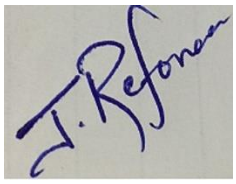
Submitted for Viva-voce Examination held on 20-04-2023



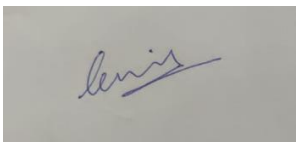
Internal Examiner



External Examiner

DECLARATION

I,**LEVIN MCLEISH .M (Reg.No-39110566)**, hereby declare that the Project entitled **“Cyberspace”** was done by me under the guidance of **Dr.T. Judgi,M.E.,Ph.D.** is submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering degree in **Computer Science and Engineering.**



DATE: 20-04-2023

PLACE: Chennai **SIGNATURE OF THE CANDIDATE**

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to the Board **of Management of SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. T. Sasikala M.E., Ph.D.,** Dean School of Computing and **Dr. L. Lakshmanan, M.E., Ph.D.,** Head of the Department of Computer Science and Engineering for providing me necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to my Project Guide **Dr. T. Judgi, M.E., Ph.D.,** for her valuable guidance, suggestions and constant encouragement paved the way for the successful completion of my project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the **Department of Computer Science and Engineering** who were helpful in many ways for the completion of the project.

ABSTRACT

Cyberspace refers to the complex and interconnected network of devices, systems, and data that make up the internet and digital communications. It has revolutionised the way we communicate, work, and socialise. Exploring the key aspects of cyberspace, the challenges it presents, and the strategies for addressing these challenges. Social Virtual Worlds have begun to offer great potential for communication in recent years. The recent development of Social Virtual Worlds , Virtual reality and blockchain has led to the metaverse. Social Virtual Worlds is all about creating an immersive virtual social environment that simulates a three dimensional social environment for communication, which is primarily based on personal presence and social presence. In this research let's connect users in a surreal virtual environment and establish voice communication in order to make them feel each other's presence. Users can interact and hangout in the virtual world.

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CHAPTER 1
INTRODUCTION

Designing is the creative process of designing the setting of the virtual environment of the game, models, aesthetic, character design, plot etc. It is the creative side of creating a game. Development is the process of programming the physics, game mechanics and technical aspects and making the game functional. It is the technical side of creating a game.

A virtual world is an online community where individuals can communicate with one another in a computer-based simulated environment. These modelled worlds may take inspiration from real or fantastical realms for their rules. Avatars are digital representations of the avatar creator on the internet. Users can communicate with one another through text, gestures and voice communication. Massively multiplayer online role-playing games (MMORPGs) frequently feature real-time dialogue and action. Players construct a character who moves between locations for work or play, is also possible, text-based communication is more common. People use input devices like the keyboard, mouse, and other specially built command and simulation tools like VR controllers to control their avatars. Virtual worlds of today are created specifically for social, educational, training and entertainment. In the 1990s, the introduction of multiplayer 3D games sparked new developments in interactive virtual environments. Users interact with these virtual environments using their avatars to play games. Fantasy novels, comics, science fiction, anime, literature and films have a significant influence on these virtual worlds. Social virtual worlds [SVWs] emphasis on user engagement, education, and training through simulated worlds in addition to enjoyment. Virtual environments offer a range of flexible experiences that allow users to interact with others in various ways, including exploring natural settings, participating in adventurous activities, interacting with members of virtual communities, engaging in political debates or experiments, attending educational sessions, training in simulated environments, and many other virtual experiences. These social virtual worlds are rapidly gaining appeal, especially in educational, governmental, commercial, and military groups, while being less established than game worlds. Because of these developments in virtual worlds, the metaverse—

basically a virtual domain that connects several virtual worlds—has emerged. In science fiction, the "metaverse" is a proposed iteration of the Internet as a single, universal, and immersive virtual world that is made possible by the use of virtual reality (VR) and augmented reality (AR) headsets. The concept "metaverse" was first coined by author Neal Stephenson in his science fiction book Snow Crash in 1992, but development of the technology that supports a virtual reality-based internet has been ongoing for decades. Meta is defined as transcendent, hence the name Metaverse. It implies that the metaverse extends past this verse and reality.The term "metaverse" is often used in the computer industry to describe a unified, immersive, and persistent 3D virtual world that enables people to have experiences that may not be possible in real life. This concept can be enhanced by combining different technologies, such as SVWs, XR, NFTs, blockchain, and digital twin tech.

The Life-cycle of a Video Game and XR application involves:

- Pre-production
- Production
- Post-production

1.1.Pre-Production phase:

Pre-production is the planning phase. In this phase all the artists and developers need to brainstorm the ideas and imaginations of each other to sort out how they are going to proceed.

The most basic questions that need to be answered are:

- How can it be summarised in a pitch?
- Who is the target audience?
- What is our estimated cost to develop this application?
- Will we need to hire additional team members?
- How will we monetize the application?
- What is our estimated timeframe for the launch?

Only after these things are sorted out, can we proceed to the next stage in the pipeline.

1.2.Production phase:

The production stage of development is when the studio takes the concepts created during pre-production and turns them into source code and various assets. It's where the bulk of your time, effort, and resources go.

Design: The design team continues their work from the pre-production stage. Working together with the artists, they render character models, craft dynamic and immersive level designs and environments, iterate on the interfaces, and so on. The designs become more detailed and granular, some ideas get refined while others are thrown out.

Programming: Even in case you decide to use an existing game engine, the programmers will have plenty of work prototyping ideas, incorporating new features, and fixing the bugs introduced along the way.

Art, graphics, and audio: Most games require a great number of creative assets. Artists, music composers, and voice actors need to work together with the designers and developers to make sure all elements fit together.

Testing: Making sure the game works as intended is critical. Testers don't wait till the game is finished; they start their work as soon as anything is playable. Early on, testing a game occupies a relatively small amount of time, but as development draws to a close, it requires multiple people working full-time.

1.3.Post-production:

After the final version of the game is released, it enters the final stage of the development process – the post-production.

Bug-fixing: Despite the efforts of testers, most games still contain minor bugs at the moment of their launch. The first few months during the post-production stage are typically spent identifying and squashing these bugs.

New content: post-production also includes regular software updates for the application, ranging from game-balancing patches to new DLCs.

CHAPTER 2
LITERATURE SURVEY

Adel Hendaoui et al. in “3D Social Virtual Worlds” [1] discusses the various challenges and needs associated with SVWs. The author suggests that SVWs are increasingly becoming a significant force in shaping the knowledge-based and globalised societies and economies of the future. However, along with technological and business challenges, the application of theories related to the rights of the

physical world in the virtual world is still an important issue that needs to be addressed.

Iain Olive et al. in “Virtual and Real Worlds” [2] explore the idea of using 3D environments for a variety of purposes, such as classroom instruction, business meetings, and virtual socialising. However, it highlights the potential risk of errors leading to the spread of virtual epidemics among avatars.

Jingzhi Guo et al. in “Virtual Wealth Realisation” [3] emphasises the advantages of connecting and rebuilding businesses in the metaverse, but also acknowledges the importance of addressing the technological requirements for its co-existence. The design of Second Life, for instance, enables seamless movement between virtual properties, but requires an adaptable architecture to manage changes in player numbers.

Gunkel N.B et al. in "Multi-user (Social) Virtual Reality Communication." [4] explains the positive aspects of VR-based social network inclusion, such as facilitating expertise, knowledge, relationships, and opportunities. However, it also acknowledges that adapting to VR can be challenging, and some individuals may struggle with the hardware requirements.

Sahar A Aseeri et al. "The Influence of Avatar Representation and Behavior on Communication in Social Immersive Virtual Environments." [5] discusses how virtual worlds have become a new form of interaction for millions of users and how telecommunications service providers can leverage this trend to generate revenue. However, they must also confront issues related to standardising interfaces on social networks and addressing discrepancies in coverage.

In summary, these articles highlight the potential of SVWs to shape the future of society and business, while also acknowledging the various challenges and risks associated with their use. They emphasise the need for careful consideration and planning to ensure the successful integration of SVWs into our daily lives. Overall, these papers highlight the potential of SVWs to shape society and business in the

future, while also acknowledging the challenges and issues that need to be addressed.

2.1.INFERENCE FROM LITERATURE SURVEY:

From the literature survey on cyberspace, it can be inferred that it is a term used to refer to the virtual world of electronic communication over computer networks. It is a realm of information where people interact, exchange ideas and engage in digital activities such as online shopping, social media, and gaming. It is also characterized by the principles of anonymity, borderlessness, and the ability to transcend physical limitations. However, cyberspace is not without its challenges, including cybercrime, online harassment, and privacy concerns, prompting the need for adequate regulations and cybersecurity measures.

- Explores the impact of cyber conflict on national security, including the characteristics of cyber warfare, the roles of state and non-state actors, and the challenges of defending against cyber attacks.
- This research paper analyses the emerging threats and challenges of cyber security, including the growing number of cyber attacks and the need for better strategies and technologies to protect against them.
- This article presents a futuristic perspective on cyber space, including potential advances in technology, emerging security threats, and the implications on society and the economy.
- Have to discuss the increasing threats to cyber security in the digital age, as well as the need for improved policies and technologies to address these threats.
- There is a need to explore the economic and political factors influencing the development of cyberspace, including the role of government, private sector, and civil society in shaping cyber-related policies and regulations.
- The impact of cyber space on individual privacy, security, and human rights, as well as the challenges and opportunities for legal and policy frameworks to address these issues.

2.2.OPEN PROBLEM IN EXISTING SYSTEM:

Cyberbullying:

This involves the use of electronic devices to harass, intimidate or humiliate individuals, often targeting vulnerable groups, like children and teenagers.

Online Scams:

This involves the use of fraudulent schemes and phishing to swindle money, property, or sensitive personal information from unsuspecting victims.

Privacy Invasion:

This is when the personal identity of an individual, including their bank account, medical records, or activities, are made public without their consent.

Cybercrime:

This is unlawful activity carried over the internet, including cyberstalking, computer hacking, and identity theft.

Hate speech:

This occurs when individuals use online platforms to promote discriminatory or abusive messages against particular racial, religious, or gender groups.

Addiction to social media:

This problem afflicts users of social media, leading to over-dependence on social media and creating a reclusive lifestyle.

Online Piracy:

This occurs when individuals download or distribute copyrighted material without permission or compensation to the rightful owners.

Cyber Vigilantism:

In cyberspace, vigilantes may use the internet to hack sites, trace, and prosecute individuals for presumed wrongdoing, denying the individuals their right to a fair trial.

Dissemination of Fake and Misleading Information:

This threatens to misinform and create confusion to destabilise the society by spreading fake news, rumours, and conspiracy theories.

Cyberwarfare:
This involves hacking and manipulating digital infrastructure, disrupting critical systems to create chaos and damage to countries and their economies.

CHAPTER 3
REQUIREMENT ANALYSIS

Security:
The cyberspace should be secure and protected from cyber threats like hacking, malware, and other types of cybercrime.

Privacy:
The cyberspace should allow users to safeguard their personal data and mitigate the risks of identity theft, fraud, and other forms of cyber security breaches.

Accessibility:
Cyberspace should be accessible to everyone, regardless of their physical or cognitive abilities. This means ensuring that the user interface is user-friendly and that there is no discrimination based on any physical, mental, or cognitive factors.

Interoperability:
The cyberspace should allow for seamless connections between different software, systems, and devices. This allows for greater efficiency and enhances the user

experience.

Reliability:

The cyberspace should be reliable, with minimum downtime and maintenance requirements. This ensures that users have a seamless experience and can complete their activities without any interruptions.

Scalability:

The cyberspace should be scalable, meaning it can handle an increase of users without any degradation in performance. This allows for the system to adapt as per the need of the user.

Flexibility:

The cyberspace should be flexible, allowing users to customise their experience and tailor it to their unique needs. This enables the user to feel in control and have an enhanced experience.

Compatibility:

The cyberspace should be compatible with different types of devices and operating systems, ensuring that users can access it from any device they choose.

Sustainability:

The cyberspace should be sustainable, meaning it should be designed with a minimal impact on the environment while still ensuring that the needs of the users are met.

Usability & Intuitiveness:

The cyberspace should be easy to use and intuitive, providing users with an efficient platform for their activities. This ensures that the user spends less time navigating and can complete their activities faster.

3.1. Feasibility studies:

Feasibility studies of cyberspace are assessments that analyse the potential of implementing cyberspace technologies for a specific project, program or initiative. The principal objective of these studies is to understand whether the project is viable or not, by evaluating its technical, economic, environmental, social and legal factors. The following are some key elements that are often part of a feasibility study for a cyberspace initiative:

Market Demand:

Evaluating whether the market exists or not for the proposed cyberspace initiative.

Technical Feasibility:

Determining whether the required technology is readily available and costs can be covered.

Funding:

Analysing how much funding is needed for the cyberspace initiative.

Legal Factors:

Assessing the potential legal issues that may arise in implementing the initiative.

Economic Feasibility:

Examining whether the cyberspace initiative will be profitable for the businesses.

Social Feasibility:

Analysing how society will react to the proposed cyberspace initiative.

7.Environmental Feasibility:

Evaluating whether the cyberspace initiative has an enviromental impact. Upon assessing all these feasibility elements, the feasibility study report is prepared, which provides a complete understanding of whether implementing the proposed cyberspace initiative is viable and sustainable.

3.2.SOFTWARE REQUIREMENTS:

To create a virtual world, you will typically need software, tools, and platforms for designing, building, and implementing the virtual environment. Some of the commonly used software and tools for creating a virtual world include:

3D Modeling and Animation Software:

These tools enable you to create 3D models, characters, objects, scenes, and animations.Here,we used blender software for 3D modelling

Blender (Version 2.93.1)

FIG 1.1

Above Figure 1.1 describes the Blender is a 3D computer graphics software application used for creating animated films, visual effects, art, 3D printed models, motion graphics, and interactive 3D applications. It is a free and open-source software and is available for all major operating systems including Windows, macOS, and Linux. Blender offers a wide range of features including modelling, sculpting, texturing, baking, rigging, animation, simulation, rendering, and more. It also supports a variety of file formats such as FBX, OBJ, and STL making it a versatile tool for 3D artists and 3D printing enthusiasts.

Game Engines:

Game engines such as Unity or Unreal Engine provide a framework for building and rendering virtual environments, as well as programming and scripting gameplay mechanics.Here,we used Unity game engine

Unreal Engine 4 (Version 4.26.2)

FIG 1.2

Above Figure 1.2 describes Unreal as a cross-platform game engine widely used for creating video games, simulations, and interactive 3D and 2D content for various web, mobile, desktop, and VR/AR platforms. It provides a range of tools that streamline the game development process, including 2D and 3D graphics, physics, animation, scripting, networking, user interface, audio, and more. Unity uses C# as its primary programming language, and developers can also use a visual scripting

tool called Bolt to create game logic without writing code. Unity supports multiple platforms such as Windows, Mac, Linux, Android, iOS, Xbox, PlayStation, Nintendo Switch, and several AR and VR devices

Programming Languages:

You may require programming languages such as C++, Java, or Python to develop custom scripts or plugins for your virtual world.Here,we used C#(C-sharp).

C#(C-sharp):

C# (pronounced "C sharp") is a programming language developed by Microsoft as part of the .NET framework. It is a modern, general-purpose, object-oriented programming language used for writing a wide variety of applications, including desktop applications, web applications, games, mobile apps, and more.

3.3 SYSTEM USE CASE

There are numerous use cases of cyber space in real life, here are some of the most common ones:

Online shopping:

Consumers can purchase products and services through online shopping websites.

Social media:

Social media platforms such as Facebook, Instagram, and Twitter allow people to connect and share information with others online.

E-learning:

Online courses and distance learning programs have become increasingly popular due to the convenience and flexibility they offer.

Telecommuting:

Many companies now offer telecommuting options, which allow employees to work remotely from home or other locations.

Virtual meetings:

Video conferencing technology has made it possible for businesses to hold virtual meetings with stakeholders and clients around the world.

Online gaming:

Online gaming has become a popular pastime for millions of people, offering virtual

worlds and experiences that are not possible in real life.

CHAPTER 4
DESCRIPTION OF PROPOSED SYSTEM

A proposed system of cyberspace is a virtual environment that mimics the physical world and provides a platform for individuals, businesses, and government agencies to interact and exchange information. This system includes a network of interconnected devices, servers, and databases that enable users to communicate and access information from anywhere in the world. The proposed system of cyberspace is based on the principles of privacy, security, and openness. It allows users to protect their data and communications, while also providing transparency and accessibility to government agencies and businesses. The system is designed to operate without any centralised authority, with a distributed network of nodes that ensures resilience and redundancy in the face of cyber-attacks or other disruptions. The system is also built on a scalable architecture that can accommodate a growing number of users and devices. Overall, the proposed system of cyberspace aims to create a safe, secure, and open online environment that facilitates communication, commerce, and innovation while also protecting user privacy and security. A proposed system of cyberspace would involve the creation and management of a digital environment meant for communication, commerce, and information exchange. This system may include a network of connected devices, servers, software, and protocols that allow users to interact with each other and access the internet. It could provide secure and reliable connectivity, encryption protocols for data protection, and a variety of digital services like social media, e-commerce, and online banking. Additionally, an effective system of cyberspace would need to address cybersecurity concerns such as hacking, identity theft, and cyber attacks, involving cyberspace

would aim to create a secure, efficient and accessible digital environment for users to interact and exchange information in a trusted, transparent and reliable way.

4.1.METHODOLOGY

Conceptualization:

Identify the purpose, audience, and goals of the virtual world you want to create.

Storyboarding:

Develop a storyline, characters, and scenario for the virtual world. This would include designing the layout of the world.

Prototyping:

Utilise software to create 3D models for the avatars, environments, and any other objects or elements that will appear within the virtual world.

Programming:

Code the interactions that will happen within the virtual world, such as the movement of avatars and objects, and any interactive features.

Launch:

Make your virtual world accessible to users through a hosting service or platform, such as a website or app.

Iteration:

Continuously update and improve the virtual world as users provide feedback and new features are developed.

3D MODEL CREATION:

- Open Blender and choose the type of project you want to create, such as creating a new 3D model.
- In the workspace, you will see a cube. Delete it by selecting it and pressing the “X” key.
- Add a mesh by clicking on the “Add Mesh” button in the toolbar, or by using the keyboard shortcut “Shift-A”.
- Choose the type of mesh you want to add, such as a cylinder or sphere.
- Use the transform tools located in the toolbar to move, scale or rotate the mesh.

- Use the modifier tools to perform actions such as extruding or beveling on the mesh.
- Apply materials to the mesh by selecting the mesh and opening up the material window. Here, you can choose from a variety of textures, colours or patterns.
- Once you're satisfied with the model, you can render it by choosing the render settings and clicking on the “Render” button.
- Save your finished 3D model in your desired file format.

Creation of character for CyberSpace

- Create a blueprint or sketch of your character to have a reference while modelling.
- Choose a basic mesh or starting point for your character. You can use a human, animal or any pre-made models, if you want.
- Start adding details to your mesh, such as facial and body features, clothing, and accessories.
- Use a range of tools, such as extrude, sculpt, and blend, to model and shape the character.
- Add textures and colour to your model. You can either create your own textures or use pre-made ones.
- Rig your model, which is the process of adding a skeleton to it so you can pose it.
- Once modelling and texturing is complete, you can add light and environment to make it realistic.
- Finally, you can animate your character by creating a timeline, adding keyframe movements, and creating realistic movements.

Unity game engine:

To give actions to a character in Unity game engine, you can follow these steps:

- Create a character: You can use a pre-made character or create your own using software like Blender. Import the character into Unity.
- Add animations: Use animation software to create animations for your character. Import the animations into Unity.
- Create a controller: Use the Animator component in Unity to create a

controller for your character. The controller will control the animations based on player input.

- Add movement: Use the Rigidbody component to add physics to your character, such as walking, jumping, and falling.
- Add player input: Use scripts to add player input to your character. For example, you can use the Input.GetAxis function to get player input for movement.
- Add interaction: Use scripts to add interaction to your character, such as picking up objects or attacking enemies.

4.2. SYSTEM ARCHITECTURE:

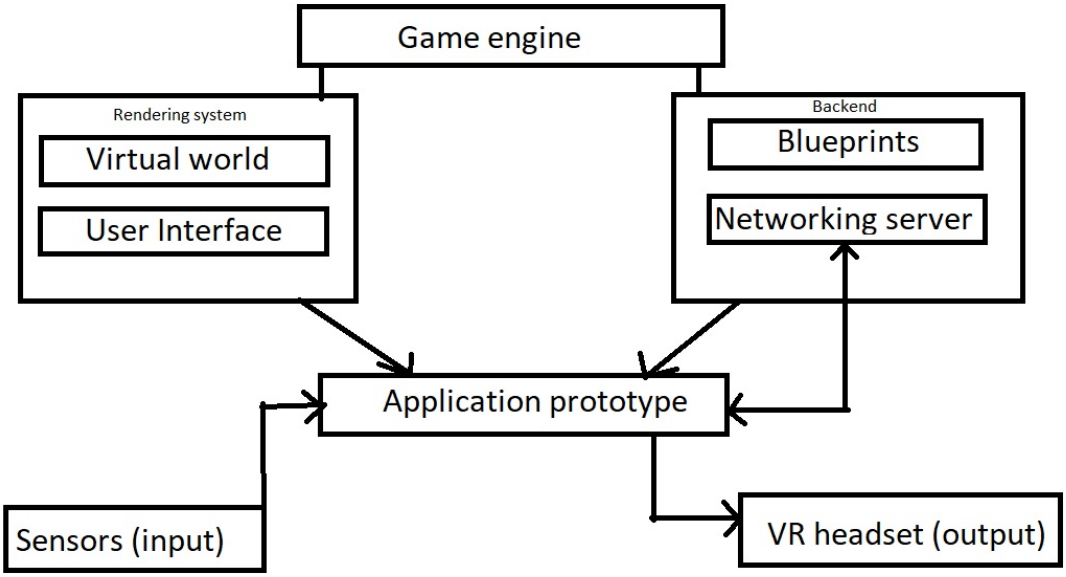

Fig.1.3

Above Figure 1.3 illustrates the architecture for cyberspace refers to the underlying design and structure that facilitate the existence and functioning of digital networks and systems. It includes the hardware, software, protocols, algorithms, and standards that support the transmission, processing, and storage of data in a virtual environment. The architecture for cyberspace is primarily based on the internet protocol suite (TCP/IP), which is the backbone of the internet. TCP/IP provides a set of rules and protocols that ensure reliable transmission of data between devices connected to the internet.

Other important components of the cyberspace architecture include:

- Operating systems: These are software that manage computer hardware and facilitate the execution of other software applications.
- Web servers and clients: These are software that enable access to websites and online applications over the internet.
- Cloud computing infrastructure: This refers to a network of servers and storage devices that provide on-demand computing resources and services.
- Encryption technologies: These are tools used to secure data and prevent unauthorised access.
- Firewalls and intrusion prevention systems: These are hardware or software that provide security by monitoring traffic and detecting and stopping threats.

In summary, the architecture for cyberspace encompasses the various technologies, protocols, and services that make digital communication possible over the internet. It is constantly evolving to accommodate new technologies and address emerging threats in the digital world.

4.3. Description of software for implementation and testing plan:

Software for the implementation and testing plan of cyberspace refers to the tools and applications used in creating and evaluating cybersecurity strategies for an organisation. This includes software for testing vulnerabilities, analysing data, monitoring network traffic, and enforcing security policies. The implementation phase involves deploying the necessary software and hardware components to secure the cyberspace environment. This includes firewalls, intrusion detection systems (IDS), antivirus software, network monitoring tools, and security information and event management (SIEM) systems. The testing plan involves identifying potential security risks, conducting penetration testing, and implementing security updates and patches. Software tools used in this phase include vulnerability scanners, ethical hacking tools, network sniffers, and forensic analysis tools.

Some popular software used in the implementation and testing plan of the cyberspace include:

- Nessus: A vulnerability scanner used to identify potential security risks and weaknesses in the system.
- Metasploit: An ethical hacking tool used to simulate cyber attacks and test the

effectiveness of security measures.

- Wireshark: A network protocol analyzer used to monitor and analyse network traffic.
- Snort: An IDS software used to detect and prevent potential cyber threats.
- Syslog-ng: A log management software used to collect and analyse log data from various sources and detect any suspicious activity.
- Splunk: A SIEM software used to monitor and analyse real-time data and alerts for potential security risks.

Overall, the implementation and testing plan of cyberspace requires a robust set of software tools to ensure the effectiveness and reliability of the cybersecurity strategy.

4.4.Project Management Plan

This project management plan aims to provide an overview of the process of developing, implementing, and maintaining a cyberspace environment for an organisation. The approach used is based on the Project Management Body of Knowledge (PMBOK) methodology.

Goals and Objectives

The main goal of this project is to create a cyberspace environment that is secure, reliable, and user-friendly for the organisation. The following are the objectives of this project:

1. To understand the requirements of the organisation for cyberspace.
2. To develop a plan for implementing cyberspace.
3. To evaluate and select the appropriate cyberspace technologies.
4. To develop and implement a security plan for cyberspace.
5. To train and educate users on how to use cyberspace.

Scope

The scope of this project includes the development, implementation, and maintenance of a cyberspace environment for an organisation. It includes the following:

1. Understanding the organisation's requirements and constraints for cyberspace.
2. Developing a plan for implementing cyberspace.

3. Evaluating and selecting cyberspace technologies.
4. Developing and implementing a security plan for cyberspace.
5. Training and educating users on how to use cyberspace.
6. Maintaining cyberspace and its associated technologies.

Roles and Responsibilities

The following roles and responsibilities must be identified and assigned to people in the project team:

1. Project Manager – responsible for overseeing the entire project, managing the budget and timeline, and ensuring that the objectives are met.
2. Cyberspace Architect – responsible for designing, developing, and implementing the cyberspace environment.
3. Cyberspace Administrator – responsible for managing and maintaining cyberspace.
4. Security Expert – responsible for developing and implementing the security plan for cyberspace.
5. User Trainer – responsible for training and educating users on how to use cyberspace.
6. Technical Support – responsible for providing technical support to users.

Budget and Timeline

The budget and timeline for this project must be identified and communicated to all members of the project team. The budget will be based on the cost of technology, human resources, and any other associated costs.

CHAPTER 5
IMPLEMENTATION DETAILS

5.1.DESIGNING THE VIRTUAL ENVIRONMENT:

First step is creating and setting up a new project in an unreal engine. Let’s create a

new project by clicking game > VR category and select blueprint project. We can also set the maximum quality and Target platform.

Then let's create distinctive folders for meshes, Blueprints, materials, textures, Foliage, Widgets, images and music separately.

Let's create a new **Level map** first. We can see certain starter contents are there in the project, other than that there is nothing and we can see our viewport is completely blank.

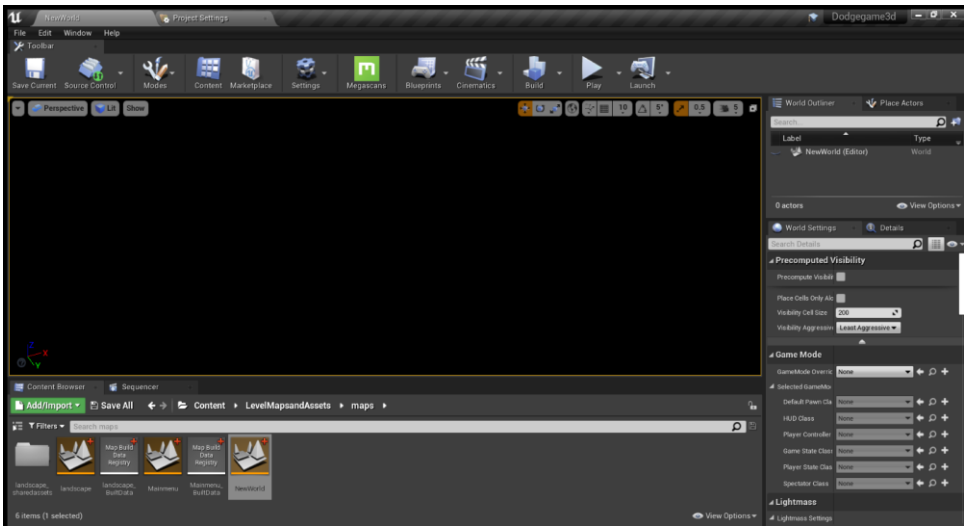

Fig.1.4

That's because there is no light in our virtual environment. Let's place a light actor in the viewport. In the right pane click on the place actors and search for lights. sky lights. Different lights serve a different purpose. Let us use directional light and sky light for creating a sky like atmosphere. Now let's create a big sphere like dome and place a sky atmosphere for our sky.

Now we have created a sky in our environments, we can adjust our lighting more and customise the time of the day and we can even give a blue tint or a sunny tint for a more realistic feel.

We can adjust more lighting until we get a more realistic feel, we can also make our lights from static to movable to get the shadow move with the object while real time rendering. We can change the orientation of the directional light to change the direction of sunlight to our liking.

Fig.1.5

Then let's create the land. Inside starter content there will be a floor or create a cube and scale it down along the z-axis to create a land. Now let's create a **material** and **texture** for our land**.**.

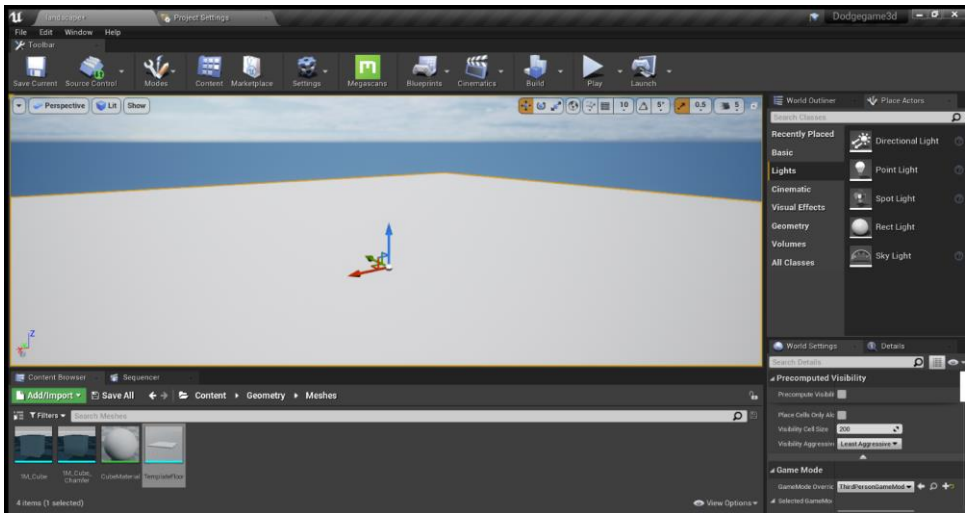

Fig.1.6

Materials:

A **Material** is an asset that can be applied to a mesh to control the visual look of the scene. At a high level, it is probably easiest to think of a Material as the "paint" that is applied to an object. But even that can be a little misleading, since a Material literally defines the type of surface from which your object appears to be made. You

can define its colour, how shiny it is, whether you can see through the object, and much more.In more technical terms, when light from the scene hits the surface, a Material is used to calculate how that light interacts with that surface. These calculations are done using incoming data that is input to the Material from a variety of images (textures) and math expressions, as well as from various property settings inherent to the Material itself.

Textures are images that are used in Materials. They are mapped to the surfaces the Material is applied to. Either Textures are applied directly - for example, for Base Color textures - or the values of the Texture's pixels (or *texels*) are used within the Material as masks or for other calculations. In some instances, Textures may also be used directly, outside of materials, such as for drawing to the HUD. For the most part, Textures are created externally within an image-editing application, such as Photoshop, and then imported into Unreal Editor through the **Content Browser**.

create a new material in the material folder and name it as grassland. Now we need some normal maps textures and base colour images of a real land to create a virtual realistic environment. We can find those maps and images online for free from unreal marketplace, bridge, and other websites. After downloading the megascans we should import them into our current project under the materials folder

Now Let’s drag those maps and textures into the material we created. We can see they are converted into nodes. We need to add a Landscape Coordinate node and create a size parameter. Then multiply these nodes by a multiple node and give the output as inputs to the UVs of the texture samples. We can also import more megascans and give more details to the land, like a grass part, rock part and dry grass part. We just need to do the same process again in this same material. After that create a MakeMaterialAttributes node and give the RGB channel from the textures to the base colour, Roughness and Normal channel. Likewise, we need to repeat the process for rock dirt land and dry grassland. Then we can create a Layer blend node and give these outputs and combine them to make the material attributes of this land.

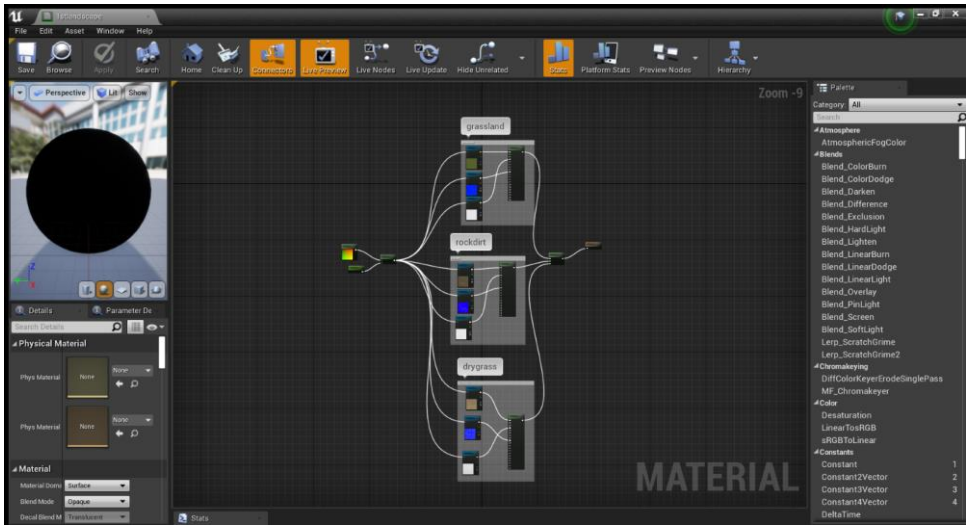
grassland
rockdirt
drygrass
MATERIAL

Fig.1.7

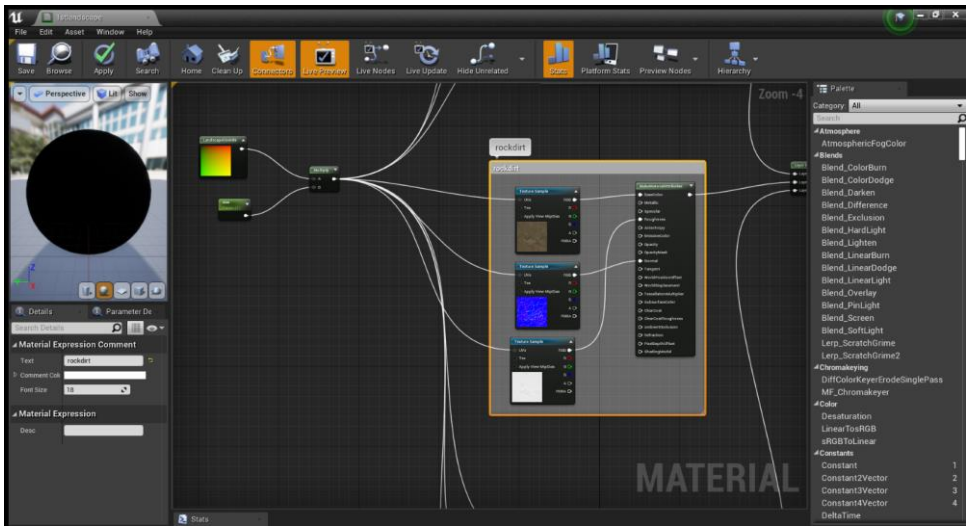
rockdirt
MATERIAL

Fig.1.8

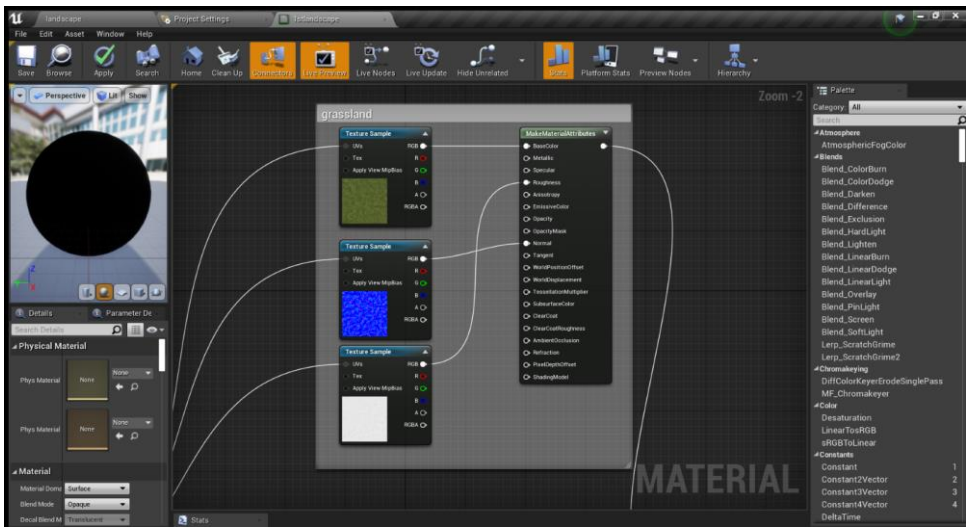
grassland
MATERIAL

Fig.1.9

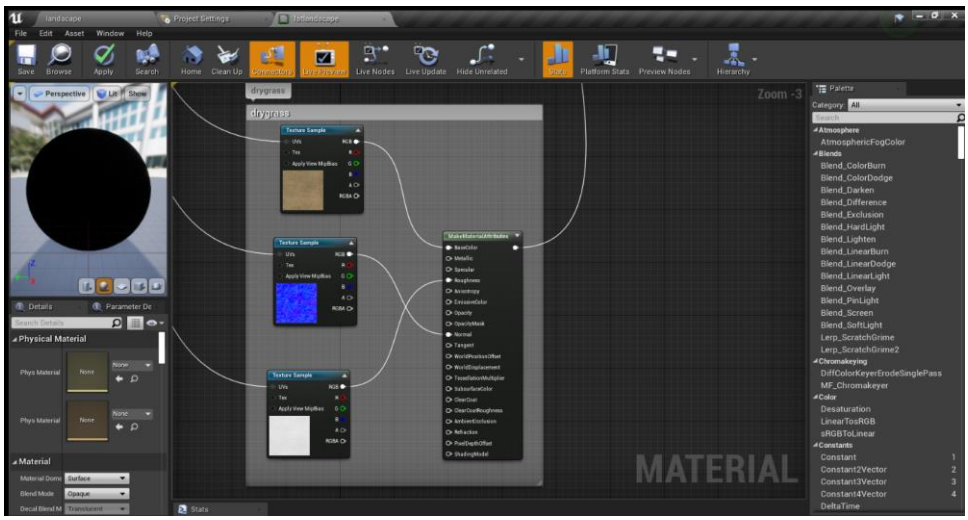

Fig.2.0

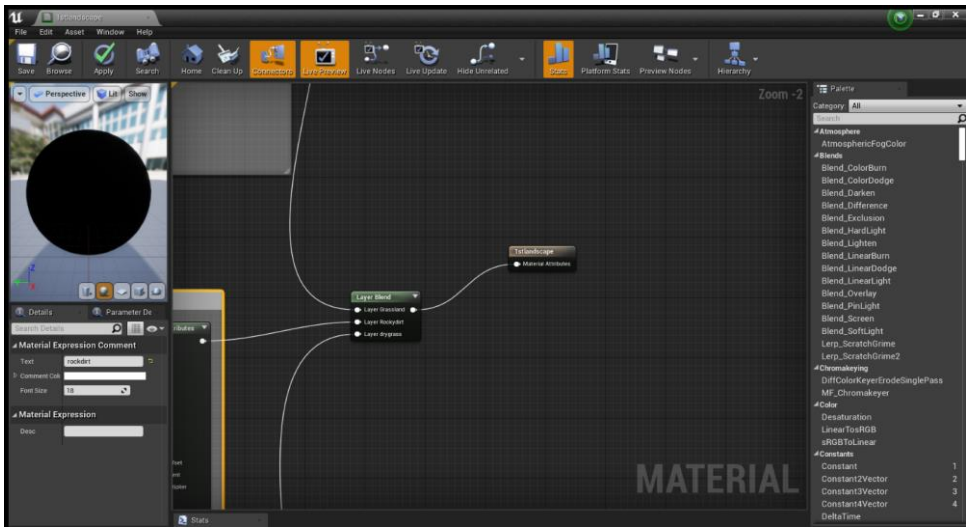

Fig.2.1

5.2.DEVELOPMENT:

Let’s use the default third person character mesh available in unreal and get started for now. We can change it to FPP later as we need it to be FPP for VR if we need; For now let's focus on the PC prototype.

- We need to program this character to move in six degrees of freedom. The character movement keys should be WASD keys.
- We should be able to rotate the camera by rotating the mouse.
- And we should be able to jump when the spacebar key is pressed.

For doing all these things we need to create a new blueprint for this third person character. **Blueprint** is the visual scripting system inside the unreal engine 4 and is an efficient way to prototype the application. Instead of visually writing code line by line you drag and drop nodes, set their properties and drag wires to connect them.
After creating a blueprint in the viewport add the default character and place a camera behind the character and attach it with the character.

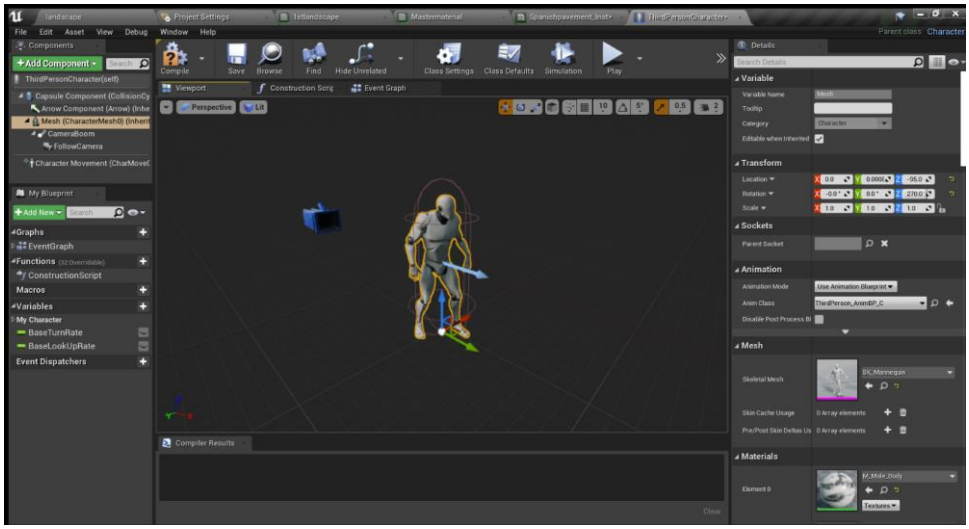

Fig.2.2

After all these let's click the event graph where we can assign controls.

We can create an input axis event for turning sideways and for turning up and down and give it to the input as pitch and yaw separately.

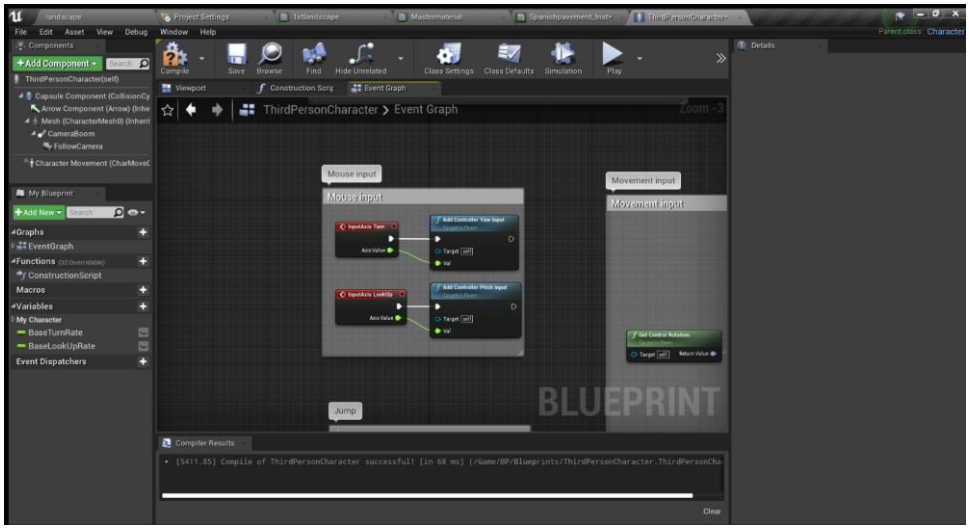

Fig.2.3

To move forward and side we can use forward vector and right vector to the input movement node setting the target as the character.

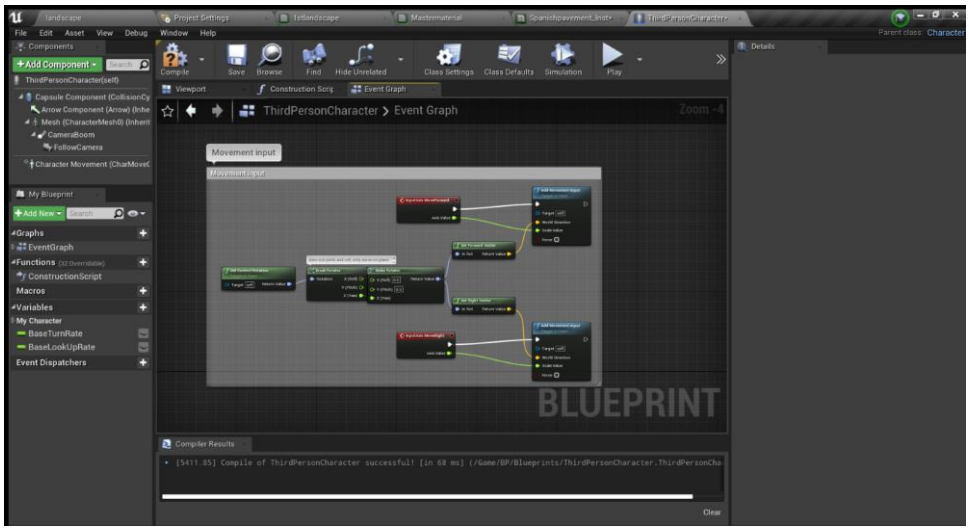

Fig.2.4

We can create a custom event for jumping and give conditions when to stop jumping and when to start jumping.

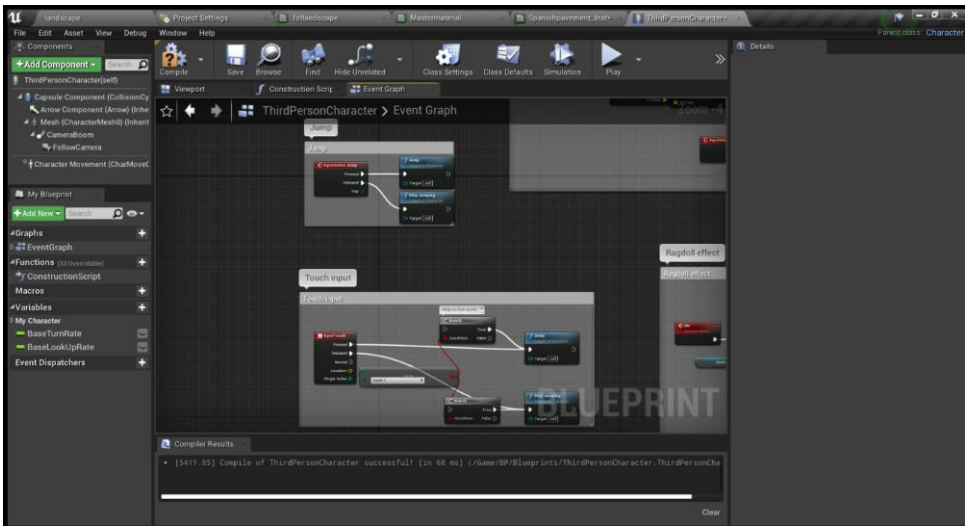

Fig.2.5

the basic interactions, the functions for hosting and joining the session, as well as enabling real-time voice communication is created. Unreal Engine 5 can be used efficiently to program these functions, which includes setting up the networking

system and integrating the EOS Epic online services. You'll also need to program the prototype that will allow players to host and join sessions.

Networking and Voice Communication: Unreal Engine 5 is a powerful game engine that comes equipped with a range of networking features, which make it an ideal platform for creating Social Virtual Worlds. However, to make full use of these features, programmers need to carefully choose the online subsystem interface (OSS) that will best meet the needs of their project. In this case, the EOS Epic of functionalities that are crucial for hosting a successful Social Virtual World. The Epic Developer Portal is used to create and host the product, which makes it easy by integrating the EOS services with the Social Virtual World, users are able to enjoy a seamless communication experience with their friends, family, and colleagues. The voice communication feature enables real-time conversations, which adds a new dimension to the overall experience of being in a Social Virtual World. This allows users to interact with each other in a more natural and engaging manner, and facilitates the sharing of ideas, knowledge, and information.

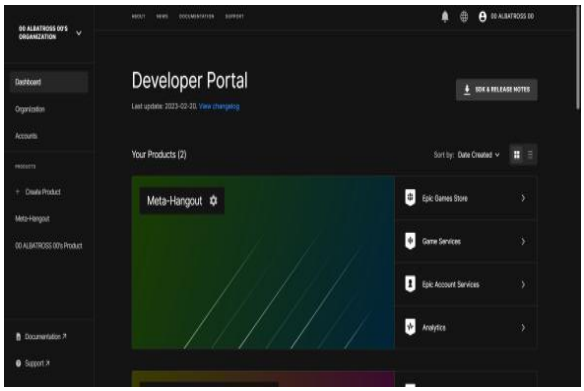

Fig.2.6

In order to host and join the session, a prototype is created that includes the basic functions required for these actions. This prototype will be used for testing and refining the game mechanics and networking functionality before investing too much time and resources into full-scale development.

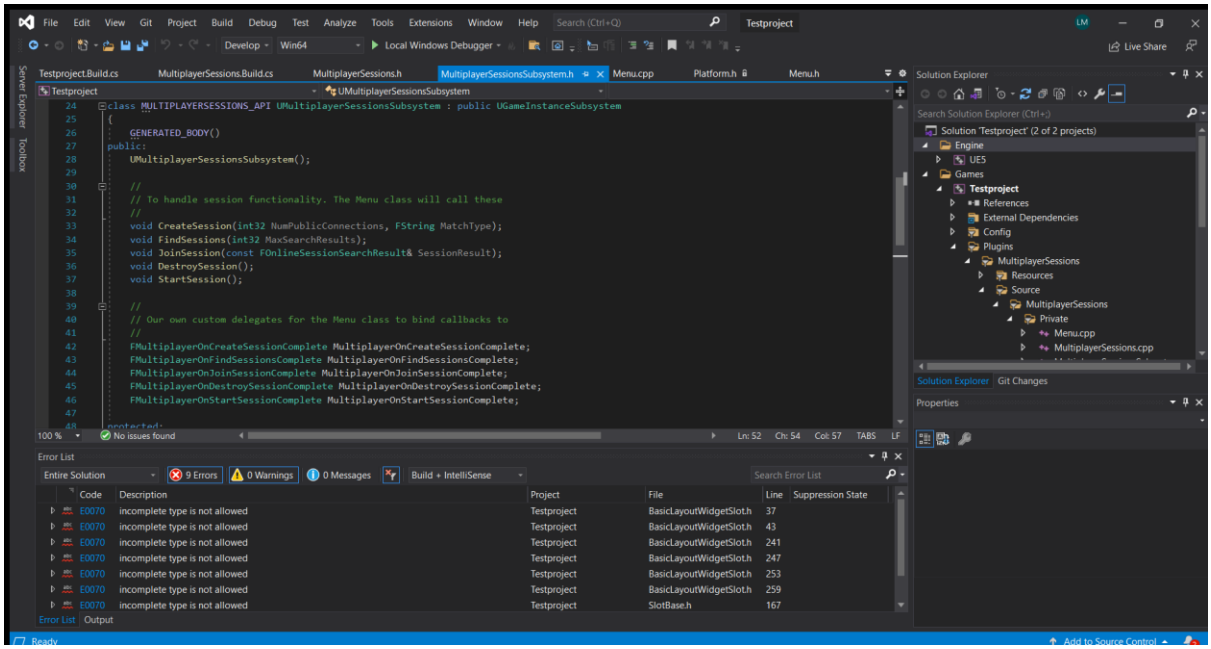

Fig 2.7

After returning that one , the script we created connects the user to the hosted session which was hosted earlier by our host.

Testing and Optimization:

Testing your application is critical to ensure that it is stable, reliable, and free of bugs. perform manual and automated testing to identify issues and address them. Optimization techniques such as code profiling and asset optimization will also be necessary to improve the game's performance and reduce resource usage.

Deployment:

Finally, the application needs to be built and deployed for the targeted platforms. This includes creating a package for each platform and testing it to ensure that it works properly. Also, factors such as user interface design and input methods for each platform should be considered, and optimise the application accordingly. Once the application is fully tested and optimised, it can be deployed to the public for use.

CHAPTER 6
RESULTS AND DISCUSSION

With the increasing use of the internet, cyberspace has become an essential part of our daily lives. It is an interconnected landscape where people access various online services, participate in conversations, and share information globally. People also use cyberspace to buy and sell goods, access financial services, and seek entertainment.

Discussion: While cyberspace has provided numerous benefits, it also comes with various risks. Cybercrimes such as hacking, cyberbullying, identity theft, and phishing have become increasingly common. Governments and other organisations also use cyberspace for surveillance, which can threaten people's privacy and freedom of expression. Moreover, the spread of fake news and propaganda through the internet has caused significant damage to society. People often find it challenging to distinguish between genuine and fake news, which can lead to widespread misinformation and distrust of institutions.

In conclusion, the use of cyberspace has transformed the way we interact with the world around us. However, we need to be aware of the risks associated with this digital realm and take measures to protect ourselves and our information. Governments, organisations, and individuals should work towards creating a safe and secure cyberspace that promotes positive interactions and information exchange while safeguarding individual freedoms and privacy.

CHAPTER 7
CONCLUSION

7.1. CONCLUSION

In conclusion, cyberspace serves as a powerful platform for connecting individuals, organisations, and governments across the globe. With the growth of technology, cyberspace has become an essential tool in our daily lives for communication, commerce, education, and entertainment. However, it is also important to be aware of the potential risks and challenges in cyberspace, such as cybercrime, privacy violations, and cyberbullying. As we continue to rely on cyberspace for our daily activities, it is essential to implement strong cybersecurity measures and ethical practices to ensure the safety and protection of individuals and the overall digital infrastructure. In summary, cyberspace has revolutionised the way we communicate and interact with the world, and we must continue to use it responsibly and safely to continue reaping its benefits.

7.2.FUTURE WORK

- One possible improvement is to host the SVW on a dedicated server, making it accessible from anywhere in the world. This would increase the reach and

availability of the virtual world, allowing users from all over the globe to connect and interact.

- Another potential area for expansion is to make the virtual world bigger and more interactive, providing opportunities for a wider range of businesses and entertainment options to thrive. This could include creating new areas and features, such as virtual marketplaces, gaming experiences, or social spaces.
- To accommodate a larger number of users, it may be necessary to optimize the infrastructure of the virtual world, allowing it to support a greater volume of simultaneous interactions and users. This could involve improving the efficiency and scalability of the servers, as well as optimizing the design of the virtual environment to minimize lag and other performance issues.
- Finally, deploying the SVW in virtual reality (VR) could be a game-changer, allowing users to fully immerse themselves in the virtual world and experience it in a more realistic and engaging way. However, this would also require significant advancements in VR technology and hardware, as well as careful design considerations to ensure optimal usability and accessibility.

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APPENDIX

A.SOURCE CODE:

Multiplayersessionsubsystem.h

```
#include "CoreMinimal.h"
#include "Subsystems/GameInstanceSubsystem.h"
#include "Interfaces/OnlineSessionInterface.h"
#include "MultiplayerSessionsSubsystem.generated.h"
//
// Declaring our own custom delegates for the Menu class to bind callbacks to
//
DECLARE_DYNAMIC_MULTICAST_DELEGATE_OneParam(FMultiplayerOnCreate
SessionComplete, bool, bWasSuccessful);
DECLARE_MULTICAST_DELEGATE_TwoParams(FMultiplayerOnFindSessionsCo
mplete, const TArray<FOnlineSessionSearchResult>& SessionResults, bool
bWasSuccessful);
DECLARE_MULTICAST_DELEGATE_OneParam(FMultiplayerOnJoinSessionComp
lete, EOnJoinSessionCompleteResult::Type Result);
DECLARE_DYNAMIC_MULTICAST_DELEGATE_OneParam(FMultiplayerOnDestro
ySessionComplete, bool, bWasSuccessful);
DECLARE_DYNAMIC_MULTICAST_DELEGATE_OneParam(FMultiplayerOnStartS
essionComplete, bool, bWasSuccessful);

/**
 *
 */
UCLASS()
class MULTIPLAYERSESSIONS_API UMultiplayerSessionsSubsystem : public
```

```
UGameInstanceSubsystem
{
	GENERATED_BODY()
public:
	UMultiplayerSessionsSubsystem();

	//
	// To handle session functionality. The Menu class will call these
	//
	void CreateSession(int32 NumPublicConnections, FString MatchType);
	void FindSessions(int32 MaxSearchResults);
	void JoinSession(const FOnlineSessionSearchResult& SessionResult);
	void DestroySession();
	void StartSession();
	//
	// Our own custom delegates for the Menu class to bind callbacks to
	//
	FMultiplayerOnCreateSessionComplete
MultiplayerOnCreateSessionComplete;
	FMultiplayerOnFindSessionsComplete MultiplayerOnFindSessionsComplete;
	FMultiplayerOnJoinSessionComplete MultiplayerOnJoinSessionComplete;
	FMultiplayerOnDestroySessionComplete
MultiplayerOnDestroySessionComplete;
	FMultiplayerOnStartSessionComplete MultiplayerOnStartSessionComplete;

protected:

	//
	// Internal callbacks for the delegates we'll add to the Online Session Interface
delegate list.
	// Those don't need to be called outside this class.
	//
	void OnCreateSessionComplete(FName SessionName, bool
bWasSuccessful);
```

```
	void OnFindSessionsComplete(bool bWasSuccessful);
	void OnJoinSessionComplete(FName SessionName,
EOnJoinSessionCompleteResult::Type Result);
	void OnDestroySessionComplete(FName SessionName, bool
bWasSuccessful);
	void OnStartSessionComplete(FName SessionName, bool bWasSuccessful);

private:
	IOnlineSessionPtr SessionInterface;
	TSharedPtr<FOnlineSessionSettings> LastSessionSettings;
	TSharedPtr<FOnlineSessionSearch> LastSessionSearch;

	//
	// To add to the Online Session Interface delegate list.
	// We'll bind our MultiplayerSessionsSubsystem internal callbacks to these.
	//
	FOnCreateSessionCompleteDelegate CreateSessionCompleteDelegate;
	FDelegateHandle CreateSessionCompleteDelegateHandle;
	FOnFindSessionsCompleteDelegate FindSessionsCompleteDelegate;
	FDelegateHandle FindSessionsCompleteDelegateHandle;
	FOnJoinSessionCompleteDelegate JoinSessionCompleteDelegate;
	FDelegateHandle JoinSessionCompleteDelegateHandle;
	FOnDestroySessionCompleteDelegate DestroySessionCompleteDelegate;
	FDelegateHandle DestroySessionCompleteDelegateHandle;
	FOnStartSessionCompleteDelegate StartSessionCompleteDelegate;
	FDelegateHandle StartSessionCompleteDelegateHandle;

	bool bCreateSessionOnDestroy{ false };
	int32 LastNumPublicConnections;
	FString LastMatchType;
};
```

Source code: Menu.cpp

```
#include "Menu.h"
#include "Components/Button.h"
#include "MultiplayerSessionsSubsystem.h"
#include "OnlineSessionSettings.h"
#include "OnlineSubsystem.h"

void UMenu::MenuSetup(int32 NumberOfPublicConnections, FString TypeOfMatch,
FString LobbyPath)
{
	PathToLobby = FString::Printf(TEXT("%s?listen"), *LobbyPath);
	NumPublicConnections = NumberOfPublicConnections;
	MatchType = TypeOfMatch;
	AddToViewport();
	SetVisibility(ESlateVisibility::Visible);
	bIsFocusable = true;

	UWorld* World = GetWorld();
	if (World)
	{
		APlayerController* PlayerController = World-
>GetFirstPlayerController();
		if (PlayerController)
		{
			FInputModeUIOnly InputModeData;
			InputModeData.SetWidgetToFocus(TakeWidget());

	InputModeData.SetLockMouseToViewportBehavior(EMouseLockMode::DoNo
tLock);
			PlayerController->SetInputMode(InputModeData);
			PlayerController->SetShowMouseCursor(true);
		}
	}
	UGameInstance* GameInstance = GetGameInstance();
```

```
	if (GameInstance)
	{
		MultiplayerSessionsSubsystem = GameInstance-
>GetSubsystem<UMultiplayerSessionsSubsystem>();
	}

	if (MultiplayerSessionsSubsystem)
	{
		MultiplayerSessionsSubsystem-
>MultiplayerOnCreateSessionComplete.AddDynamic(this,
&ThisClass::OnCreateSession);
		MultiplayerSessionsSubsystem-
>MultiplayerOnFindSessionsComplete.AddUObject(this,
&ThisClass::OnFindSessions);
		MultiplayerSessionsSubsystem-
>MultiplayerOnJoinSessionComplete.AddUObject(this, &ThisClass::OnJoinSession);
		MultiplayerSessionsSubsystem-
>MultiplayerOnDestroySessionComplete.AddDynamic(this,
&ThisClass::OnDestroySession);
		MultiplayerSessionsSubsystem-
>MultiplayerOnStartSessionComplete.AddDynamic(this,
&ThisClass::OnStartSession);
	}
}

bool UMenu::Initialize()
{
	if (!Super::Initialize())
	{
		return false;
	}

	if (HostButton)
	{
```

```
		HostButton->OnClicked.AddDynamic(this,
&ThisClass::HostButtonClicked);
	}
	if (JoinButton)
	{
		JoinButton->OnClicked.AddDynamic(this,
&ThisClass::JoinButtonClicked);
	}

	return true;
}

void UMenu::OnLevelRemovedFromWorld(ULevel* InLevel, UWorld* InWorld)
{
	MenuTearDown();
	Super::OnLevelRemovedFromWorld(InLevel, InWorld);
}

void UMenu::OnCreateSession(bool bWasSuccessful)
{
	if (bWasSuccessful)
	{
		UWorld* World = GetWorld();
		if (World)
		{
			World->ServerTravel(PathToLobby);
		}
	}
	else
	{
		if (GEngine)
		{
			GEngine->AddOnScreenDebugMessage(
				-1,
```

```
                        15.f,
                        FColor::Red,
                        FString(TEXT("Failed to create session!"))
                    );
            }
            HostButton->SetIsEnabled(true);
        }
}

void UMenu::OnFindSessions(const TArray<FOnlineSessionSearchResult>&
SessionResults, bool bWasSuccessful)
{
        if (MultiplayerSessionsSubsystem == nullptr)
        {
            return;
        }

        for (auto Result : SessionResults)
        {
            FString SettingsValue;
            Result.Session.SessionSettings.Get(FName("MatchType"),
SettingsValue);
            if (SettingsValue == MatchType)
            {
                MultiplayerSessionsSubsystem->JoinSession(Result);
                return;
            }
        }
        if (!bWasSuccessful || SessionResults.Num() == 0)
        {
            JoinButton->SetIsEnabled(true);
        }
}
void UMenu::OnJoinSession(EOnJoinSessionCompleteResult::Type Result)
```

```
{
	IOnlineSubsystem* Subsystem = IOnlineSubsystem::Get();
	if (Subsystem)
	{
		IOnlineSessionPtr SessionInterface = Subsystem-
>GetSessionInterface();
		if (SessionInterface.IsValid())
		{
			FString Address;
SessionInterface->GetResolvedConnectString(NAME_GameSession, Address);
	APlayerController* PlayerController = GetGameInstance()-
>GetFirstLocalPlayerController();
			if (PlayerController)
			{
				PlayerController->ClientTravel(Address,
ETravelType::TRAVEL_Absolute);
			}
		}
	}
}

void UMenu::OnDestroySession(bool bWasSuccessful)
{
}
void UMenu::OnStartSession(bool bWasSuccessful)
{
}

void UMenu::HostButtonClicked()
{
	HostButton->SetIsEnabled(false);
	if (MultiplayerSessionsSubsystem)
	{
MultiplayerSessionsSubsystem->CreateSession(NumPublicConnections,
```

```
MatchType);
	}
}

void UMenu::JoinButtonClicked()
{
	JoinButton->SetIsEnabled(false);
	if (MultiplayerSessionsSubsystem)
	{
		MultiplayerSessionsSubsystem->FindSessions(10000);
	}
}

void UMenu::MenuTearDown()
{
	RemoveFromParent();
	UWorld* World = GetWorld();
	if (World)
	{
		APlayerController* PlayerController = World-
>GetFirstPlayerController();
		if (PlayerController)
		{
			FInputModeGameOnly InputModeData;
			PlayerController->SetInputMode(InputModeData);
			PlayerController->SetShowMouseCursor(false);
		}
	}
}
FString(TEXT("FreeForAll")), FString LobbyPath =
FString(TEXT("/Game/ThirdPersonCPP/Maps/Lobby")));
protected:
```

Source code: Menu.h

```
#include "CoreMinimal.h"
#include "Blueprint/UserWidget.h"
#include "Interfaces/OnlineSessionInterface.h"
#include "Menu.generated.h"
UCLASS()
class MULTIPLAYERSESSIONS_API UMenu : public UUserWidget
{
	GENERATED_BODY()
public:
	UFUNCTION(BlueprintCallable)
	void MenuSetup(int32 NumberOfPublicConnections = 4, FString
TypeOfMatch = ol Initialize() override;
	virtual void OnLevelRemovedFromWorld(ULevel* InLevel, UWorld* InWorld)
override;
	//
	// Callbacks for the custom delegates on the MultiplayerSessionsSubsystem
	//
	UFUNCTION()
	void OnCreateSession(bool bWasSuccessful);
	void OnFindSessions(const TArray<FOnlineSessionSearchResult>&
SessionResults, bool bWasSuccessful);
	void OnJoinSession(EOnJoinSessionCompleteResult::Type Result);
	UFUNCTION()
	void OnDestroySession(bool bWasSuccessful);
	UFUNCTION()
	void OnStartSession(bool bWasSuccessful);

Private:
	UPROPERTY(meta = (BindWidget))
	class UButton* HostButton;

	UPROPERTY(meta = (BindWidget))
	UButton* JoinButton;
```

```
	UFUNCTION()
	void HostButtonClicked();

	UFUNCTION()
	void JoinButtonClicked();

	void MenuTearDown();

	// The subsystem designed to handle all online session functionality
	class UMultiplayerSessionsSubsystem* MultiplayerSessionsSubsystem;

	int32 NumPublicConnections{4};
	FString MatchType{TEXT("FreeForAll")};
	FString PathToLobby{TEXT("")};
};
```

Source code: Multiplayerbuild.cs

```
using UnrealBuildTool;
public class MultiplayerSessions : ModuleRules
{
	public MultiplayerSessions(ReadOnlyTargetRules Target) : base(Target)
	{
		PCHUsage =
ModuleRules.PCHUsageMode.UseExplicitOrSharedPCHs;
		PublicIncludePaths.AddRange(
			new string[] {
				// ... add public include paths required here ...
			}
			);
		PrivateIncludePaths.AddRange(
			new string[] {
				// ... add other private include paths required here ...
			}
			);
		PrivateDependencyModuleNames.AddRange(
```

```
                new string[]
                {
                        "CoreUObject",
                        "Engine",
                        "Slate",
                        "SlateCore",
                        }
                );
DynamicallyLoadedModuleNames.AddRange(
                new string[]
```

B.SCREENSHOTS:

Fig 2.8

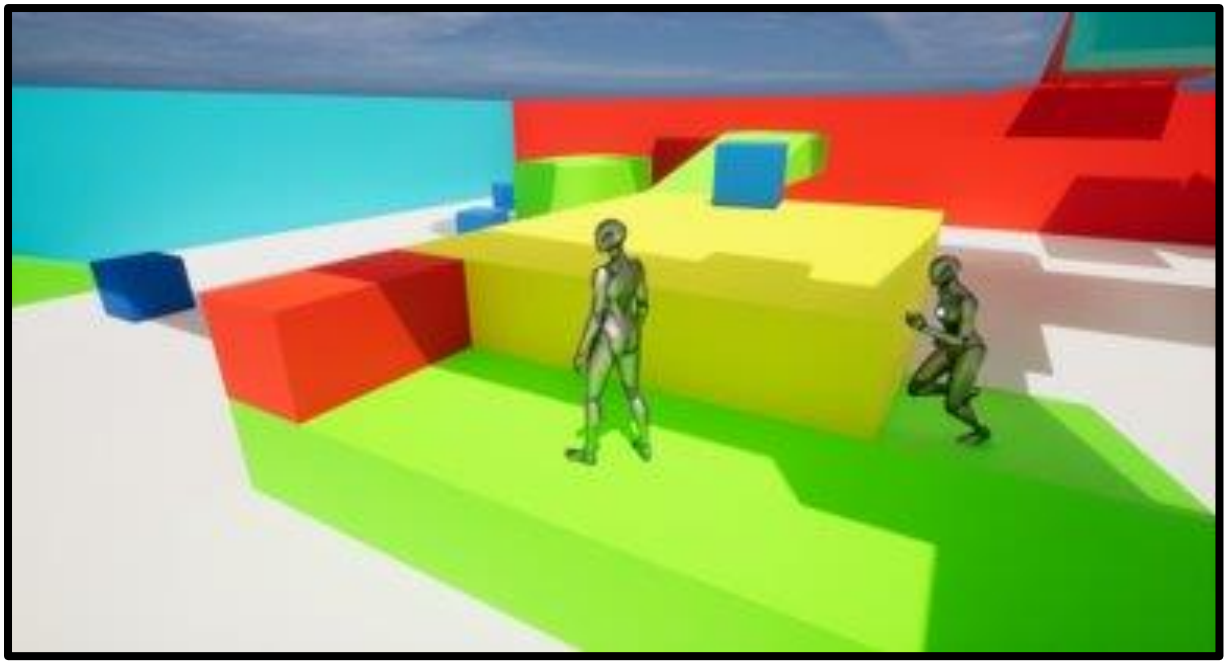

Fig 2.9

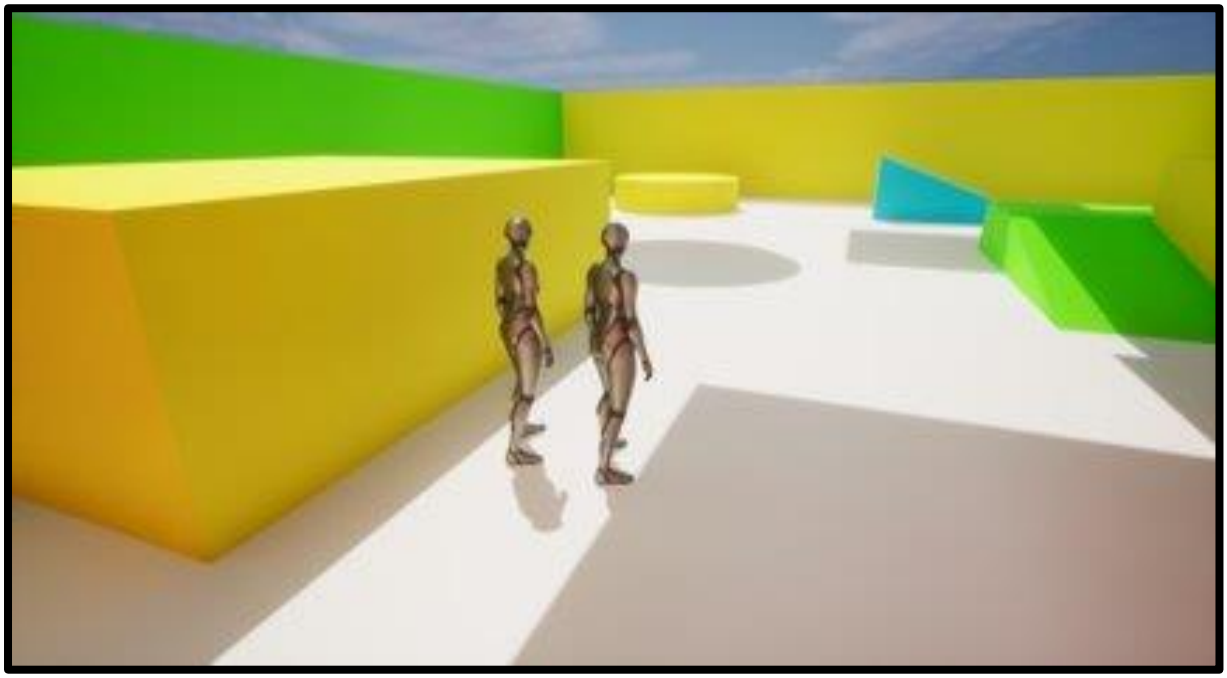

Fig 3.0

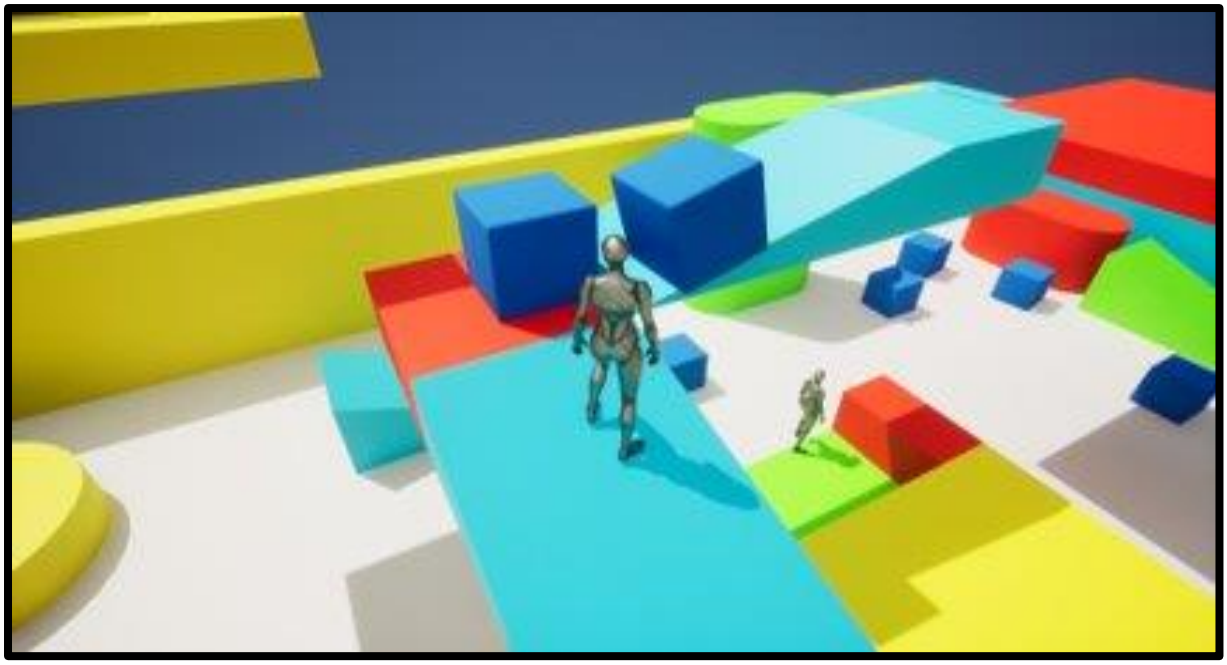

Fig 3.1

C.RESEARCH PAPER

Exploring Social Virtual Worlds for Virtual Communication

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Abstract-- Social Virtual Worlds have begun to offer great potential for communication in recent years. The recent development of SVWs , VR and blockchain has led to the metaverse. SVW is all about creating an immersive virtual social environment that simulates a three dimensional social environment for communication, which is primarily based on personal presence and social presence. In this research we connect users in a surreal virtual environment and establish voice communication in order to make them feel each other's presence. Users can interact and hangout in the virtual world.

Keywords*:* Social Virtual Worlds (SVW), Metaverse, Virtual reality, Networking.

I. INTRODUCTION

A virtual world is an online community where individuals can communicate with one another in a computer-based simulated environment. These modeled worlds may take inspiration from real or

fantastical realms for their rules. Avatars are digital representations of the avatar creator on the internet. Users can communicate with one another through text, gestures and voice communication. Massively multiplayer online role-playing games (MMORPGs) frequently feature real-time dialogue and action. Players construct a character who moves between locations for work or play, such as buildings, towns, and entire worlds. Although real-time voice communication is also possible, text-based communication is more common. People use input devices like the keyboard, mouse, and other specially built command and simulation tools like VR controllers to control their avatars. Virtual worlds of today are created specifically for social, educational, training and entertainment. In the 1990s, the introduction of multiplayer 3-D games sparked new developments in interactive virtual environments. Users interact with these virtual environments using their avatars to play games.

Fantasy novels, comics, science fiction, anime, literature and films have a significant influence on these virtual worlds. Social virtual worlds [SVWs] emphasis on user engagement, education, and training through simulated worlds in addition to enjoyment. Virtual environments offer a range of flexible experiences that allow users to interact with others in various ways, including exploring natural settings, participating in adventurous activities, interacting with members of virtual communities, engaging in political debates or experiments, attending educational sessions, training in simulated environments, and many other virtual experiences. These social virtual worlds are rapidly gaining appeal, especially in educational, governmental, commercial, and military groups, while being less established than game worlds. Because of these developments in virtual worlds, the metaverse—basically a virtual domain that connects several virtual worlds—has emerged.

In science fiction, the "metaverse" is a proposed iteration of the Internet as a single, universal, and immersive virtual world that is made possible by the use of virtual reality (VR) and augmented reality (AR) headsets. The concept "metaverse" was first coined by author Neal Stephenson in his science fiction book Snow Crash in 1992, but development of the technology that supports a virtual reality-based internet has been ongoing for decades. Meta is defined as transcendent, hence the name Metaverse. It implies that the metaverse extends past this verse and reality. The term "metaverse" is often used in the computer industry to describe a unified, immersive, and persistent 3D virtual world that enables people to have experiences that may not be possible in real life. This concept can be enhanced by combining different technologies, such as SVWs, XR, NFTs, blockchain, and digital twin tech. In this virtual world, it's possible to envision a scenario where billions of people can live, work, shop, learn, and interact with each other. It's as if technology has erased the boundary between reality and the digital world, opening up limitless potential and possibilities.

II. LITERATURE REVIEW

The article [1] discusses the various challenges and needs associated with SVWs. The author suggests that SVWs are increasingly becoming a significant force in shaping the knowledge-based and globalized societies and economies of the future. However, along with technological and business challenges, the application of theories related to the rights of the physical world in the virtual world is still an important issue that needs to be addressed.

Another article [2] explores the idea of using 3D environments for a variety of purposes, such as classroom instruction, business meetings, and virtual socializing. However, it highlights the potential risk of errors leading to the spread of virtual epidemics among avatars.

The author of [3] emphasizes the advantages of connecting and rebuilding businesses in the metaverse, but also acknowledges the importance of addressing the technological requirements for its co-existence. The design of Second Life, for instance, enables seamless movement between virtual properties, but requires an adaptable architecture to manage changes in player numbers.

In [4], the focus is on the positive aspects of VR-based social network inclusion, such as facilitating expertise, knowledge, relationships, and opportunities. However, it also acknowledges that adapting to VR can be challenging, and some individuals may struggle with the hardware requirements.

Finally, [5] discusses how virtual worlds have become a new form of interaction for millions of users and how telecommunications service providers can leverage this trend to generate revenue. However, they must also confront issues related to standardizing interfaces on social networks and addressing discrepancies in coverage.

In summary, these articles highlight the potential of SVWs to shape the future of society and business, while also acknowledging the various challenges and risks associated with their use. They emphasize the need for careful consideration and planning to ensure the successful integration of SVWs into our daily lives. Overall, these papers highlight the potential of SVWs to shape society and business in the future, while also acknowledging the challenges and issues that need to be addressed.

III. PROPOSED WORK

In this work, we aim to create a next level of communication via the internet. In the Previous generations, we used to have telegraph, after that voice call was introduced and then voice call evolved into video call in which both audio and video is available. Now with the boom of Meta verse and VR technologies gave much more place to social virtual worlds in communication. So our work is going to be the SVW in which users can enter into the virtual 3D world and can talk with each other while doing certain fun activities like playing in that virtual world etc. Avatar is a 3D model which is going to represent the user in the virtual 3D world. In this virtual world there will be a host who will host the session and other members can find the session and join into the session.

IV. RESEARCH METHODOLOGY

In this study a social virtual world is created and hosted so that members can join the created session. This session is available for the other players to join and as soon as they join , their character will spawn into the social virtual world. Then these players in the SVW can play and use voice chat features for communication. This project will enable real time voice communication with players inside the session. We selected Unreal Engine 5 particularly for this particular project.

Fig.1 Development pipeline

Configuration and Design Phase: In this phase, set up the development environment and configure the necessary settings for your targeted platforms. Also design the virtual world, which includes creating a layout for the environment and defining the objects and characters within it. There are several factors to consider such as the size of the world, the number of players it can accommodate, and the types of activities that can be performed. The setting of the world is important as people spend time seeing them and interacting with them. It needs to be engaging, informative as well as appropriate. By appropriate I mean it needs to be a board room for a meeting and a club for friends who hangout from remote locations.

Development Phase: This is the programming phase where the functions required for moving the characters,
Defining the game mechanics and game physics of the world, and functions for basic interactions within the game environment is done. After done with the basic interactions, the functions for hosting and joining the session, as well as enabling real-time voice communication is created. Unreal Engine 5 can be used efficiently to program these functions, which includes setting up the networking system and integrating the EOS Epic online services. You'll also need to program the prototype that will allow players to host and join sessions.

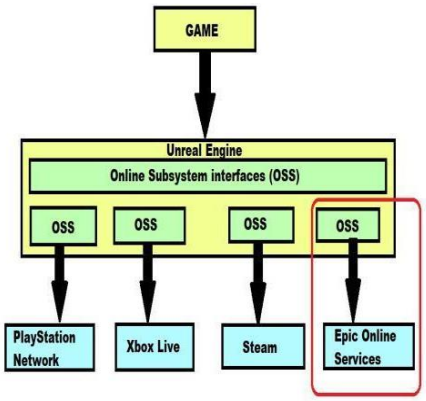

Fig.3 Networking

Networking and Voice Communication: Unreal Engine 5 is a powerful game engine that comes equipped with a range of networking features, which make it an ideal platform for creating Social Virtual Worlds. However, to make full use of these features, programmers need to carefully choose the online subsystem interface (OSS) that will best meet the needs of their project. In this case, the EOS Epic online services were selected as the ideal choice for hosting the session and enabling voice communication. The EOS Epic online services provide a wide range of functionalities that are crucial for hosting a successful Social Virtual World. The Epic Developer Portal is used to create and host the product, which makes it easy to manage and customize the world as per the specific requirements of the users. The portal also provides an intuitive interface for integrating the voice communication functionality using the EOS services, which simplifies the entire process of setting up a Social Virtual World.

By integrating the EOS services with the Social Virtual World, users are able to enjoy a seamless

communication experience with their friends, family, and colleagues. The voice communication feature enables real-time conversations, which adds a new dimension to the overall experience of being in a Social Virtual World. This allows users to interact with each other in a more natural and engaging manner, and facilitates the sharing of ideas, knowledge, and information.

The use of EOS Epic online services for hosting a Social Virtual World enables a more engaging and immersive experience for the users. By making full use of the networking and voice communication features of Unreal Engine 5, programmers can create a platform that is both fun and informative, and that can be accessed by anyone, anywhere in the world.

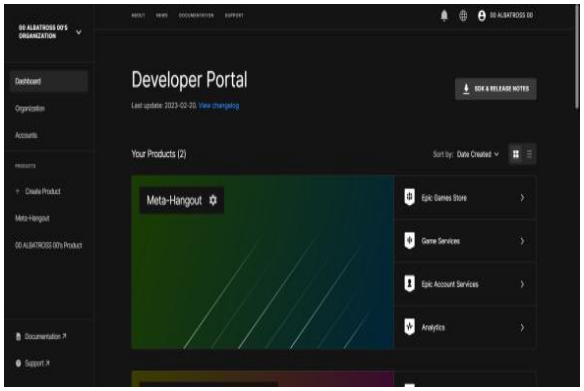

Fig.3 EOS dev portal

Prototype Programming: In order to host and join the session, a prototype is created that includes the basic functions required for these actions. This prototype will be used for testing and refining the game mechanics and networking functionality before investing too much time and resources into full-scale development.

Testing and Optimization: Testing your application is critical to ensure that it is stable, reliable, and free of bugs. perform manual and automated testing to identify issues and address them. Optimization techniques such as code profiling and asset optimization will also be necessary to improve the game's performance and reduce resource usage. Unreal Engine offers powerful tools and features for testing and optimizing content in applications that require high frame rates for quality experiences. One such tool is the Gameplay Debugger Tool (GDT), which allows developers to monitor real-time data at runtime, even on clients in networked games with replication. The GDT works in Play In Editor (PIE), Simulate In Editor (SIE), and standalone game sessions, and the data is displayed as an overlay on the game viewport. It also provides a framework that can be extended to enable debugging of game-specific data. Another useful tool is the Console Variables Editor, which displays information about all the console variables set in the project and provides a central location to view and modify them. This tool allows for creating presets to use the same console variables and values across multiple projects and supports controlling variables across multiple computers in a Multi-User session.

Deployment: Finally, the application needs to be built and deployed for the targeted platforms. This includes creating a package for each platform and testing it to ensure that it works properly. Also, factors such as user interface design and input methods for each platform should be considered, and optimize the application accordingly. Once the application is fully tested and optimized, It can be deployed to the public for use.

V. CONCLUSION

The research findings demonstrate that Social Virtual Environments (SVWs) offer a multitude of benefits for users, including the ability to participate in a wide range of activities such as experiments, debates, educational sessions, and training simulations. SVWs also provide opportunities to explore natural settings, engage in adventurous activities, and interact with community members in various virtual settings. Moreover, this study highlights that SVWs are not only entertaining but also highly informative, particularly in terms of communication. By utilizing these virtual environments, users can enjoy the benefits of networking and voice communication using tools such as EOS, which has proven to be an effective means of communication within SVWs.

Overall, the findings suggest that SVWs offer a more flexible and engaging experience compared to traditional methods of communication and education. As technology continues to evolve, SVWs are likely to become an increasingly important part of our daily lives, providing new and exciting opportunities for socializing, learning, and exploring.

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