Kinderview

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Declaration

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Dedication

We dedicate this project to Our Beloved Parents whose prayers, affection and encouragement made us able to get this project and success. We also like to dedicate this project to our instructors and Supervisor Ms. Sana Yousuf for assisting us in developing our technological abilities and for the many hours of proofreading.

Abstract

The traditional verbal educational method is currently the main emphasis of the teaching and learning process, which is not always advantageous. Previous studies have shown that students who just get verbal instructions struggle far more to comprehend and solve issues than students who receive verbal and visual instructions. Since children in kinder garden demands greater attention to increase their motivation in the classroom, learning experiences are a crucial part of the teaching and learning process. It is necessary to change the one-way teaching and learning system to incorporate additional senses like sight and hearing.

Kinderview is a virtual reality platform that has been designed to enhance the learning experience of Montessori pupils. The platform features a library of scientific models that are presented in a 3D format, allowing learners to fully comprehend the important features of the models. By using the Kinderview smartphone app in conjunction with a VR headset, pupils are able to view the models in virtual reality and gain a deeper understanding of the material.

The use of Kinderview has been shown to be an effective tool in improving pupils' understanding of scientific concepts and stimulating creative thinking. It is an engaging and immersive way for learners to interact with the subject matter. To fully benefit from the Kinderview platform, it is necessary for pupils to use a VR headset. Overall, Kinderview is a valuable addition to the educational toolkit for Montessori pupils.

In addition to its educational benefits, Kinderview has the potential to be a fun and exciting learning experience for pupils. The virtual reality environment provides a unique and interactive way for learners to engage with the material, which can help to keep them motivated and focused. It can also be an enjoyable way for pupils to learn, which can contribute to a positive and engaging classroom atmosphere. Overall, Kinderview is a promising educational tool that has the potential to enhance the learning experience of Montessori pupils.

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Chapter 1 Introduction

1. Introduction

Recent times have seen an increase in online classes due to the covid-19 pandemic. Kinderview is a VR library of scientific models for Montessori students. This platform provides a complete understanding of specific scientific models from the science book in a 3D version containing necessary functionalities. We aimed to develop Kinderview in a smartphone application where students will be able to view models in 3d & in virtual reality through VR headsets. To take complete advantage of Kinderview a student would need a headset to see the 3D model of the respective diagram. It will help them better understand the diagrams which will make their imagination grow.

1.1. Overall Description

1.1.1. Objectives

The main objective of Kinderview is to make the study experience better for students. Here are the objectives by which Kinderview aims to achieve its goal:

1. To provide students with a clear view of the models in 3D.
2. To provide 3d models which has a 360° view
3. To provide audio aid for the models

1.1.2. Problem Description

Whenever we see a 2d model of anything, our brain unconsciously converts it into a 3d model, which helps us to understand it. But each brain works with its imagination which may cause confusion. Explaining 2d models to children could be a hefty task for a teacher, but explaining the same models in 3d may help the students visualize the concept as it is without less chance of confusion. Aligning this concept with the idea of a virtual environment where students can see these models as they are can be very fruitful in explaining difficult concepts.

1.1.3. Methodology

We used blender for 3D models then create a virtual environment in unity where we would have imported those 3D models. Then we have added essential functionality such as audio aid for explaining models. We have embedded this virtual environment in an application in an android.

1.1.4. Project Scope

The Kinderview mainly targets the students of Montessori & primary levels (From Nursery to Level 2). Its scope includes providing audio-visual aid to children through the means of VR, helping them understand the common scientific models. Kinderview provides a 360° view of a model & its audio description. The classification is like that there are 3 levels. First level is for nursery, level 2 is for class 1 and lastly level 3 is for class 2. Level 1 scene in animals, level 2 scene is Urban and Solar system, and level 3 scene is Human Anatomy.

1.1.5. User Classes and Characteristics

Student: The student is the most important actor, as the project basically targets the students & their experience. They will use this application to visualize & conceptualize simple 2D images from the book into interactive 3D models.

Instructor: The instructor would have the same access to the application as the student. The only role that the instructor plays is to help the student while interacting with the application.

1.1.6. Operating Environment

Kinderview runs on Android operating systems. It requires a smartphone with a minimum of 4 GB RAM to function effortlessly.

1.1.7. Assumptions and Dependencies

- A certain level of training will be required for the students using this application, which will either be provided by their instructor or via on screen instructions.
- We aim to develop a modular application so that any future updates could be provided.
- The system will have quite an impact on the understanding of the children & their education.

- As Kinderview is being developed as a mobile application, everyone with a decent smartphone with a minimum requirement of 4 GB RAM and 32 GB Memory space can access this product.
- A 1080p HD camera should be used for scanning the models out of the book.

1.2. Functional Requirements

This section defines the Functional requirements or features of Kinderview

1.2.1. Three-dimensional Models View

Description:

The models are conceptualized in a 3D manner.

Functional Requirement:

- Purpose: Allow the user a comprehensive understanding of the model.
- Input: None
- Output: Three-Dimensional Model

1.2.2. Rotation of the model

Description:

This feature allows the user to rotate the 3D model.

Functional Requirement:

- Purpose: Allow the user a comprehensive understanding of the model.
- Input: Touch/Movement Input by the user
- Output: Rotation of the Model

1.2.3. Angular view of the model

Description:

This feature allows the user to revolve the 3D model.

Functional Requirement:

- Purpose: Allow the user a comprehensive understanding of the model.
- Input: Touch/Movement Input by the user.
- Output: The model revolves around a fixed axis.

1.2.4. Detailed Textures

Description:

Every 3-D Model has detailed textured view.

Functional Requirement:

- Purpose: Allow the user a comprehensive understanding of the model.
- Input: Focus on the model for two seconds
- Output: High textured model

1.2.5. Hierarchal scenes

Description:

This feature allows the user to have all the scenes in a hierarchal method. Every Main scene will have main menu as well as the small scenes. Main Menu will provide the complete hierarchy.

Functional Requirement:

- Purpose: Allow the user a comprehensive understanding of the model.
- Input: Focus on the desired menu for two seconds
- Output: Have focused Model

1.2.6. Text Instructions of model

Description:

This feature is meant to train the user while interacting with the models. It will provide a text description of the model.

Functional Requirement:

- Purpose: Allow the user a comprehensive understanding of the model.
- Input: None
- Output: Text instructions on the screen.

1.2.7. Audio Instructions of model

Description:

This feature is meant to train the user while interacting with the models. It aims to provide audio description of the model.

Functional Requirement:

- Purpose: Allow the user a comprehensive understanding of the model.
- Input: Touching the sound button/ Hovering over the sound button
- Output: Audio instruction/description for the user.

1.2.8. Visual Instructions of model

Description:

This feature is meant to train the user while interacting with the models. It aims to provide visual hints to the user.

Functional Requirement:

- Purpose: Allow the user a comprehensive understanding of the model.
- Input: Touching the arrows.
- Output: Symbols on screen to improve interaction.

1.2.9. Tutorials

Description:

This feature is meant to teach the user and give a little demo on how to use the application.

Functional Requirement:

- Purpose: Allow the user a comprehensive understanding of the model.
- Input: Focus for two seconds, Pause the video.
- Output: Tutorial Begins.

1.2.10. VR Interface

Description:

Created a unique Virtual Platform with complete details.

Functional Requirement:

- Purpose: Allow the user a comprehensive understanding of the model.
- Input: Focus for two seconds, Pause the video.
- Output: Desired scene will load.

1.3. External Interface Requirements

This section defines the External Interface Requirements of Kinderview.

1.3.1. User Interfaces

The user interface would be developed as if Kinderview is a game, this is to attract the attention of students. Also, it would be designed to be child friendly. The user interface would be designed so that its effect on the eyes will be pleasant.

1.3.2. Hardware Interfaces

Our application is fit for both android & IOS hardware. A user must have a smartphone with a minimum of 4 GB RAM. If the application is developed into an AR product, a decent camera that supports 1080p HD output would also be required.

1.3.3. Software Interfaces

For the development of the 3D environment, we will use Blender for the models & unity for the environment. Furthermore, this 3D environment would be embedded in an android application.

1.4. Nonfunctional Requirements

This section defines the Non-functional Requirements of Kinderview

1.4.1. Performance Requirements

The system must perform well & take advantage of the system resources. It should provide the user with a minimum of 30FPS while interacting with the models. The transition & movement of the models should seem smooth & fluid.

1.4.2. Hardware Limitations

The VR headsets could become a liability. Normally these headsets are expensive & prone to damage. To overcome this, VR headsets must be used under the supervision of the instructor to minimize damage. Furthermore, we aim to provide disposable cardboard VR headsets which may cost much less than proper headsets.

1.4.3. Software Quality Attributes

This system is totally self-contained. It will be compatible with Android. The user's involvement is extremely limited and is only requested when absolutely essential. A comprehensive guide will be offered to the user in the form of a handbook so that the user can fully comprehend it. Our system will be able to accomplish its goals by making the greatest use of all available resources.

1.5. Report Structure

This document's objective is to provide a full overview of the criteria for the "Kinderview" system. It will exhibit the purpose and thorough declaration for the system's development. This document is primarily designed to be offered to a client for approval and used as a reference by the development team while constructing the initial version of the system.

The rest of this work is divided into five chapters and appendices. The first chapter introduces the system, how dependable this product will be for the client, and how much scope it will have. It also gives an overview of the system's functioning, interactions with the user, and several types of user attributes as well as general limitations. The second chapter defines the literature review of the system in which it will define the comparative analysis. The third chapter provides the complete Design phase of the software also discussing the UMLs, low-level design, and high-level design. The fourth chapter will define the implementation and the last chapter will deal with testing of the system.

Chapter 2 Literature Review

2.1 Introduction

The traditional verbal educational method is currently the main emphasis of the teaching and learning process, which is not always advantageous. Previous studies have shown that students who just get verbal instructions struggle far more to comprehend and solve issues than students who receive verbal and visual instructions. In other words, primary school education provides a setting for social interaction, play, activities, and personal development for students. Since primary school pupils need more attention to increase their motivation and satisfaction in the classroom, learning experiences are a crucial part of the teaching and learning process. It is necessary to change the one-way teaching and learning system to incorporate more senses including sight, hearing, and sound.

2.2 Related work

The following are a few examples of current systems that operate in the same industry as our application. We've spoken about their features and specs to draw comparisons between those systems and our solution.

- ClassVR [1]
- 4D Anatomy [2]
- The Body VR [3]

2.2.1 ClassVR: [1]

From the classroom to the boardroom, ClassVR [1] is a dynamic platform that uses the power of Virtual and Augmented Reality for education and training.

2.2.1.1 Terminology

ClassVR [1] Portal is an easy method to discover and deliver interesting VR material and lessons, including access to a teacher lesson preparation and real-time classroom delivery platform. It also gives teachers complete control and administration of many headsets in the classroom, allowing them to deliver their lectures to several headsets and check and track student progress quickly and easily.

2.2.1.2 Categorizing the Existing Techniques/Works/Researches

ClassVR fails to provide a complete model library of science subjects. Also, it's a web AR, not an application.

2.2.1.3 Limitations/Gaps within Existing/Works

Following a comparison research, the following are the apps' shortcomings.

- Not available on mobile devices. i.e. Play Store or App store
- System intensive software, requires specific hardware to function properly.

2.2.2 4D Anatomy: [2]

The 4D interactive Anatomy is VR-only software that provides real human specimens online to study dissect.

2.2.2.1 Terminology

4D Anatomy [2] is an online tool/software which allows medical students to interact with real human specimens in a VR environment. It allows the user to dissect & study the human body as one would interact with one in real life. It also provides over 2000 different quizzes to study more proficiently.

2.2.2.2 Categorizing the Existing Techniques/Works/Researches

4D anatomy [2] is a very effective & one of the most advanced VR software out there. Due to its complexity, it is very difficult for users other than the targeted audience. Also, it is not available for mobile devices such as androids & iPhones as it is a steam application & functions only with a VR headset.

2.2.2.3 Limitations/Gaps within Existing/Works

Following a comparison research, the following are the apps' shortcomings:

- Difficult to operate other than the targeted audience.
- Not available for smartphones (Android, iPhone)

2.2.3 The Body VR [3]

The body VR [3] is an educational VR experience that takes the user inside the human body.

2.2.3.1 Terminology

The Body VR [3] is a META Quest VR experience that allows all types of users to discover the human body. It allows users to interact with the human body & discover its secrets. The

2.2.3.2 Categorizing the Existing Techniques/Works/Researches

The user could travel through the body via the bloodstream & discover how the human body works. It is available as a VR Experience on steam & the Meta quest website. Its flexibility allows all types of users to take advantage of it.

2.2.3.3 Limitations/Gaps within Existing/Works

Following a comparison research, the following are the apps' shortcomings:

- System intensive software, requires specific hardware to function properly.
- Not available for smartphones (Android, iPhone)

2.3 Proposed Improvements in Existing Works

This application has been designed with the user experience in mind, particularly for children and lower-level students. To provide an engaging and interactive environment for these users, this application incorporates a number of features that facilitate smooth interaction. These features include interactive models, text and audio instructions, and scalable models.

To bring these models to life and provide an immersive experience for users, this application plans to utilize Blender and Unity in its development. Blender is a highly respected and widely-used 3D modeling software that is suitable for a variety of applications, including games, film, and animation. Blender will be used to create 3D models that can be incorporated into this application. Unity is a popular game engine that is well-suited for creating virtual reality (VR) experiences. By embedding the 3D models created in Blender into a VR environment using Unity, users can interact with the models in a more immersive way.

By leveraging the capabilities of Blender and Unity, it is expected that this application will be able to create high-quality 3D models and provide an engaging VR experience for users. If new to these tools, there are many online resources available to assist in the learning process, including online courses, video tutorials, and user forums.

2.4 Comparative Analysis

Functionalities of Kinderview are listed with the existing application in Table 2.1.

Table 2. 1 illustrates the comparative analysis of other existing systems with our system

Features	**Class VR**	**4D Anatomy**	**The Body VR**	**Kinderview**
VR headset	✓	×	×	✓
Virtual Reality	✓	✓	✓	✓
Models Library	✓	✓	✓	✓
Mobile Application	×	×	×	✓
3D models	✓	✓	✓	✓
Audio Instruction	×	×	×	✓
Text Instruction	✓	✓	✓	✓
Internet Dependability	✓	✓	×	×

2.5 Summary

This research aims to provide a complete comparative analysis of Kinderview with other existing systems such as the class VR, The Body VR, and 4D Interactive anatomy. We have discussed features and specifications which make Kinderview a unique product. We have explained how our product is efficient & effective for our targeted audience & the respective field.

Chapter 3 System Design

3.1. Introduction

Recent times have seen an increase in online classes due to the covid-19 pandemic. Kinderview will be a VR library of scientific models for Montessori students. This platform will provide a complete understanding of specific scientific models from the science book in a 3D version containing necessary functionalities. We aim to develop Kinderview in a smartphone application where students will be able to view models in 3d & in virtual reality through VR headsets. To take complete advantage of Kinderview a student would need a headset to see the 3D model of the respective diagram. It will help them better understand the diagrams which will make their imagination grow.

In this chapter all the design has been done.

3.1.1. Purpose

The current teaching and learning process is mostly centered on the traditional verbal educational approach, which is not always useful. Previous study has shown that students who get only verbal instructions have a far more difficult time comprehending and solving issues than students who receive both verbal and visual instructions. In other words, elementary school is a place for student development and play, as well as activities, experience, and social contact. Learning experiences are an important part of the teaching and learning process in primary school education since pupils at this age require more attention in order to be motivated and happy in class. The one-way teaching and learning system must be adjusted to include other senses such as sight, hearing, and sound.

3.1.2. System Overview

System has been designed in Unity and blender, this system aims to provide students with a clear view of the models in 3D, to provide 3d models which will have a 360° view, To provide audio aid for the models. This platform will provide a complete understanding of specific scientific models from the science book in a 3D version containing necessary functionalities. We aim to develop Kinderview in a smartphone application where students will be able to view models in 3d & in virtual reality through VR headsets.

3.1.3. Design Map

Use-Case Model and Class Model will be designed from the functional Requirements of the system. Use-case model will show how the user is interacting with our system. System Features will be the Use-cases. Classes in the Class model will be designed with the help of Functional Requirements as well. From the Class model analysis, we will design our interface, Interface is attached to provide the idea. Activity Diagram will be designed to show the path in which the designing of interface is done. Figure 3.1 shows the design map of the Kinderview

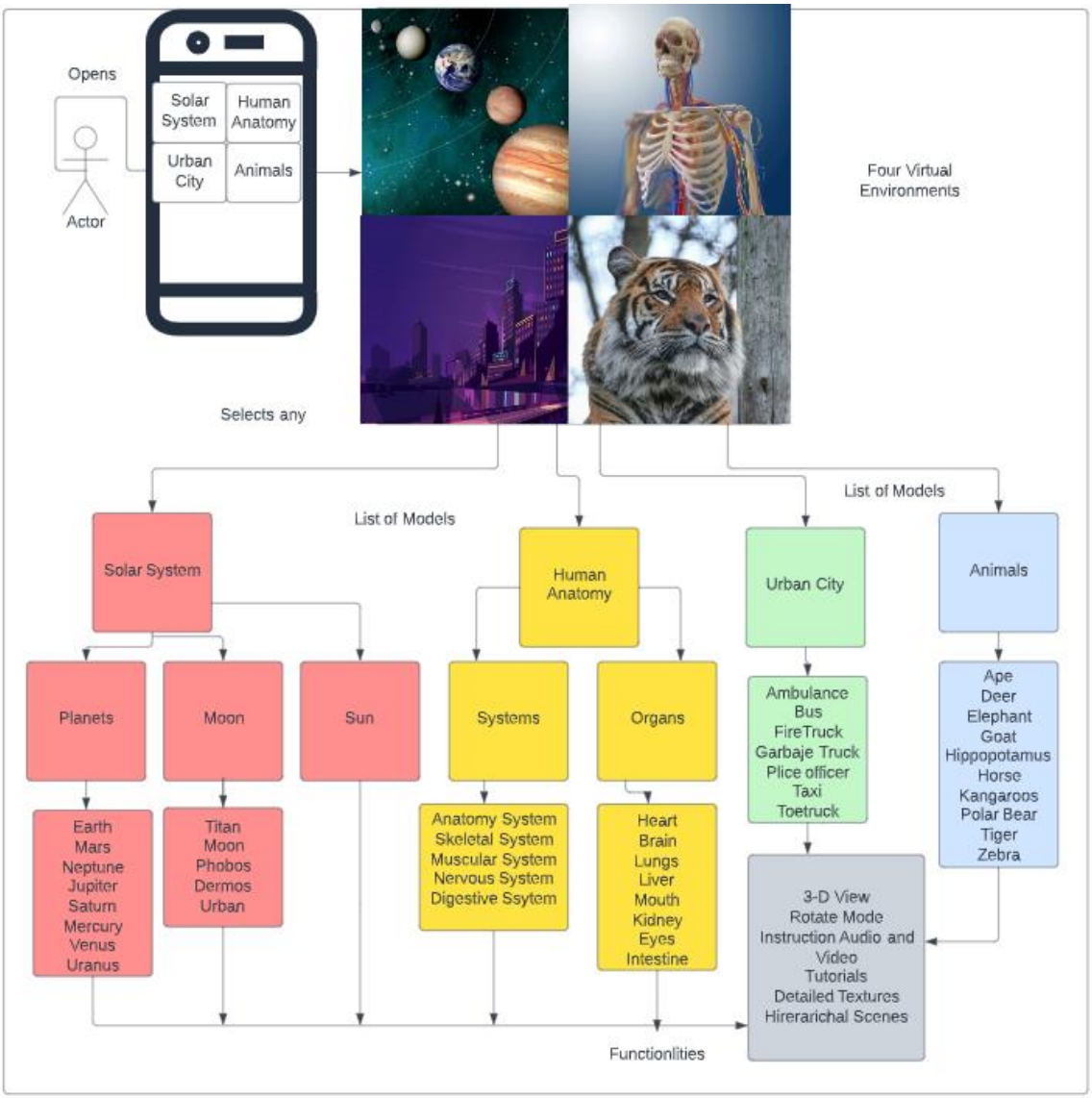

Figure 3. 1 Design Map of Kinderview

3.2. Design Considerations

This section provides all the design considerations of Kinderview.

3.2.1. Assumptions

The existing architecture and system design will retain all present components and subsystems. The recommended method will very definitely be enhanced with more capabilities.

3.2.2. Constraints

There are no technological constraints in terms of hardware, software, or software for this project. Because funding for the proposed solution has not been obtained, financial constraints may exist.

3.2.3. Risks and Volatile Areas

None have been identified.

3.2.4. Risk Mitigation

None have been identified.

3.3. Architecture

The architecture gives a system's overview and serves as a foundation for additional in-depth design work.

3.3.1. Overview

Our virtual reality based project will be made in Unity, we will use blender for 3D models. These models will be then imported into the interface designed by the Then we will add essential functionality such as audio aid for explaining models. When the user opens the application a virtual based interface will be open in front of him/her there would be four environments. Each environment is designed in Unity. User will open its desired environment and will be directed to another interface in which there will be list of models which he/he can view in 3D. Every model contains functionalities like rotate a model, revolve a model, read description, instruction in the form of audio and text and scaling a model.

3.4. High Level Design

User opens the application; an interface contains four different environments appears in front of him/her. Interface contains four environments, Solar System, Human Body, Auto Mobiles and Animals. Each Environment consist of models. Solar System contains models of all solar planets, sun and moon. Classification will be made and another interface will be designed to store the planets environments separately. Human Body contains three models as well as Auto Mobiles. Auto Mobiles model will be further classified. Animals are classified into two sub categories.

Each Model contains same functionalities which is 3-D view of the model, rotate a model, and revolve a model, instruction in the form of audio and text and scaling a model. Figure 3.2 shows the High level Design Model of Kinderview.

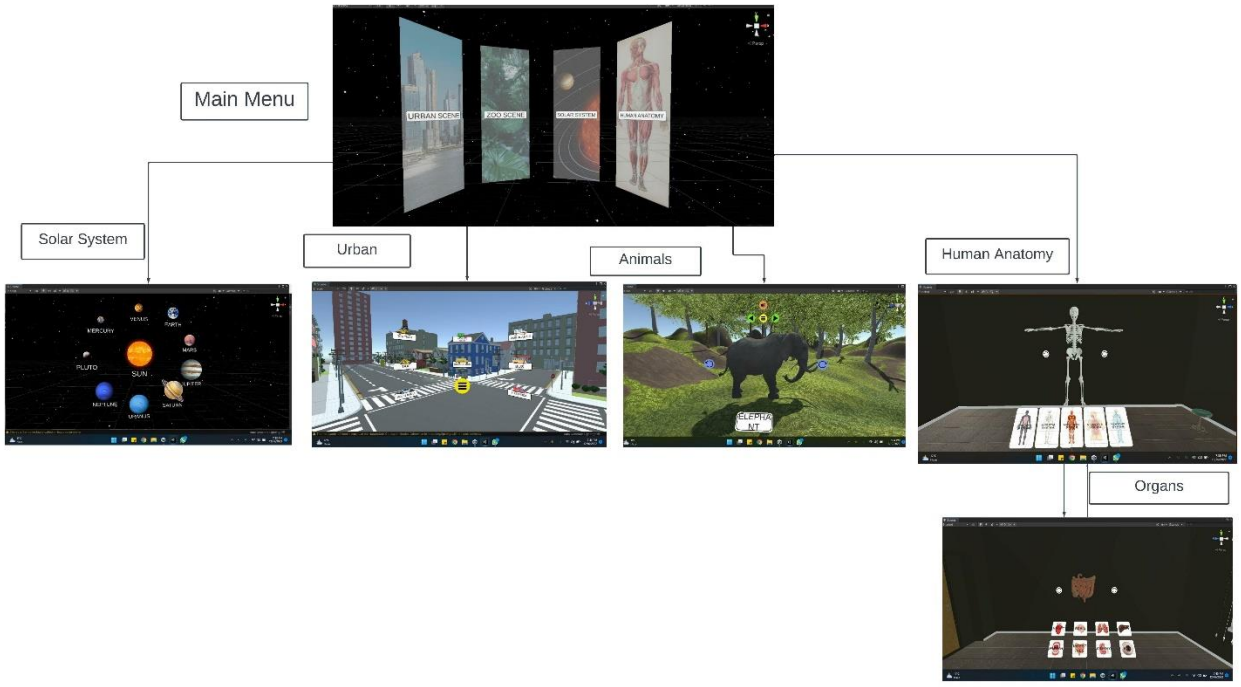

Figure 3. 2 High Level Design Model of Kinderview

3.4.1. Use-Case Model

Use-Case Model of Kinderview shows the relationship between different entities and how they interact with Kinderview. For example, Student Teacher interact with all the functionalities with their respective priorities. Figure 3.3 shows the Use-Case Model of the Kinderview.

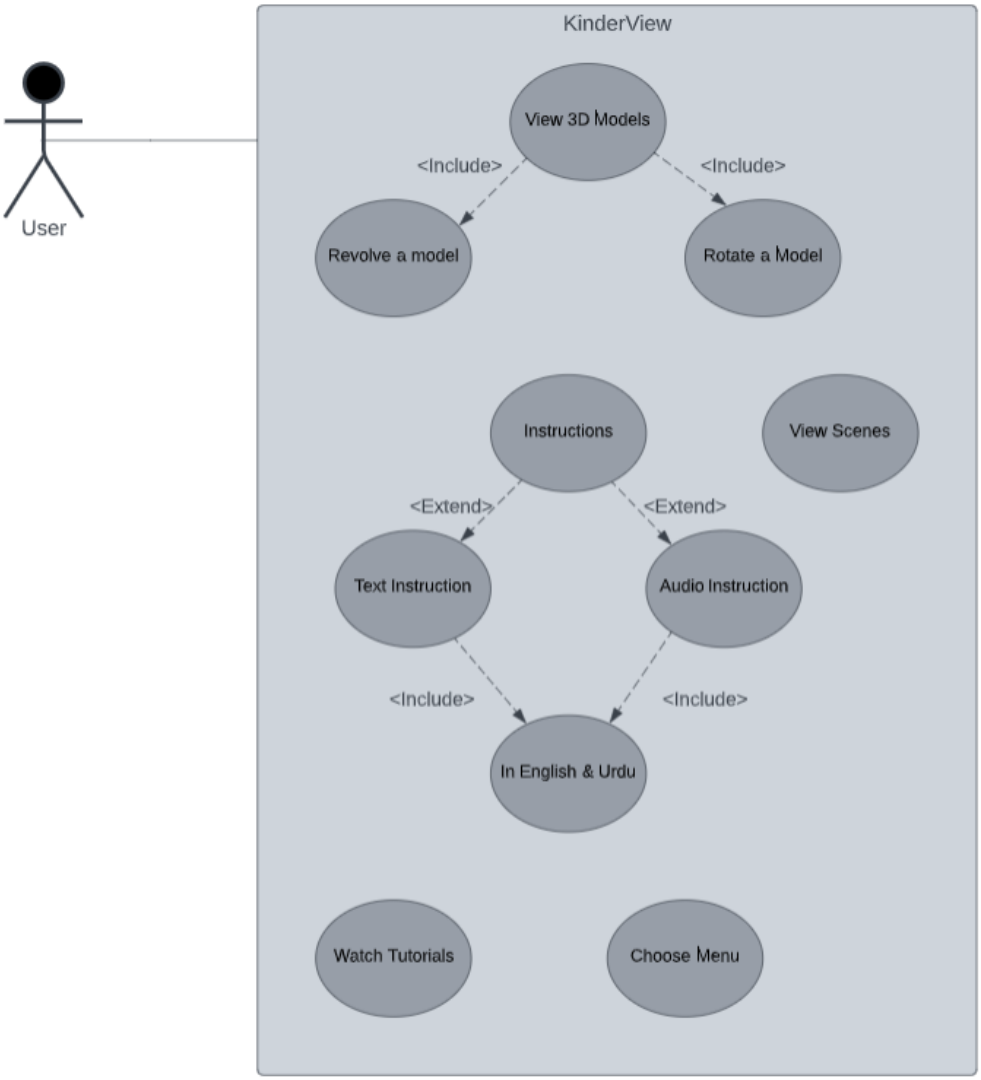

Figure 3. 3 Use-case Model of Kinderview

3.5. Low Level Design

With the use of UML diagrams we have defined the classes of our system, it also defines the interaction of user with the system on low level basis, and how each module will be designed in the step by step manner.

3.5.1. Activity Diagram

Activity Diagram of Kinderview shows different activities with their relationships with each other. Similar to a flowchart or data flow diagram, an activity diagram visually

displays a series of actions or the flow of control in a system. Figure 3.4 shows the Activity Diagram of Kinderview.

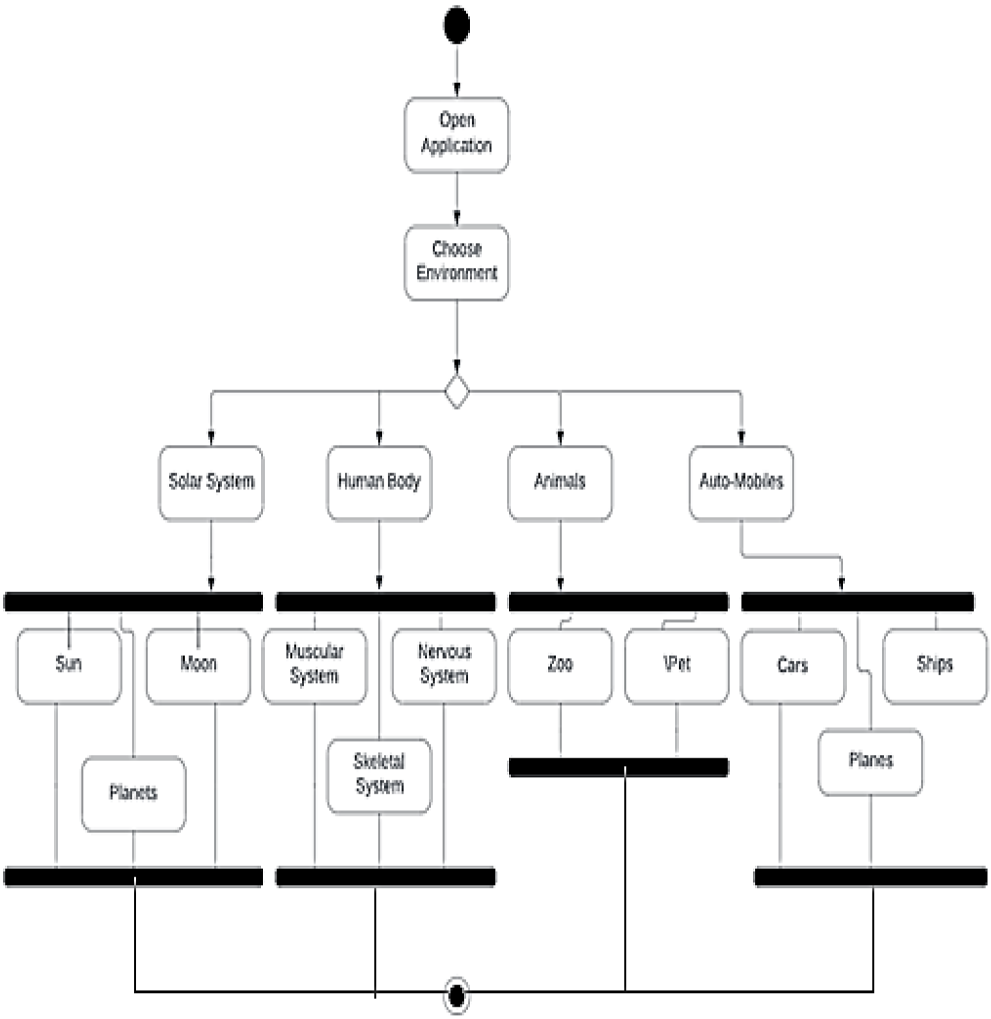

Figure 3. 4 Activity Diagram of Kinderview

3.5.2. Class Diagram

3.5.3. The Unified Modeling Language's source code dependencies and links between classes are shown in KINDERVIEW's class diagram (UML). The methods and variables in an object, which is a particular entity in a program or the unit of code that represents that entity in this context, are specified by a class in the diagram. Figure 3.5 shows the Class diagram of Kinderview.

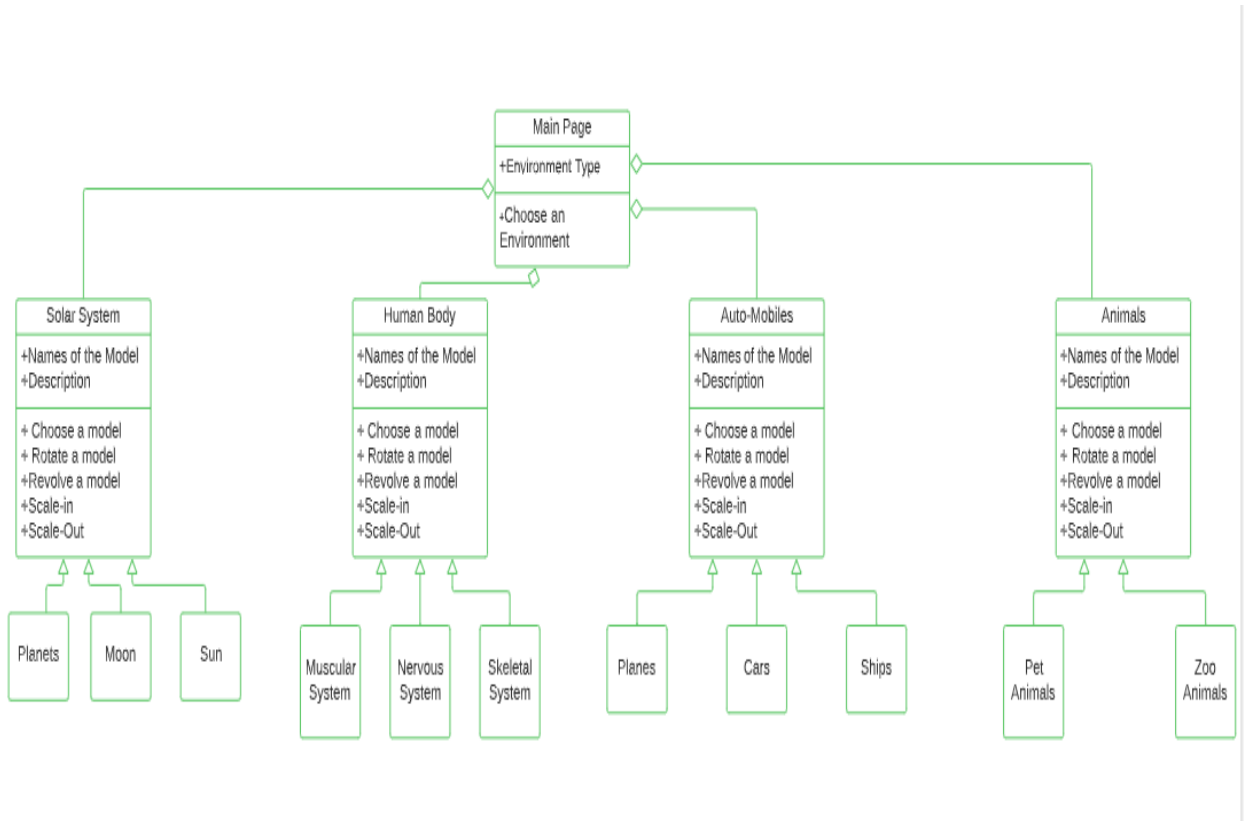

Figure 3. 5 Class Diagram of Kinderview

3.6. User Interface Design

User Interface Design of KINDERVIEW provides complete Virtual Reality of our system. Containing different Models and Objects.

3.6.1. Model of Earth

Figure 3. 6 Model of Earth at approx. daytime

Figure 3.6 showing the model of earth at approx. daytime. Planet Earth or Earth Model is shown with some description related to the model. It's revolving and that's why is shown half at a time and it's in approximately in daytime.

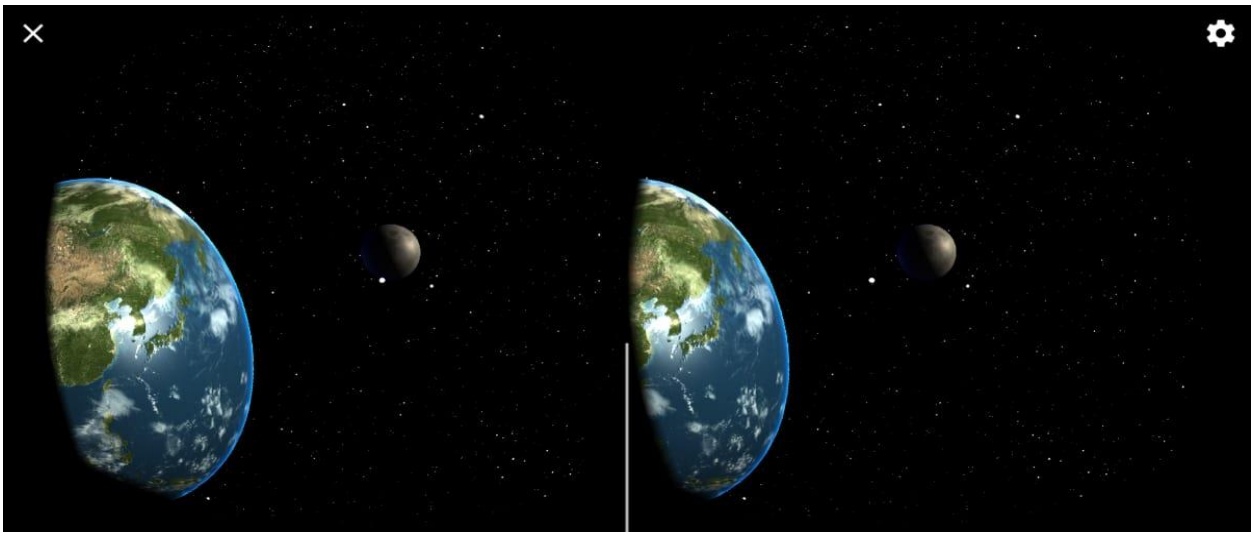

Figure 3. 7 Model of Earth and Moon revolving around it

Figure 3. 7 Shows Model of Earth and Moon revolving around it. The moon revolves around the main planet, which is rotating on its own axis and signaling day and night.

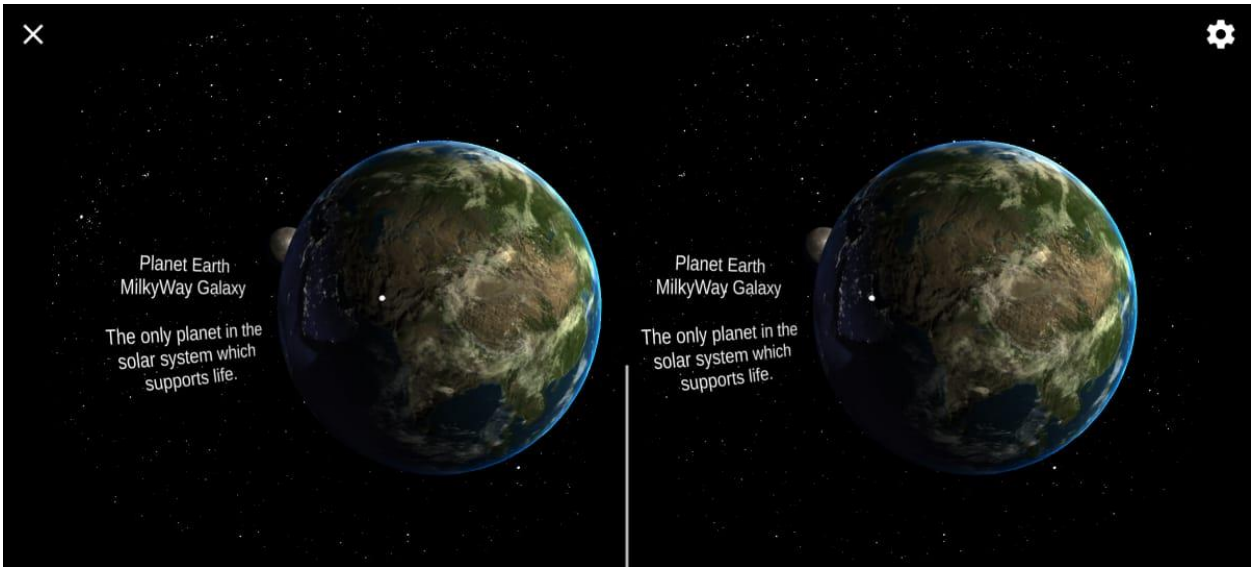

Figure 3. 8 Model of Earth at approx. Night time

Figure 3. 8 Shows Model of Earth at approx. Night time. Main planet is rotating on its own axis, and moon is revolving around the planet and which is indicating day time and night time.

These models are in 3D view. Test instructions is added next to it, to give a brief description about the model.

3.7. Summary

In this chapter we have defined the complete design phase of the system. By starting giving an introduction and system overview. After that we have discussed its architecture and in what manner design has been built. After that High level and low level designing has been done discussing some UML's in low level design. And at last we have concluded by providing an interface of our system discussing a model in it.

Chapter 4 Implementation

4.1. Discussion

The purpose of this project, as stated in Chapter 3, is to design a platform that will be beneficial to both students and teachers in the education field. The goal of this project is to create 3D models with appropriate functionalities based on kindergarten books. This goal has been achieved.

Initially, the focus of the project was on a different approach to creating the 3D models. However, due to certain difficulties encountered during this process, the focus was shifted to a simpler approach. Despite this change in approach, the goal of creating 3D models with appropriate functionalities from kindergarten books has been successfully accomplished.

4.2. Development Methodologies

The development approach which has been used by us is Scrum Development Methodology. Using the Scrum framework for development methodology can help a project team achieve agility in several ways. Here is an example of how the Scrum framework was used to achieve agility in a real-time project:

The project was the development of a virtual reality (VR) application called Kinderview, which was to be used for educational purposes. The goal was to create an engaging and interactive VR experience that would help children learn and retain new information.

We decided to use the Scrum framework to guide their work because of its focus on iterative development and the ability to adapt to changing requirements. We also liked the self-organizing nature of Scrum, as it would allow them to make decisions and solve problems on their own without needing to rely on external guidance.

We held daily stand-up meetings, called Daily Scrums, to discuss progress and any obstacles they were facing. We also held a Sprint Planning meeting at the beginning of each Sprint to determine which features would be included in the current Sprint. At the end of each Sprint, we held a Sprint Review meeting to demonstrate the work that had been

completed and a Sprint Retrospective to reflect on the past Sprint and identify areas for improvement.

This allowed us to stay focused and responsive to change, as we were able to deliver working software on a regular basis and quickly respond to any changes.

Using this Scrum process, we were able to deliver a high-quality VR experience that achieved the project's goal.

Overall, the use of the Scrum framework enabled us to be agile and responsive to change, which was key to the success of the Kinderview project.

There were many approaches discussed in the sprint period, which are as follows:

4.2.1. First Approach

Our First approach was to make 3D models in the blender and then integrate it into the Unity for functionalities and after that we would have integrated it into the Mobile application. Difficulty faced by us in this approach was time limit as well as complexity since it is a project of design arts/ computer graphics and we have less experience of it.

4.2.2. Second Approach

Our second approach was to download free assets from the Unity store and then integrate it into the Unity for functionalities. In this approach we couldn’t get required quality.

4.2.3. Third Approach

Our Current approach is that we are making some models in Unity, downloading some free assets from Unity store, also buying some and then integrating them in Unity. The difficulty we are facing right now is financial only. But we have overcome it and then implemented the project.

4.3. Implementation Tools and Technologies

We have used Unity tool in order to make our project. All the techniques implied with the project is mentioned below:

4.3.1. Game Engine:

The game engine we use is the native game engine for unity, with android SDK & NDK support. The native unity game engine is a flexible & efficient game engine which allows unity to follow an object oriented approach. Every game object is added to the scene as a standalone object or a pre-fabricated prefab. These prefabs can be added to normal models & vice versa. The game engine allows modular support for adding components to a game object, whether it be adding physics components to a game object or adding a custom script.

The Google VR (Cardboard VR) for unity is a streamlined cardboard SDK which offers a streamlined API & improved device compatibility for android devices. This specifically helps the unity game engine to develop a VR application for android devices, it also allows the user to develop a universal VR application for all android devices without using any other third-party plugin. We use the GVR camera, GVR physics ray caster & GVR event system to allow the user to interact with the system.

4.3.2. Physics Engine:

The unity physics engine helps us simulate collision & gravity, which are both essential for the development of our project. The Physics. Ray cast is the main function which allows us to interact in Kinderview without using any physical or remote buttons or keys. The ray cast function creates an invisible ray parallel to the line of sight of the user. This allows the user to interact with game object & interface just by looking at them.

4.3.3. Modeling and Texturing:

The modelling is initially started in blender where a simple low poly 3d shape is manipulated to make the game object a celestial body, a humanoid, or the desired shape of the game object. We can change the resolution of the low-poly shape to a high polygon shape to increase the resolution & details of the object in development. Some models which are difficult to design in blender are purchased or imported from the unity asset store. The unity asset store is a library of assets which are available for free or their licenses can be purchased.

The textures are either made in Illustrator/Photoshop or downloaded from a reputed website which provides accurate textures. For example, textures for planets can be downloaded from NASA's website.

4.3.4. Visual Effects:

The unity game engine provides a variety of visual effects which are an integral part of our project. The particle system of the unity allows us to create a visually effective solar system where the sun has a dynamic surface which depicts the unstable reactive surface of the sun. Similarly, the planet earth has an "Atmospheric" effect which makes the sun & earth more realistic to look at.

The planets in the solar system have a trail effect which shows a white trail behind all planets orbiting the sun in solar system. Also all the planets are orbiting the sun according to their actual orbits while rotating on point. The moons of planet Earth & Mars are also orbiting their planets causing solar & lunar eclipses on their respective planets. The rings of Saturn & Uranus are also a visual spectacle to behold which are built in blender but animated in unity.

4.3.5. Camera:

The default "Main Camera" of unity is actually useless for our project because it renders only a single view which is not viewable in any VR format. For the proper camera, the first person character from the "Standard Assets" asset pack is used, this combined with the VR camera prefab of the Google VR provides a double screen rendering for left & right eye with the right resolution to be used in a VR headset.

4.3.6. Sound Effects:

The most important implementation of proper audio is used to provide audio description of the information provided on screen of the model. Other than this audio cues are generated while interacting with the user interface. On the background a slow & low volume music will be played according to the environment user is using.

4.3.7. GUI:

The graphical user interface of Kinderview is based on line of sight interaction, where the GVR reticle component provides a simple reticle, this combined with a GVR physics ray

caster component allows the GVR reticle to animate whenever a user is looking on an interactive game object for two seconds. Custom scripts allows to embed different functionalities in normal game objects which allows a complete & wholesome interactive experience.

There are in total four environments. First scene will be the main menu including all four environments.

Screenshots are attached to understand implementation more easily:

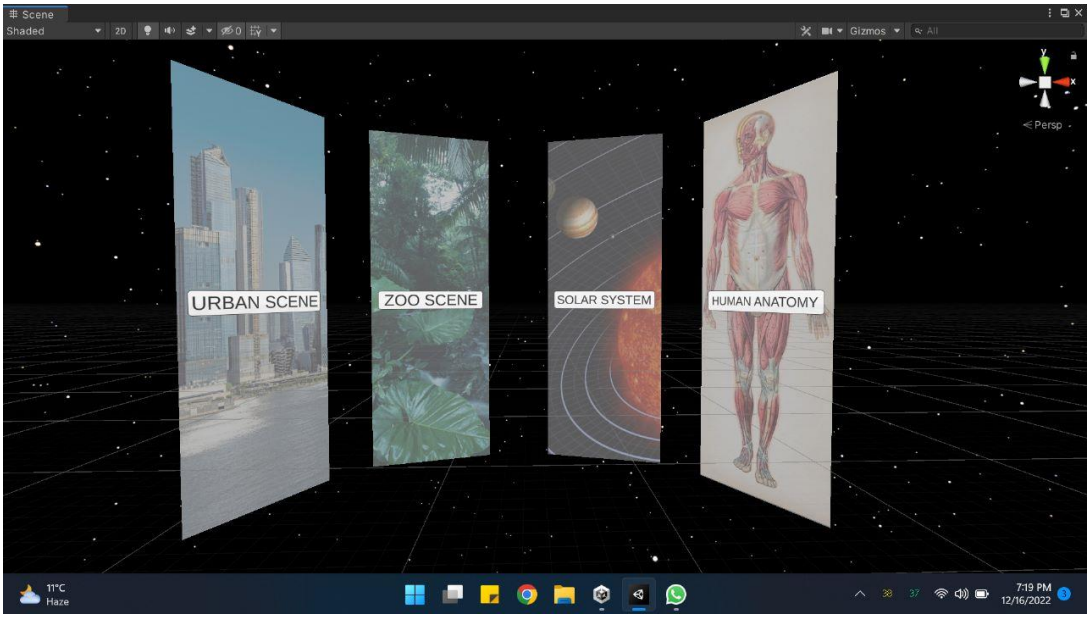

Figure 4. 1 Main Menu

Figure 4.1 shows the Main Menu of the Kinderview. In this Main screen all the four scenes or environments. User will have to choose one of them.

4.3.7.1. Solar System:

One Environment in our project is solar system. It includes all the scenes of all of every planet, their moon and sun. Every object will have its own information beside the model. Every scene will have specified UI Elements to guide the user.

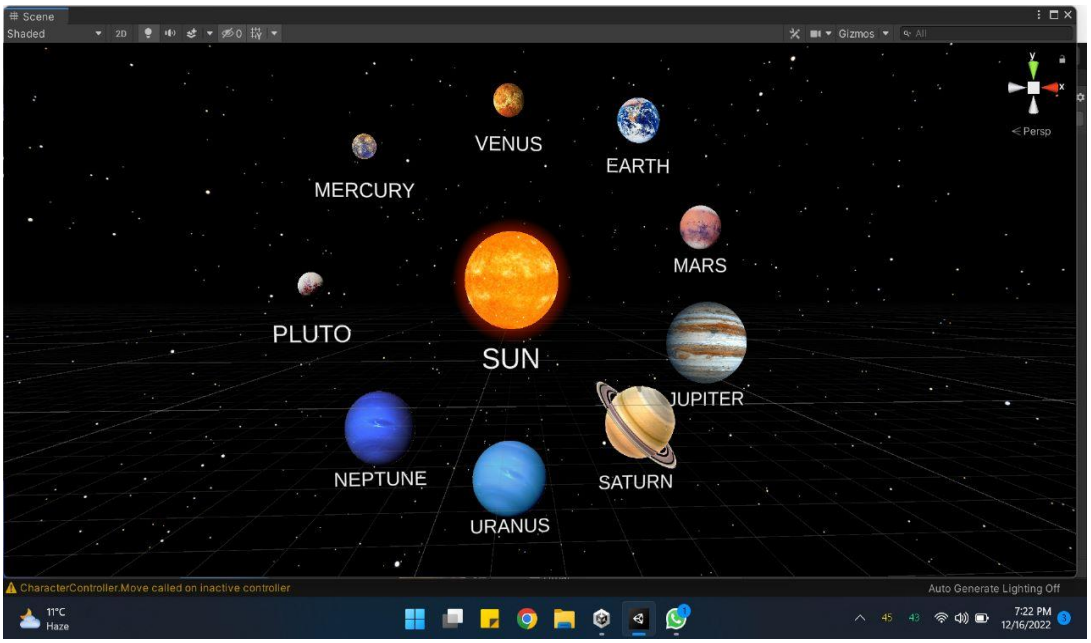

Figure 4. 2 Solar System Menu

After selecting the environment of solar system, user will enter into solar system menu as shown in Figure 4.2. This menu has every planet in it and Sun.

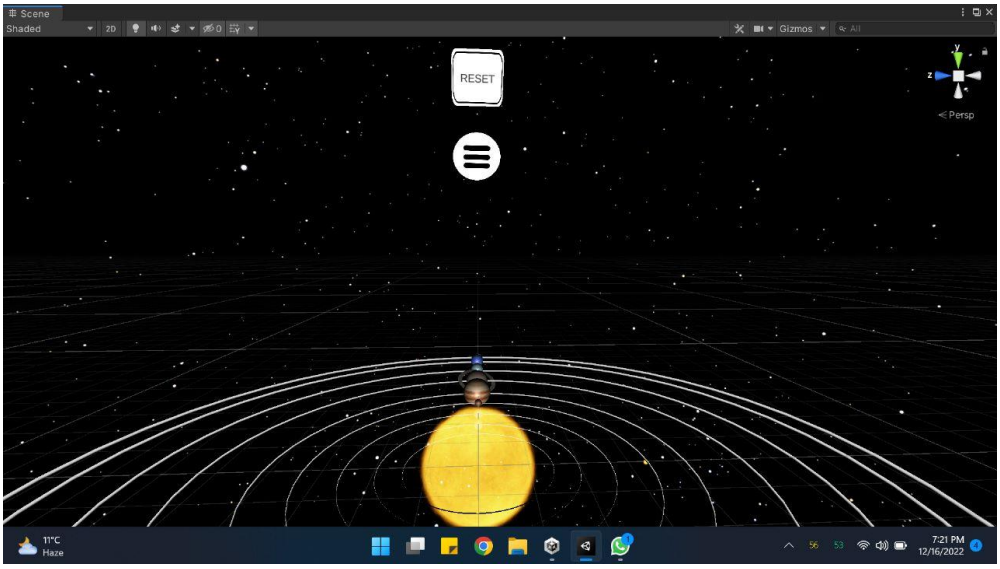

Figure 4. 3 Overall view of solar system in development

Figure 4. 3 shows the overall view of solar system in development. In the editor window one can see the sun while below the game mode shows how it would look on android. It's in the development process.

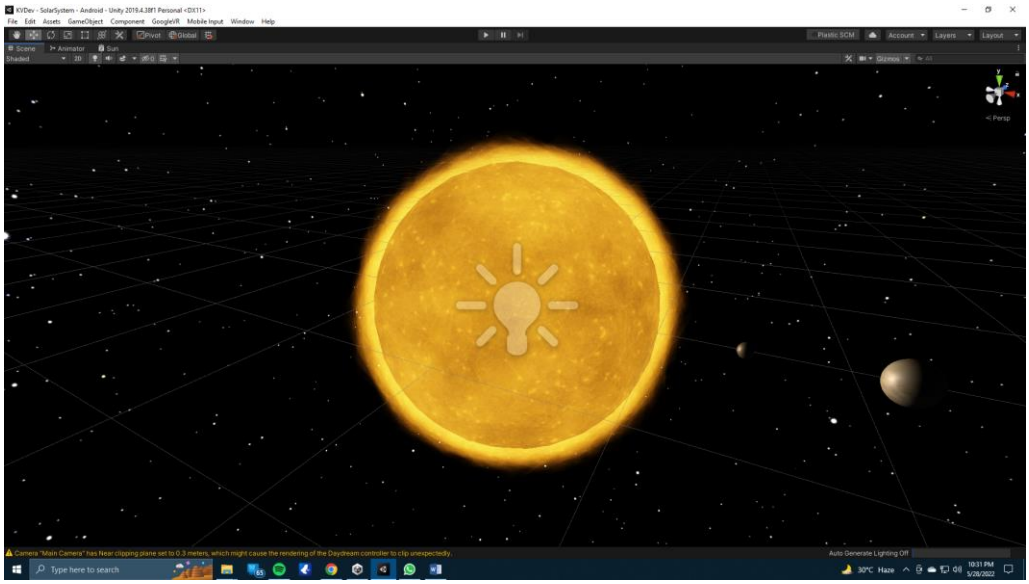

Figure 4. 4 Sun

As shown in Figure 4.4 The Sun Model showing its “Halo” made up of particle system while one can see the dark physical body of the Sun. The bulb in the middle indicates that the sun is a light source.

Figure 4. 5 Sun with planets

Figure 4.5 shows the Sun and the Planets lined up to show the approximate size difference between the Sun and between the Planets.

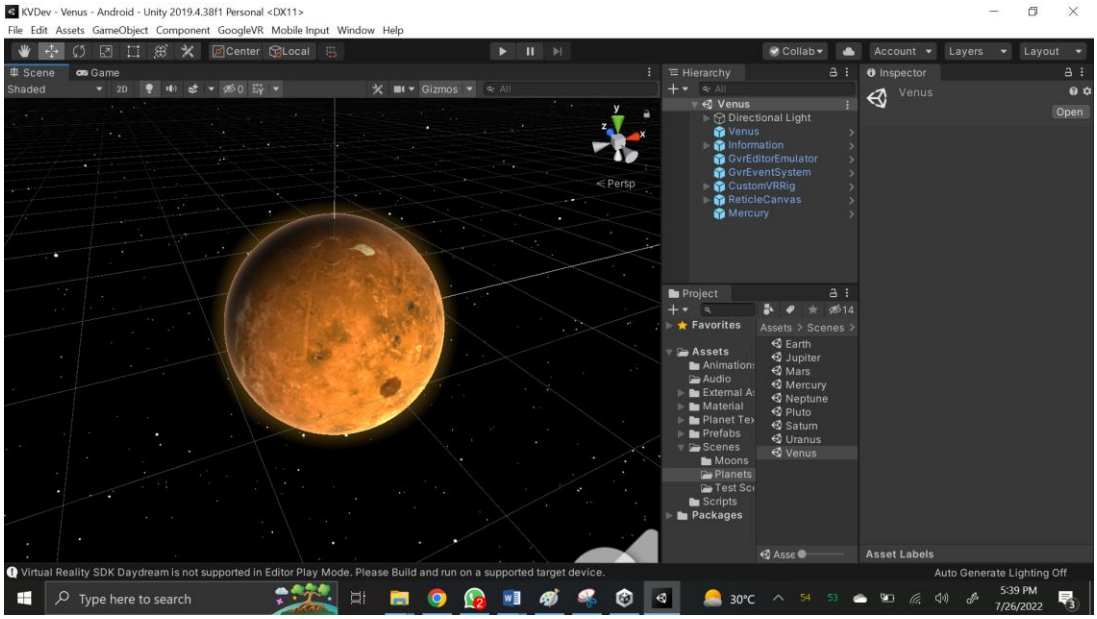

Figure 4. 6 Venus

Figure 4.6 shows the Planet "Venus". The brighter side of the Planet indicates the direction of the Sun. Also the "Halo" of Venus indicates the atmosphere of Venus.

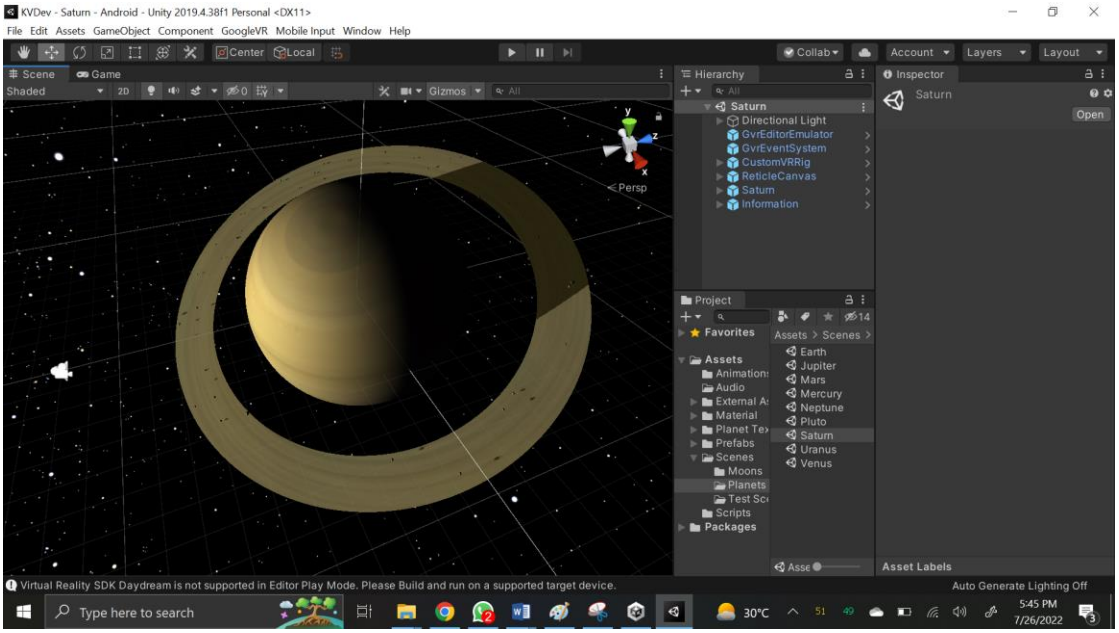

Figure 4. 7 Saturn

Figure 4.7 shows the Planet "Saturn" with its rings. The planet Saturn has a debris field around it. Which makes its beautiful rings.

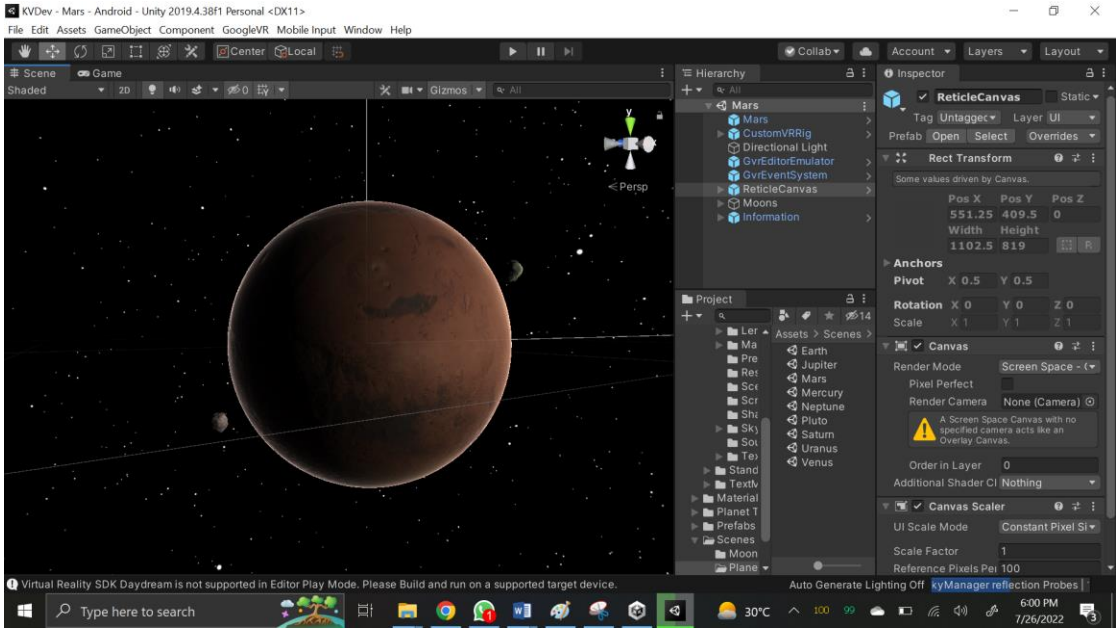

Figure 4. 8 Mars

Figure 4.8 shows the Planet “Mars”. The brighter side of the Planet indicates the direction of the Sun. Also the moons “Phobos” & “Deimos” can be observed orbiting Mars

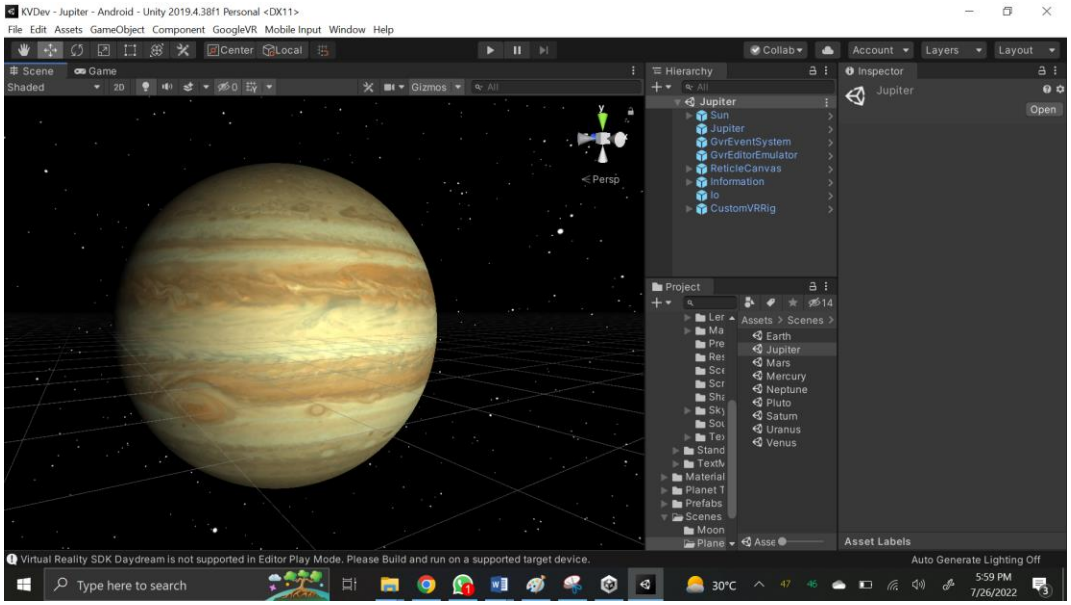

Figure 4. 9 Jupiter

Figure 4.9 shows the Planet “Jupiter”. The brighter side of the Planet indicates the direction of the Sun. It is the largest Planet in the Solar System.

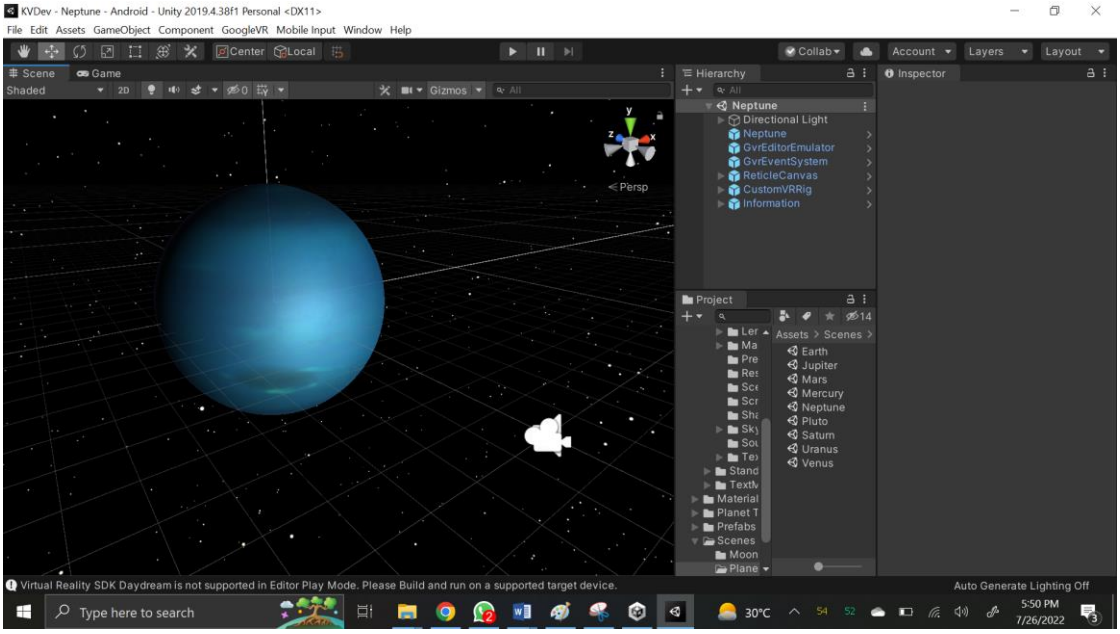

Figure 4. 10 Neptune

Figure 4.10 shows the Planet “Neptune”. The brighter side of the Planet indicates the direction of the Sun. The iconic abnormality of Neptune can be observed.

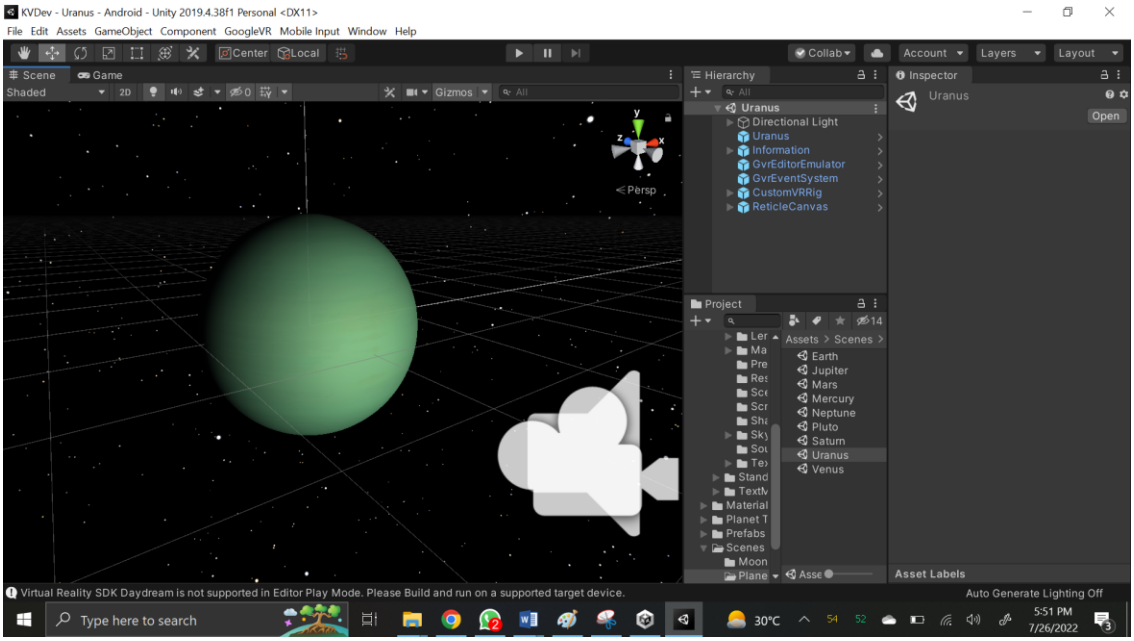

Figure 4. 11 Uranus

Figure 4.11 shows the Planet “Uranus”. The brighter side of the Planet indicates the direction of the Sun. This planet is completely made up of gas.

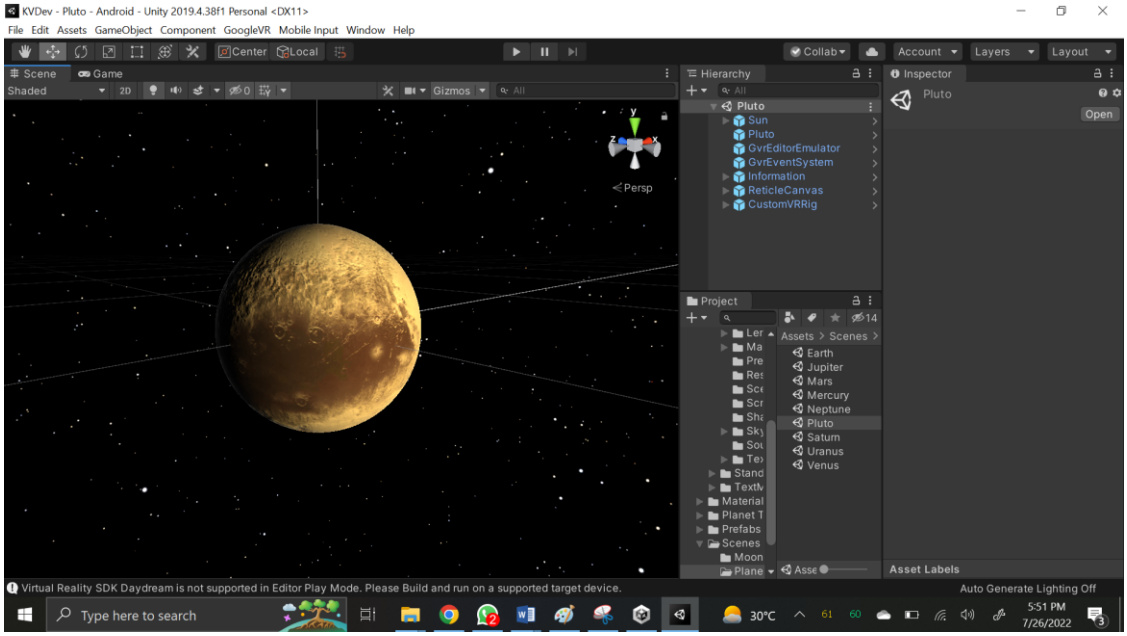

Figure 4. 12 Pluto

Figure 4.12 shows the Dwarf Planet "Pluto". The brighter side of the Planet indicates the direction of the Sun. The Pluto is the largest member of the Kuiper belt.

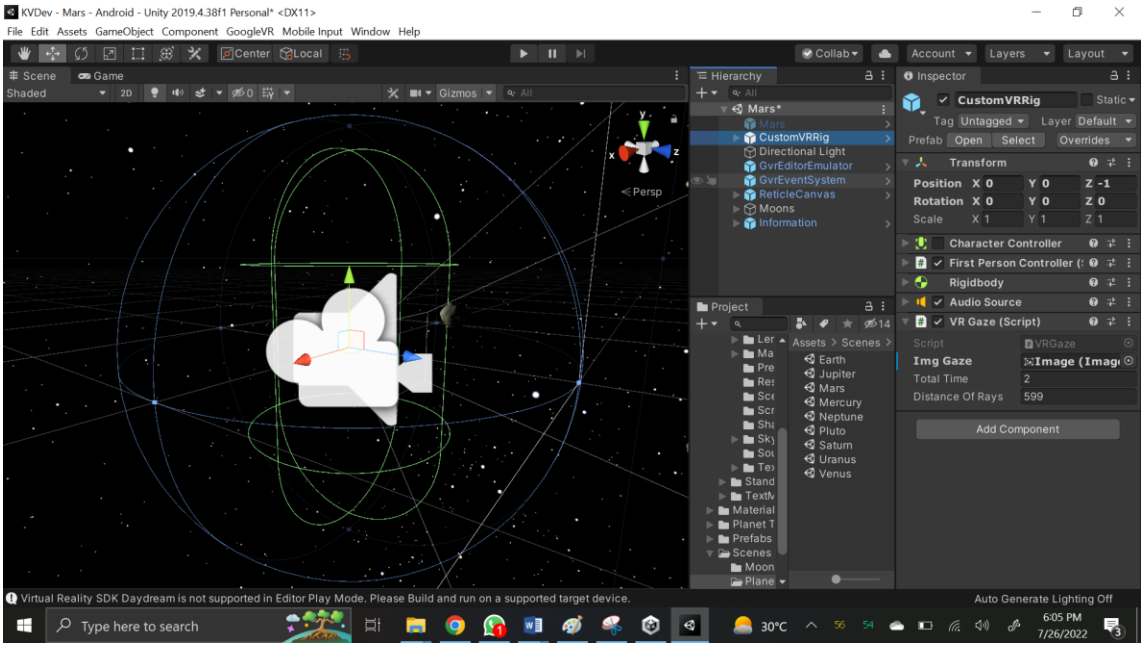

Figure 4. 13 VR Camera Rig

One can show the camera rig in the Figure 4.13. The camera rig is responsible for capturing the scenes & sound in the environment. Its sound module can detect stereo sound.

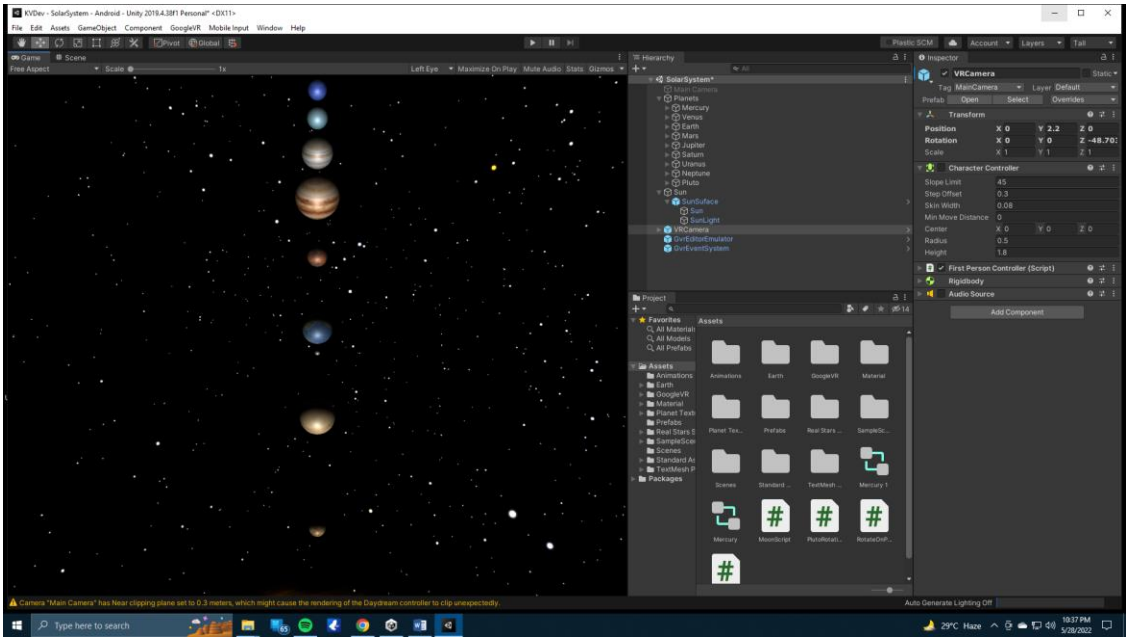

Figure 4. 14 View from VR Camera rig

Figure 4.14 shows the camera rig looking over the planets in the Solar System.

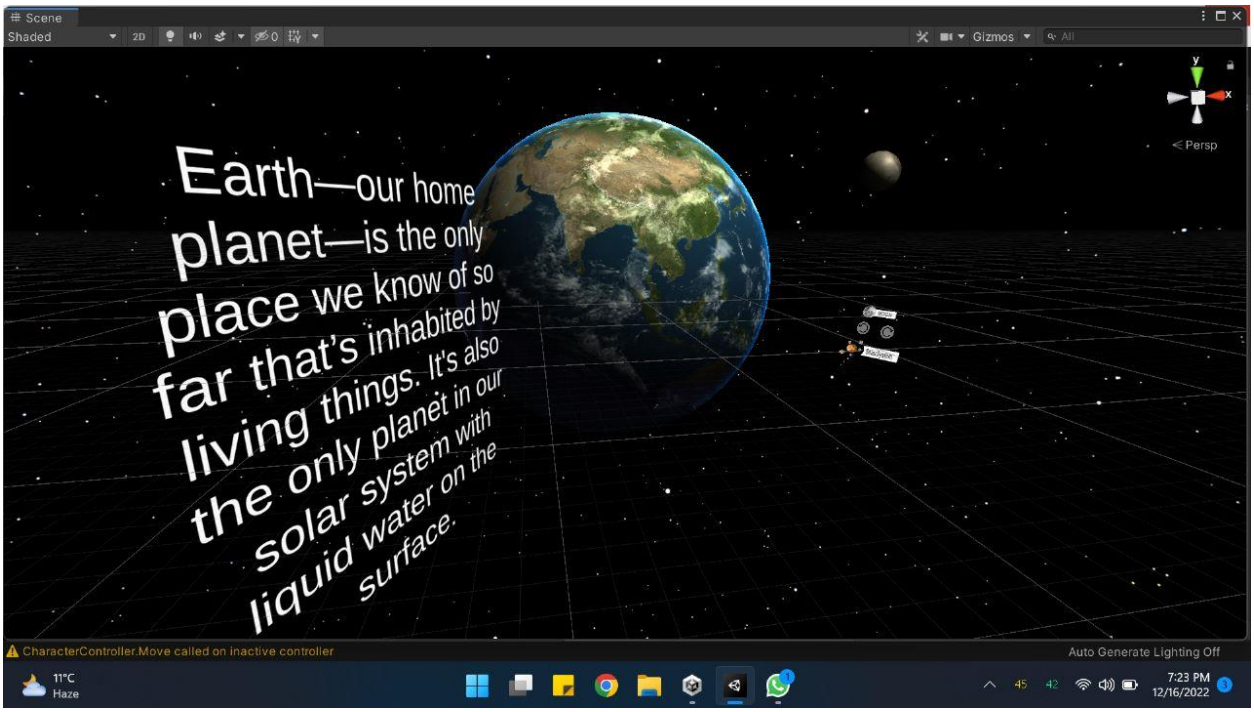

Figure 4. 15 Individual Planet Scene

Figure 4.15 shows how a planet and its moon would look like in Kinderview. Also the Information panel can be observed in the background.

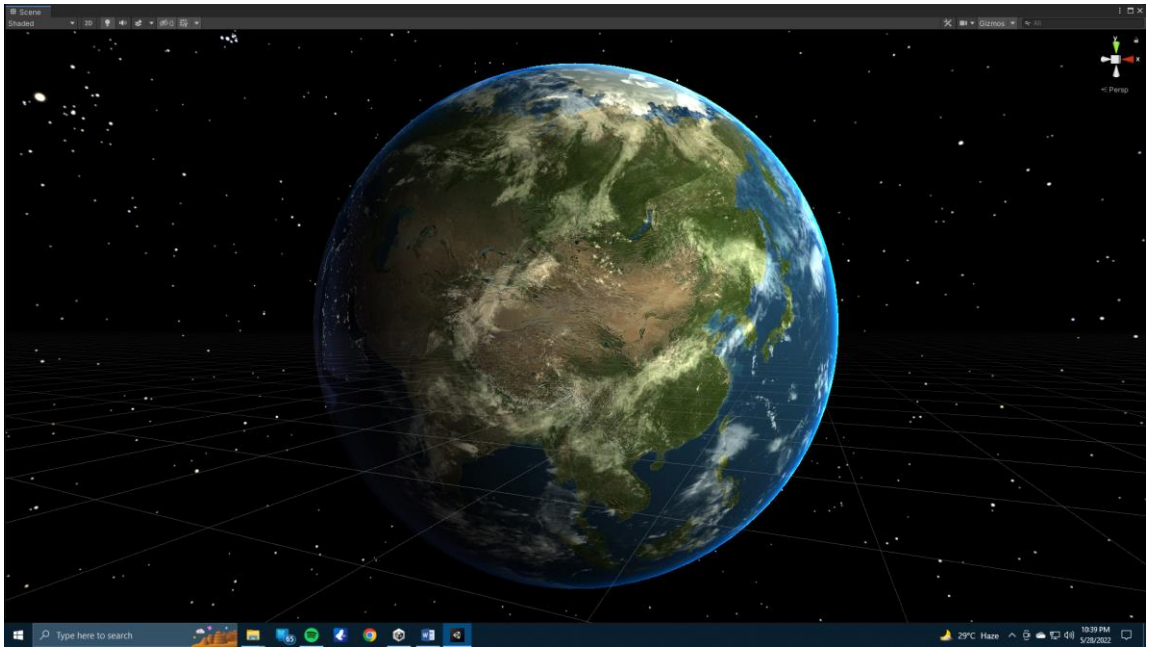

Figure 4. 16 Earth in daylight

Figure 4.16 shows how earth looks like at day time. One can see the Earth's atmosphere and clouds.

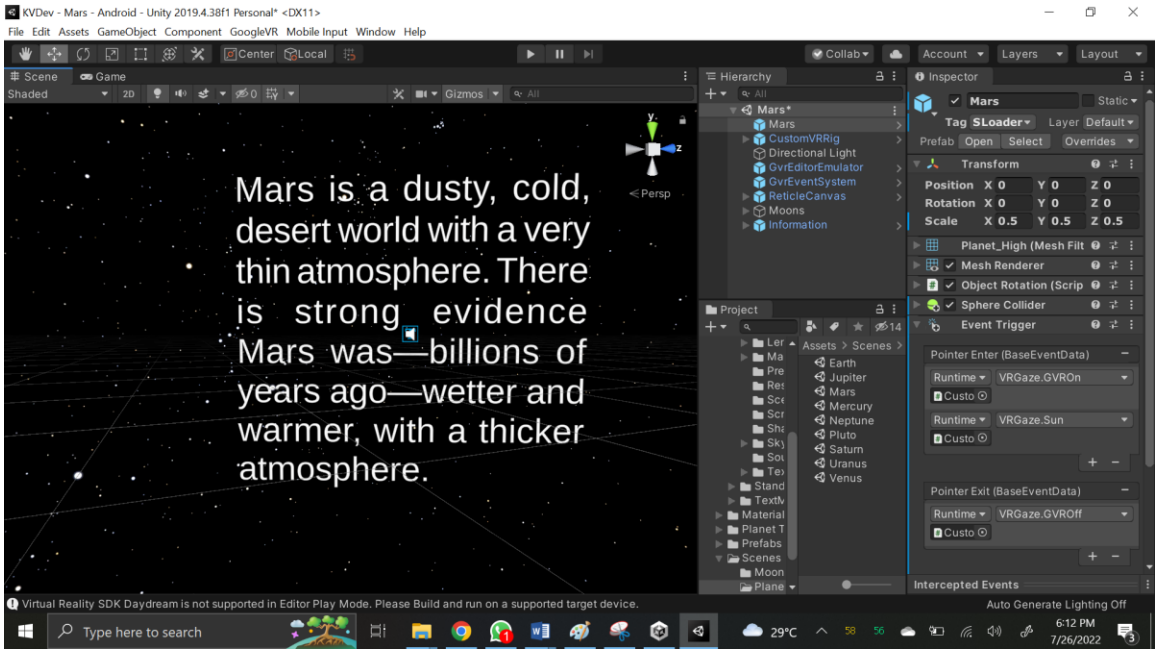

Figure 4. 17 Information Panel

Figure 4.17 shows the Information Panel, one can also observe the sound gizmo which indicates that it has a sound object attached.

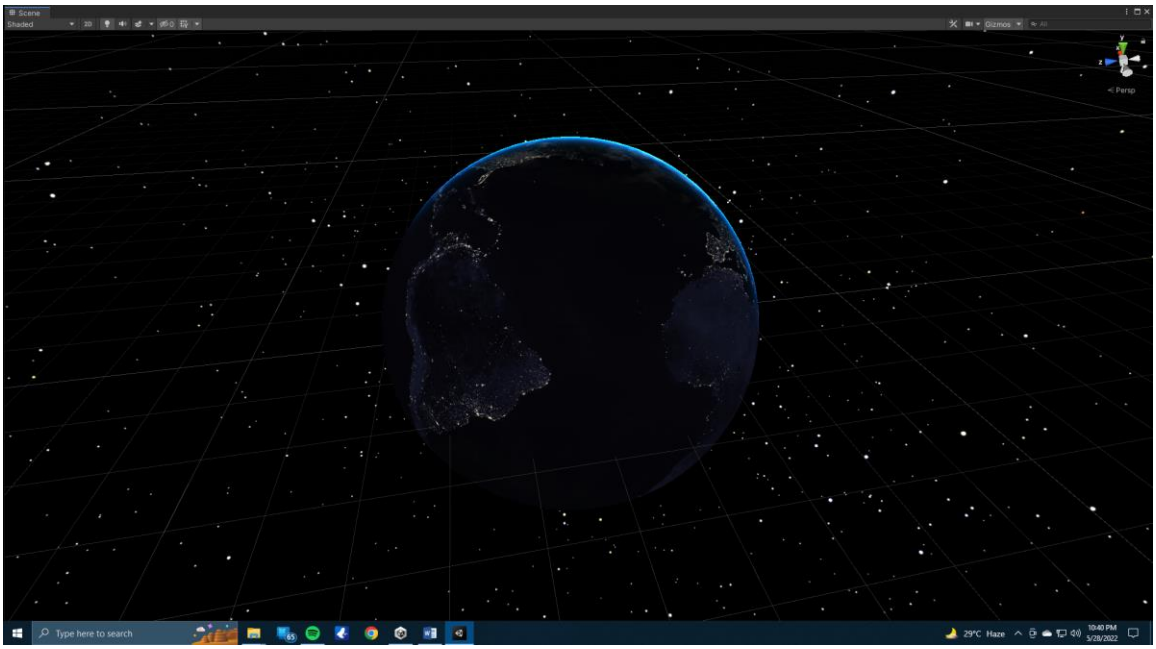

Figure 4. 18 Planet in Night time

Figure 4.18 shows how earth looks like at night time. One can see the Earth's night light during night time.

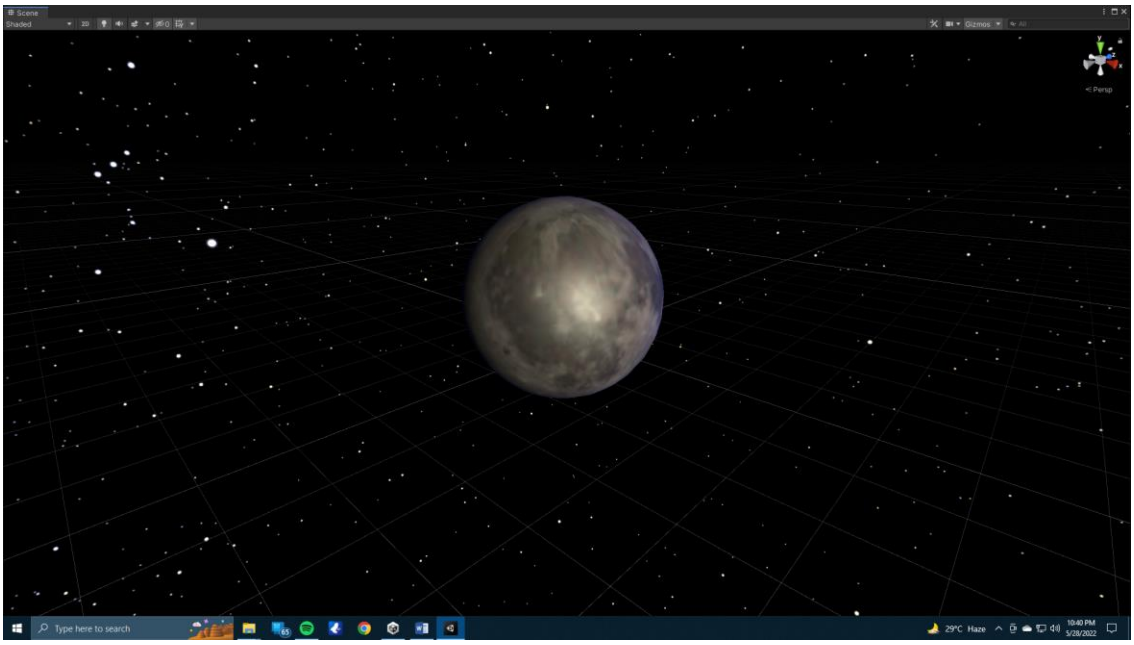

Figure 4. 19 Moon

Figure 4.19 shows the moon. The moon is the Earth's natural satellite. It orbits earth & is visible at night time.

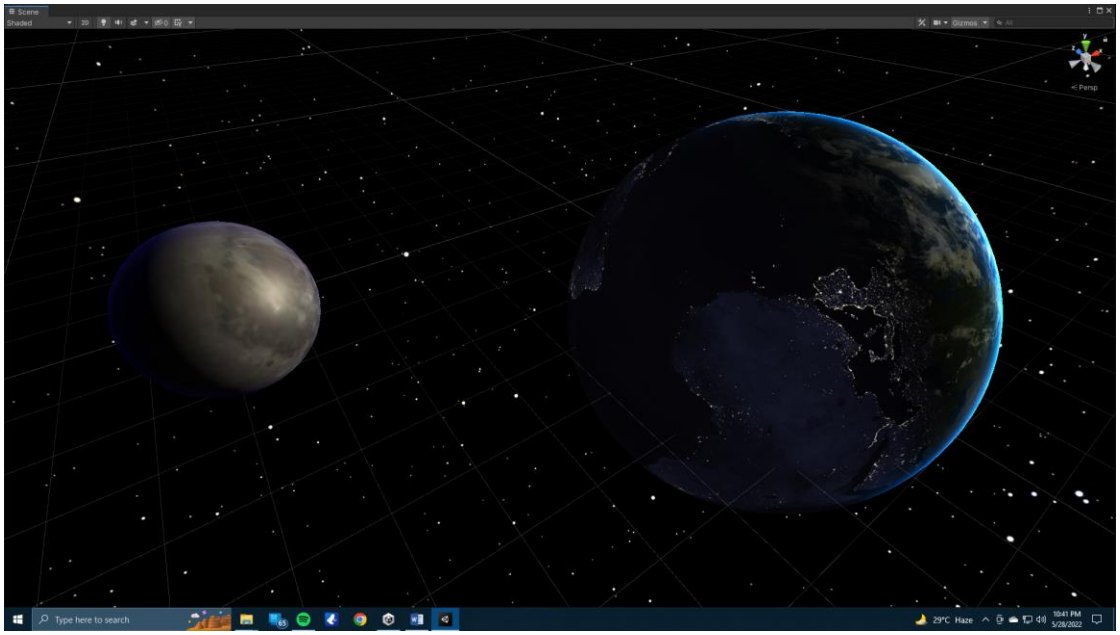

Figure 4. 20 Earth and its moon

Figure 4.20 shows the Earth and the Moon at a position where the planet is in dark. One can observe that the Moon is bright while the Earth's night side faces it.

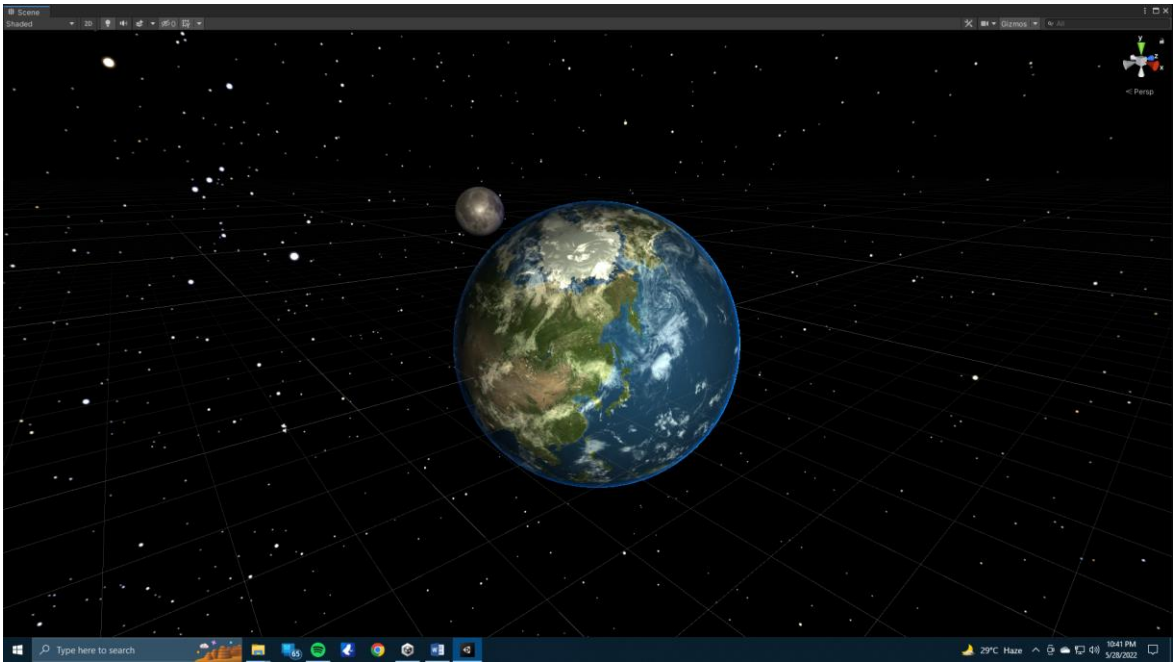

Figure 4. 21 Moon orbiting Earth

Figure 4.21 shows Earth & Moon both facing the Sun. The Moon in this configuration is behind Earth & is only visible from the night side.

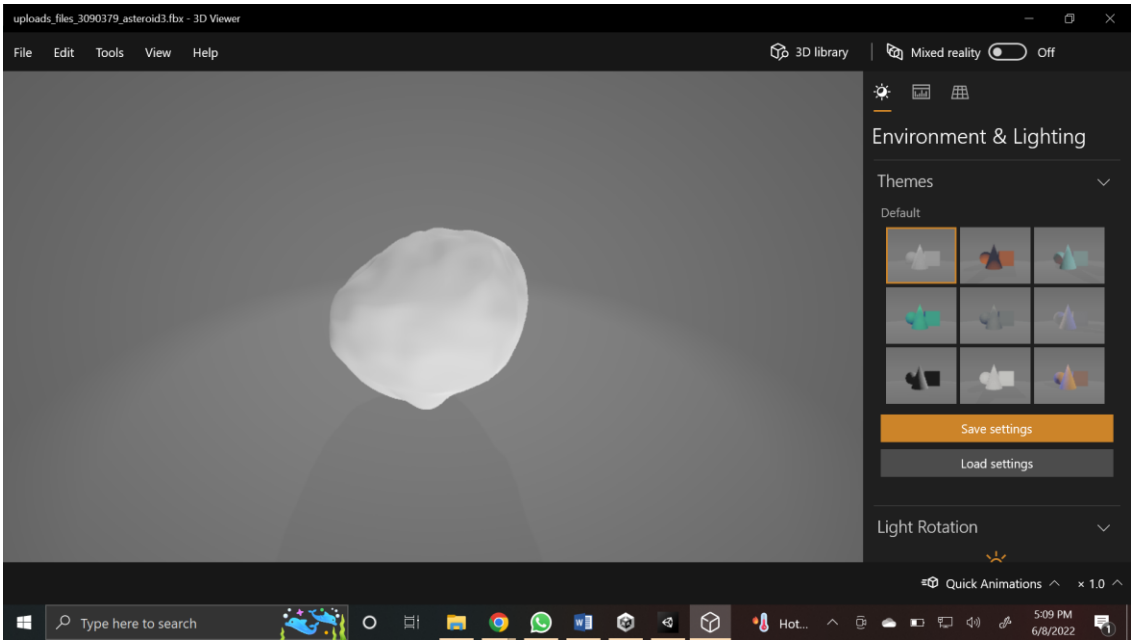

Figure 4. 22 3D asset 1

Figure 4.22 shows the 3D asset, this 3D asset is used to make Deimos, which is a moon of Mars

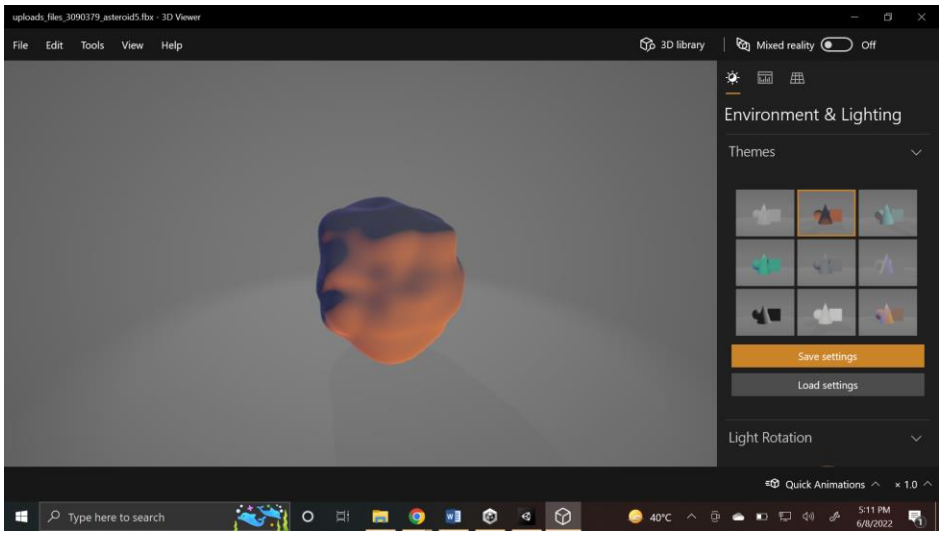

Figure 4. 23 3D asset 2

Figure 4.23 shows the 3D asset, this 3D asset is used to make Phobos, which is a moon of Mars

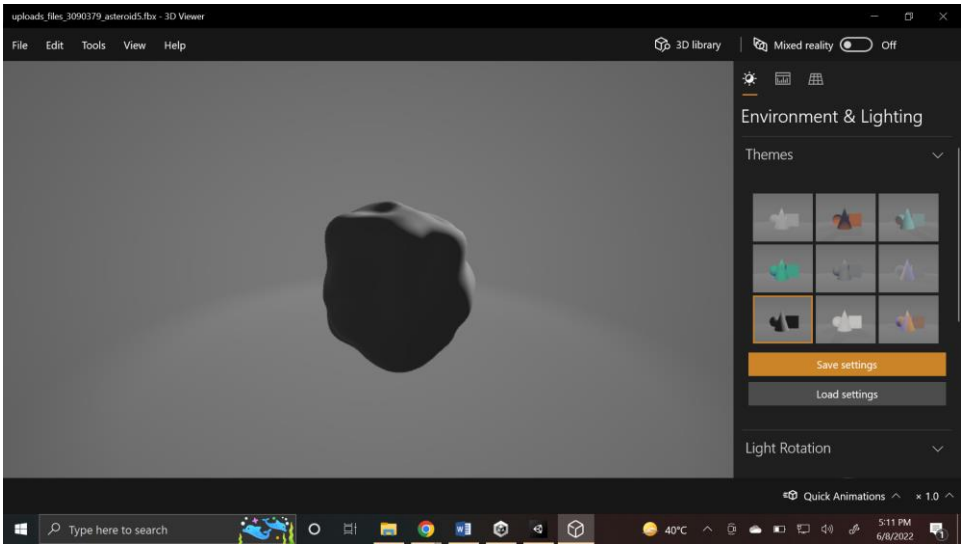

Figure 4. 24 3D asset 3

Figure 4.24 shows a 3D asset which was used in creating Saturn's Rings.

4.3.7.2. Human Anatomy:

Another Environment of our project is Human Anatomy. This environment has 13 scenes in total. There are 8 scenes of organs with the defined menu. And 5 scenes of Human body systems with their defined menu.

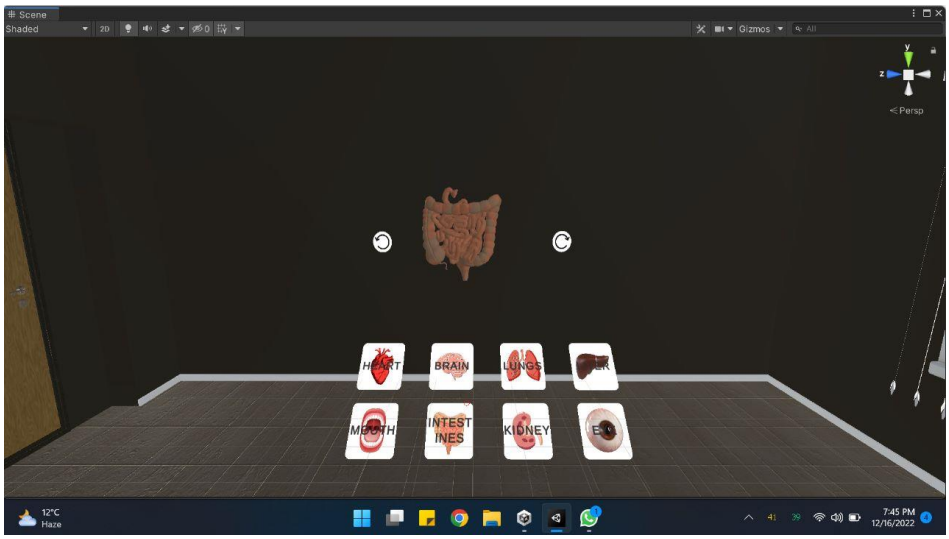

Figure 4. 25 Menu with Intestine

Figure 4.25 shows the Menu of different organs and the selected organ of Intestine. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Intestine.

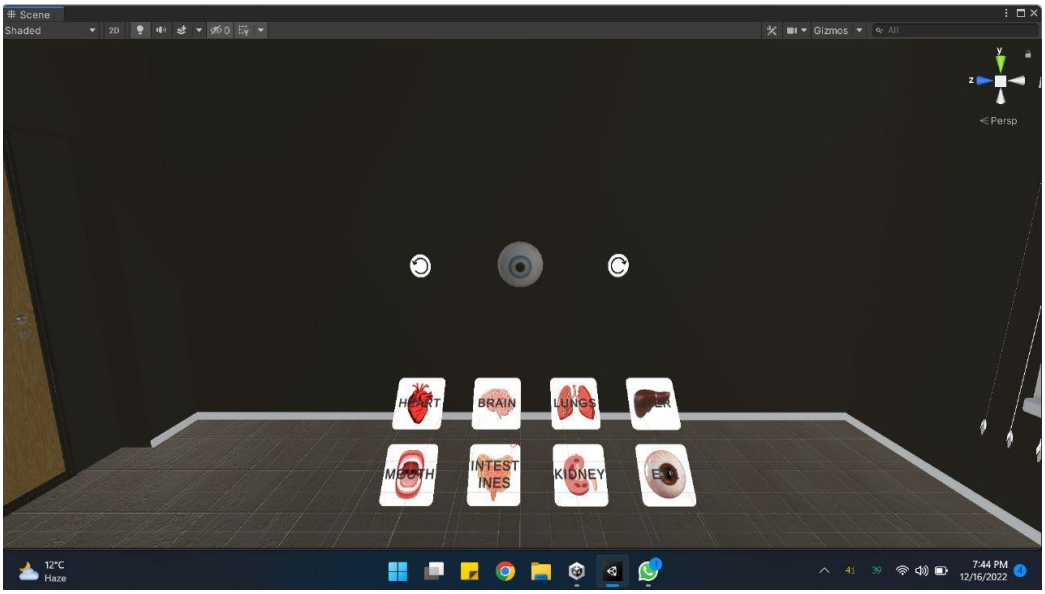

Figure 4. 26 Menu with organ Eye

Figure 4.26 shows the Menu of different organs and the selected organ of Eye. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Eye.

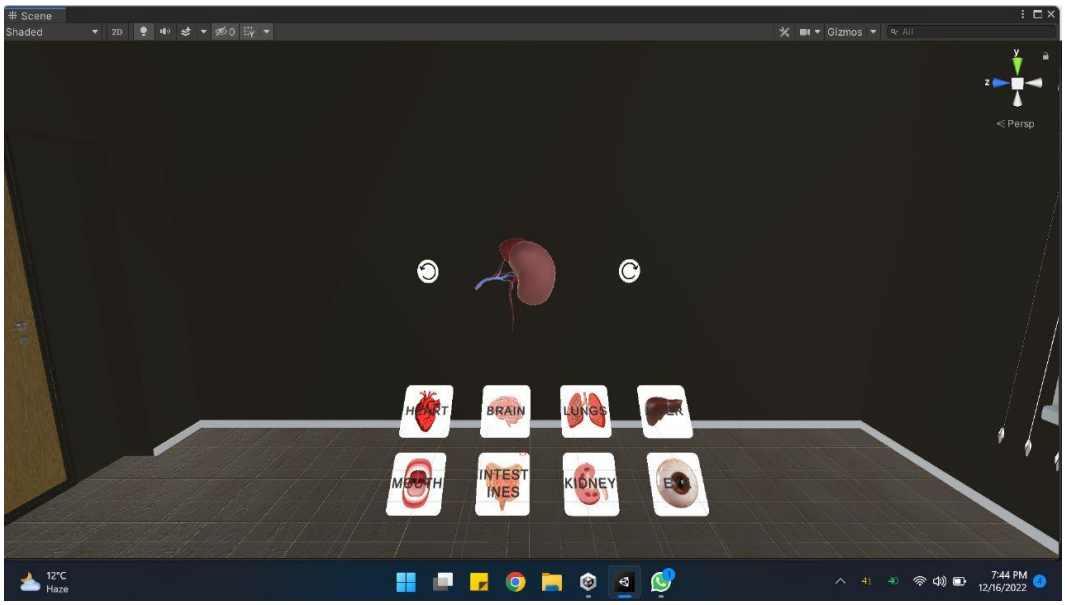

Figure 4. 27 Menu with the organ Kidney

Figure 4.27 shows the Menu of different organs and the selected organ of Kidney. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Kidney.

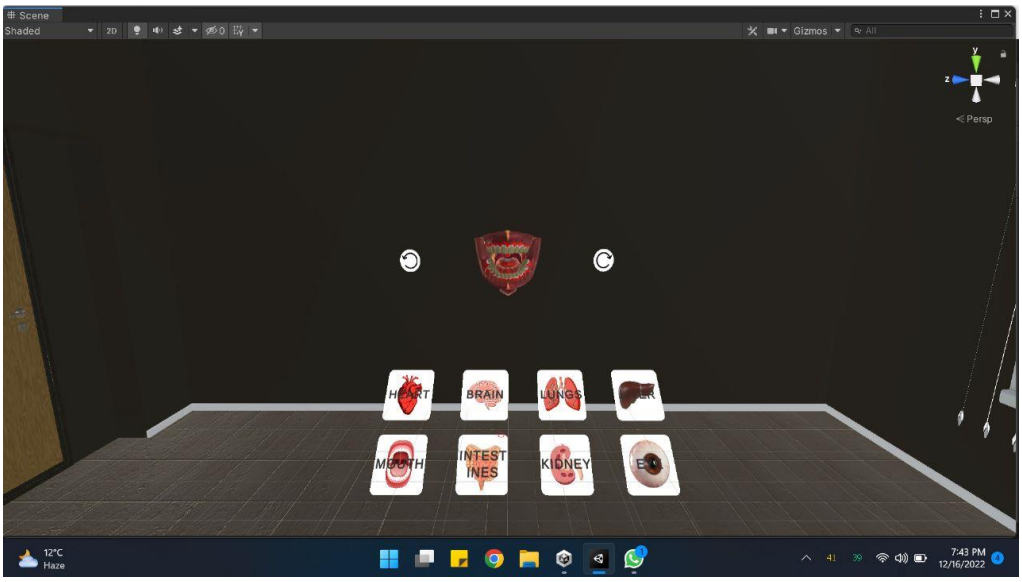

Figure 4. 28 Menu with the organ Mouth

Figure 4.28 shows the Menu of different organs and the selected organ of Mouth. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Mouth.

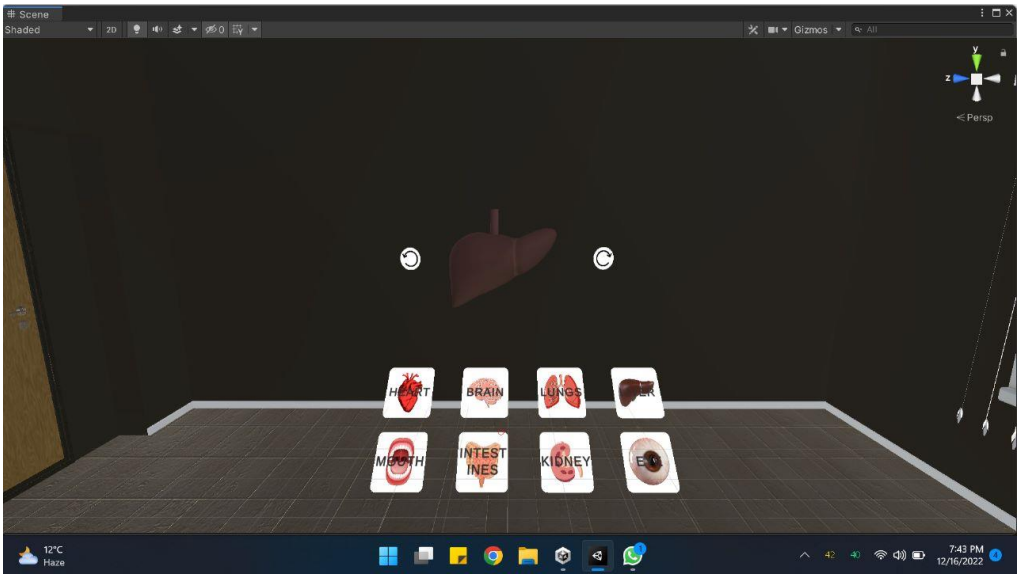

Figure 4. 29 Menu with the organ Liver

Figure 4.29 shows the Menu of different organs and the selected organ of Liver. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Liver.

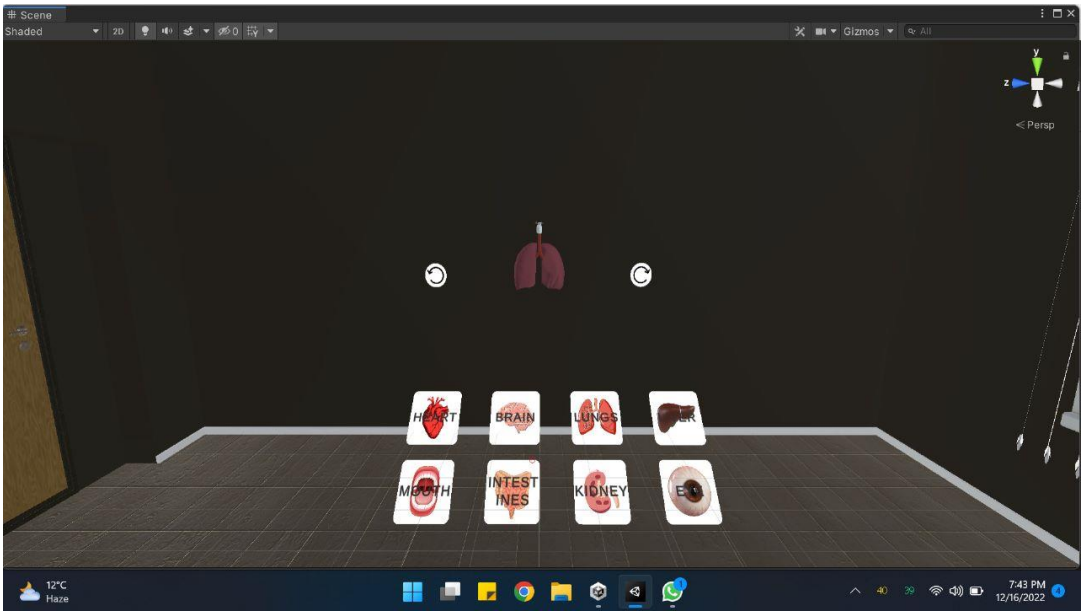

Figure 4. 30 Menu with organ Lungs

Figure 4.30 shows the Menu of different organs and the selected organ of Lungs. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Lungs.

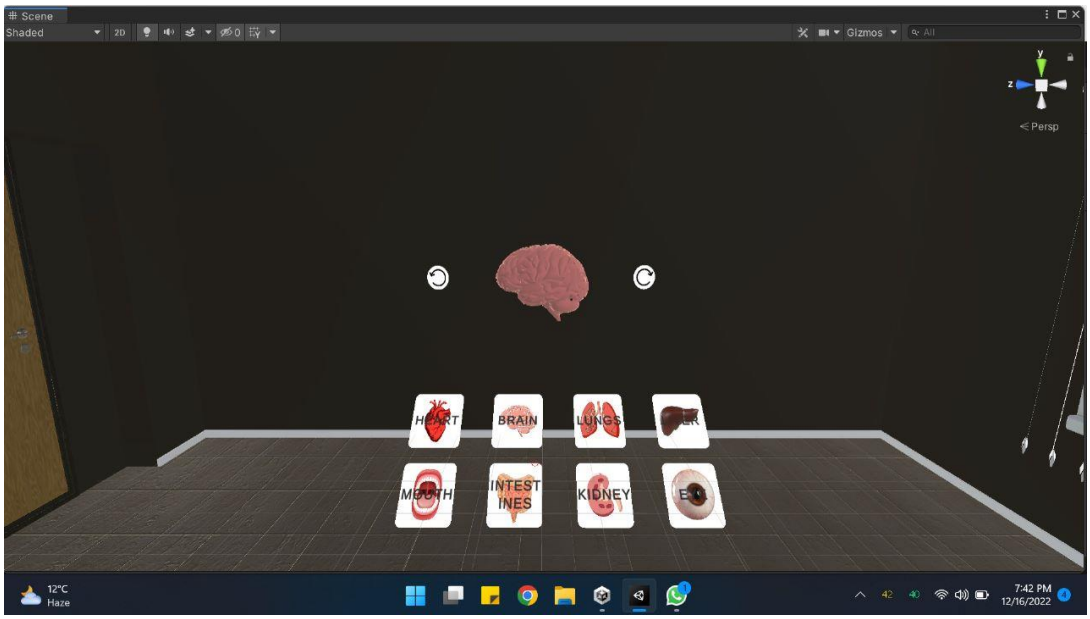

Figure 4. 31 Menu with the organ Brain

Figure 4.31 shows the Menu of different organs and the selected organ of Brain. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Brain.

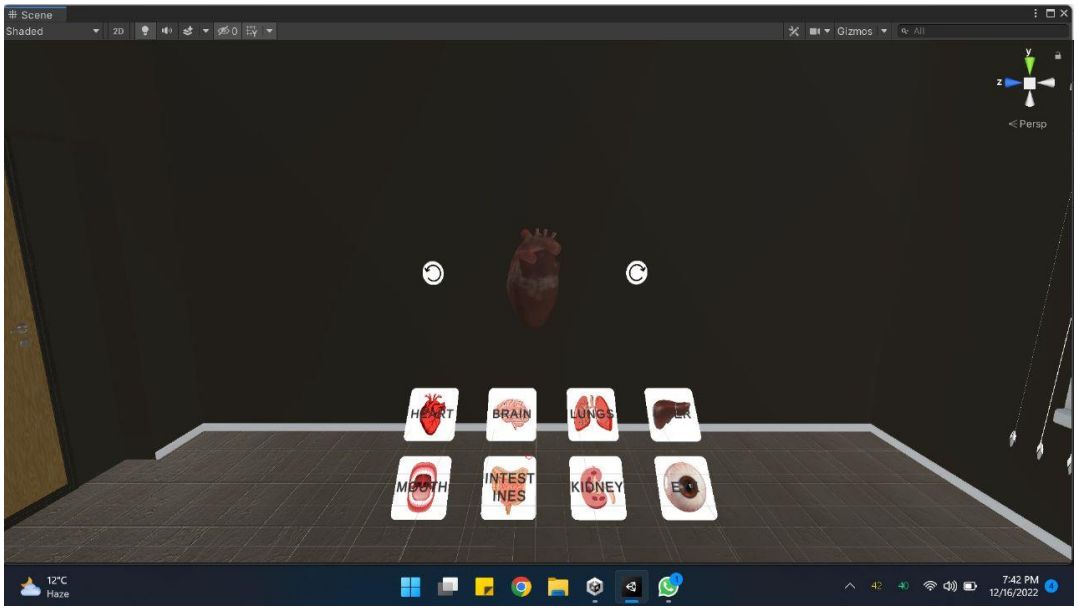

Figure 4. 32 Menu with organ Heart

Figure 4.32 shows the Menu of different organs and the selected organ of Heart. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Heart.

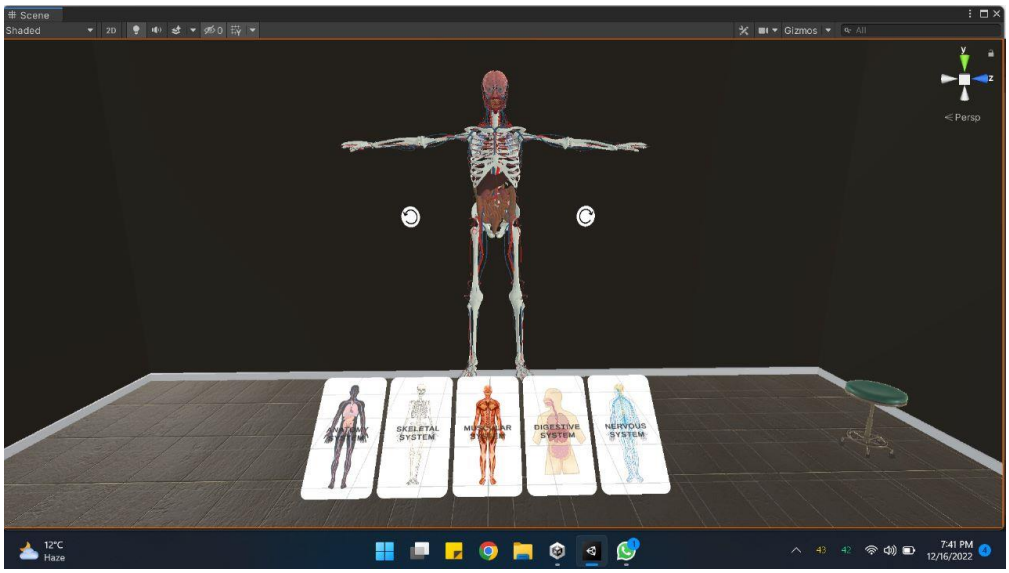

Figure 4. 33 Menu with Anatomy system

Figure 4.33 shows the Menu of different systems and the selected system of Anatomy System. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Anatomy Systems.

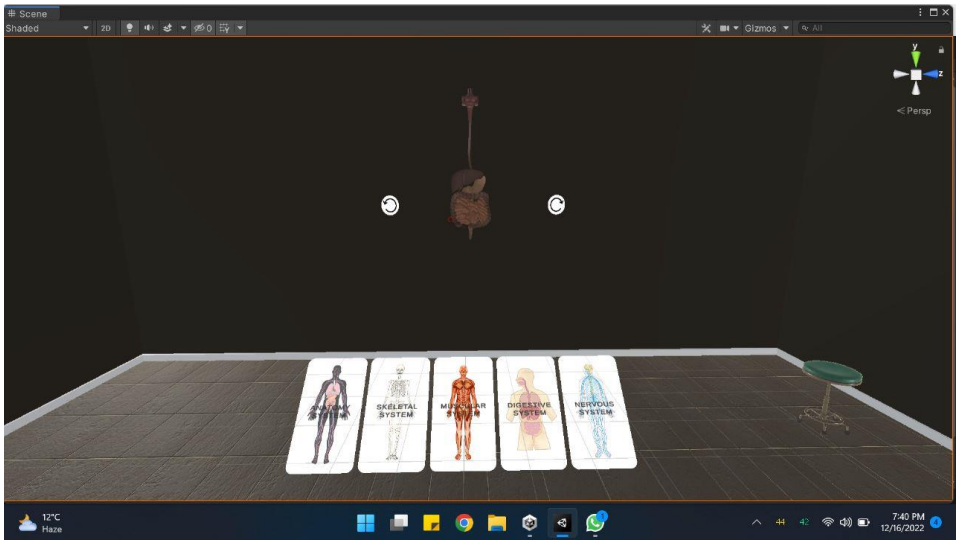

Figure 4. 34 Menu with Digestive System

Figure 4.34 shows the Menu of different systems and the selected system of Digestive System. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Digestive Systems.

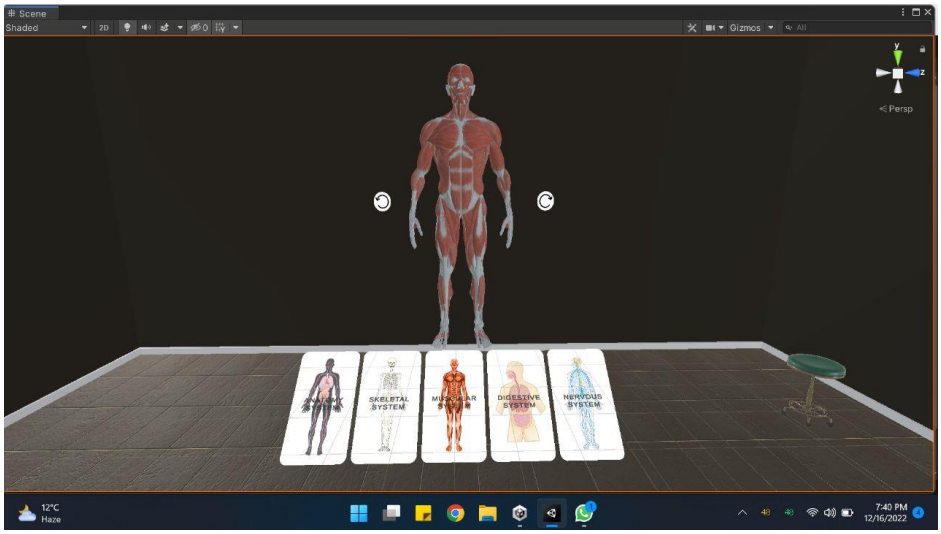

Figure 4. 35 Menu with Muscular system

Figure 4.35 shows the Menu of different systems and the selected system of Muscular System. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Muscular Systems.

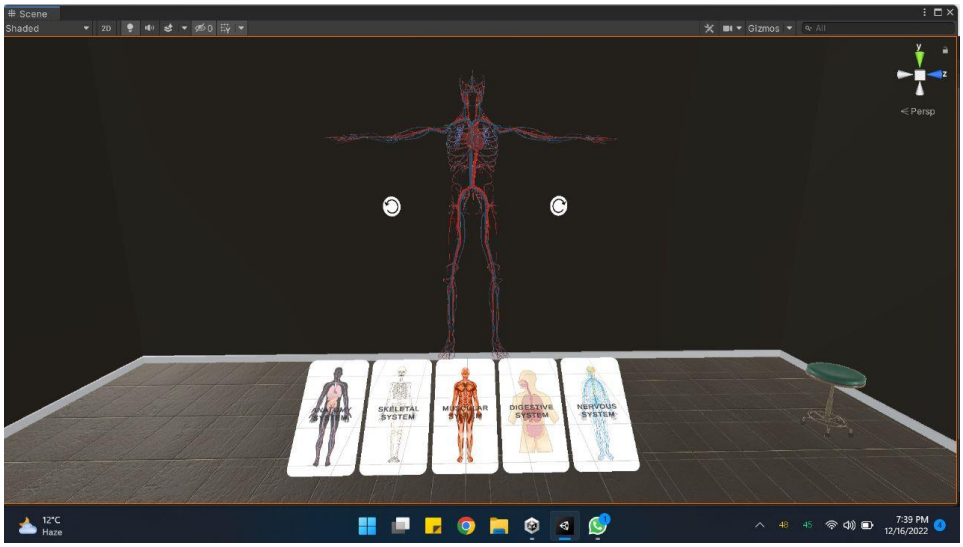

Figure 4. 36 Menu with Nervous System

Figure 4.36 shows the Menu of different systems and the selected system of Nervous System. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Nervous Systems.

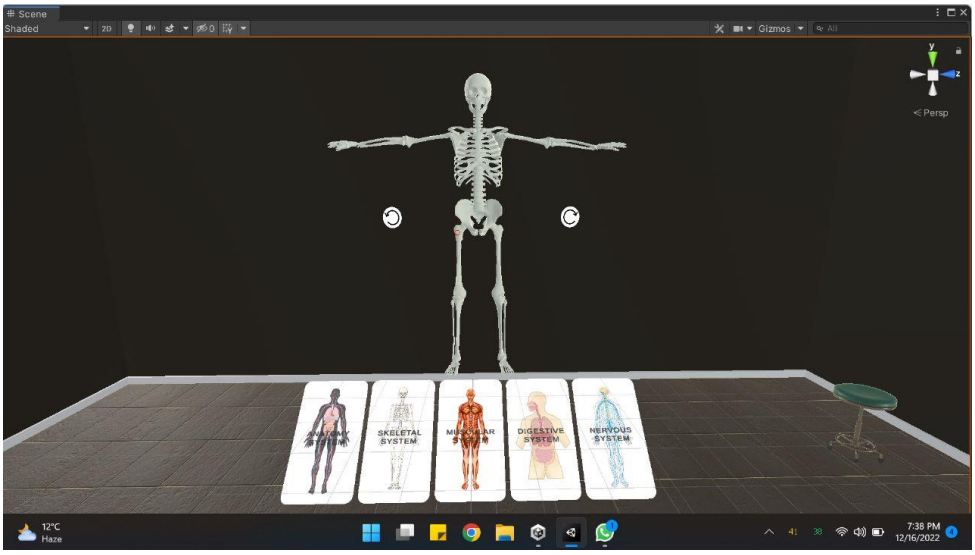

Figure 4. 37 Menu with Skeletal System

Figure 4.37 shows the Menu of different systems and the selected system of Skeletal System. As one can see there are two UI elements left rotate and right rotate present. It will revolve the model of Skeletal Systems.

4.3.7.3. Animals or Zoo

Third Environment of our project is Animals. This environment has 10 scenes in total. All of the scenes have different animals

Figure 4. 38 Zebra Object

Figure 4.38 shows the Zebra Object. As one can see there six two UI elements left rotate, right rotate, Next, Previous, Menu and Voice. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 39 Tiger object

Figure 4.39 shows the Tiger Object. As one can see there six two UI elements left rotate, right rotate, Next, Previous, Menu and Voice. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 40 Polar Bear Object

Figure 4.40 shows the Polar Bear Object. As one can see there six two UI elements left rotate, right rotate, Next, Previous, Menu and Voice. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 41 Kangaroo Object

Figure 4.41 shows the Kangaroo Object. As one can see there six two UI elements left rotate, right rotate, Next, Previous, Menu and Voice. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 42 Horse Object

Figure 4.42 shows the Horse Object. As one can see there six two UI elements left rotate, right rotate, Next, Previous, Menu and Voice. It will help the user to use the scene easily. There is a name tag of the Object as well.

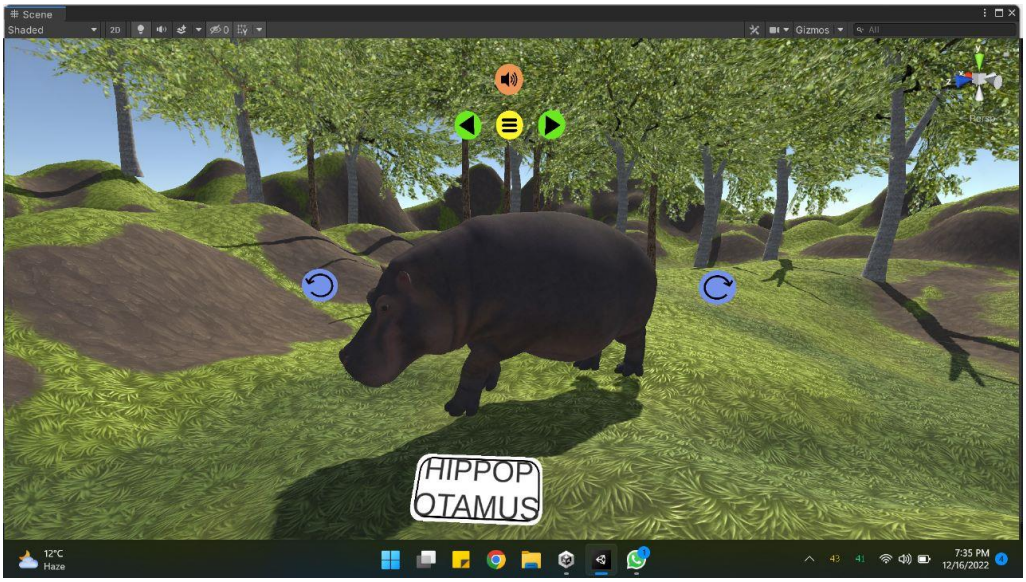

Figure 4. 43 Hippopotamus Object

Figure 4.43 shows the Hippopotamus Object. As one can see there six two UI elements left rotate, right rotate, Next, Previous, Menu and Voice. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 44 Goat object

Figure 4.44 shows the Goat Object. As one can see there six two UI elements left rotate, right rotate, Next, Previous, Menu and Voice. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 45 Elephant Object

Figure 4.45 shows the Elephant Object. As one can see there six two UI elements left rotate, right rotate, Next, Previous, Menu and Voice. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 46 Deer Object

Figure 4. 46 shows the Deer Object. As one can see there six two UI elements left rotate, right rotate, Next, Previous, Menu and Voice. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 47 Ape Object

Figure 4.47 shows the Ape Object. As one can see there six two UI elements left rotate, right rotate, Next, Previous, Menu and Voice. It will help the user to use the scene easily. There is a name tag of the Object as well.

4.3.7.4. Automobiles or Urban:

The Fourth scene of our project is Automobiles or Urban. It has 9 scenes in total. First scene is the menu.

Figure 4. 48 Menu for Urban

Figure 4.48 shows the Menu of Urban Environment. It has 8 scenes in total.

Figure 4. 49 Tow Truck Object

Figure 4.49 shows the Tow Truck Object. As one can see there five two UI elements left rotate, right rotate, Next, Previous and Menu. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 50 Taxi Object

Figure 4.50 shows the Taxi Object. As one can see there five two UI elements left rotate, right rotate, Next, Previous and Menu. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 51 School Bus Object

Figure 4.51 shows the School Bus Object. As one can see there five two UI elements left rotate, right rotate, Next, Previous and Menu. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 52 Police Mobile Object

Figure 4.52 shows the Police Mobile Object. As one can see there five two UI elements left rotate, right rotate, Next, Previous and Menu. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 53 Garbage Truck Object

Figure 4. 53 shows the Garbage Truck Object. As one can see there five two UI elements left rotate, right rotate, Next, Previous and Menu. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 54 Fire Truck Object

Figure 4. 54 shows the Fire Truck Object. As one can see there five two UI elements left rotate, right rotate, Next, Previous and Menu. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 55 Bus Object

Figure 4. 55 shows the Bus Object. As one can see there five two UI elements left rotate, right rotate, Next, Previous and Menu. It will help the user to use the scene easily. There is a name tag of the Object as well.

Figure 4. 56 Ambulance Object

Figure 4. 56 shows the Ambulance Object. As one can see there five two UI elements left rotate, right rotate, Next, Previous and Menu. It will help the user to use the scene easily. There is a name tag of the Object as well.

4.3.8. UI Elements:

UI Elements are used for better guidance of every environment. Every element has its special purpose. Purpose of every UI element will be defined in the tutorial for better understanding of each and everything.

4.3.8.1. Left Rotate:

The left rotate icon will conduct an act, function, or operation in a sequence to turn left around an axis or a center, specifically: to move so that all particles follow circles with the same angular velocity around a common axis.

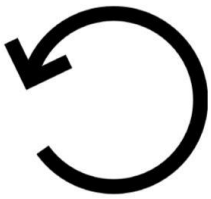

Figure 4. 57 Left Rotate UI Element

Figure 4.57 shows the Left Rotate UI Element shows. It will help the user to view the model on complete 360 degrees.

4.3.8.2. Right Rotate:

The left rotate icon will conduct an act, function, or operation in a sequence to turn left around an axis or a center, specifically: to move so that all particles follow circles with the same angular velocity around a common axis.

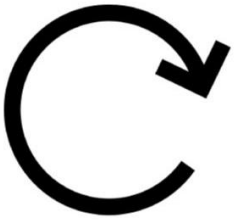

Figure 4. 58 Right Rotate UI Element

Figure 4. 58 shows the Right Rotate UI Element. It will help the user to view the model on complete 360 degrees.

4.3.8.3. Reticle:

In this situation, a reticle is a popular name for a 3D cursor at the point of collision between a projected ray and an object. It's essentially a laser pointer. And it's our attempt to create a 3D mouse. However, it should be noted that using a reticle is more natural than using a mouse.

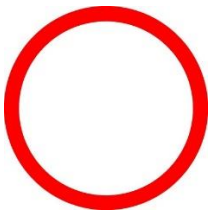

Figure 4. 59 Reticle UI Element

Figure 4. 59 shows the Reticle UI Element. It will be used as a mouse

4.3.8.4. Loader Image:

When the reticle is over an object, the circle fills up, indicating how much time you have to look at the object. In our situation, the time is two seconds. When the circle fills up it will select the object automatically making it a perfect mouse click through VR.

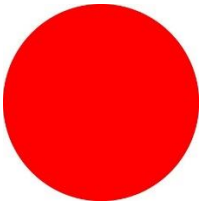

Figure 4. 60 Loader Image UI Element

Figure 4. 60 shows the Loader Image UI Element. When the circle is full the desired object would be selected.

4.3.8.5. Next:

When the object is selected and its scene will appear. There will be directions to move further. The next icon will indicate to move to the next scene.

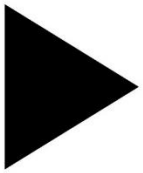

Figure 4. 61 Next UI Element

Figure 4. 61 shows the Next UI Element. The reticle will focus on the next icon and after 2 seconds the scene will be change to the next one.

4.3.8.6. Previous:

When the object is selected and its scene will appear. There will be directions to move further. The previous icon will indicate to move to the previous scene.

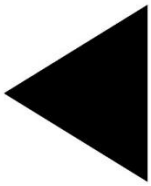

Figure 4. 62 Previous UI Element

Figure 4. 62 shows the Previous UI Element. The reticle will focus on the previous icon and after 2 seconds the scene will be change to the previous one.

4.3.8.7. Menu:

A menu will allow users to access all the scene in the interface. It gives users alternatives to choose in between of different objects and built-in instructions to access the features or functions of an application.

Figure 4. 63 Menu UI Element

Figure 4. 63 shows the Menu UI Element. The reticle will focus on the Menu icon and after 2 seconds the scene will be change and show the menu screen.

4.3.8.8. Voice:

Voice icon will be displayed on top of every object. It will be used to provide Audio aid or Audio description to the object. When the icon is selected through Loader Image. The audio will be start playing providing aid to the user.

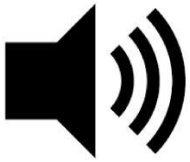

Figure 4. 64 Voice UI Element

Figure 4.64 shows the Voice UI Element. The audio will be start playing after selected providing aid.

4.3.8.9. Tags with Picture:

Every object in every scene will have its own personal icon. The icons will be like the figure below. For example, if its Moon model then it will There will be tag attached with the Moon picture. User will focus on the tag/ icon for two seconds using reticle and then the model will appear. Mostly these tags will be on the menu screen.

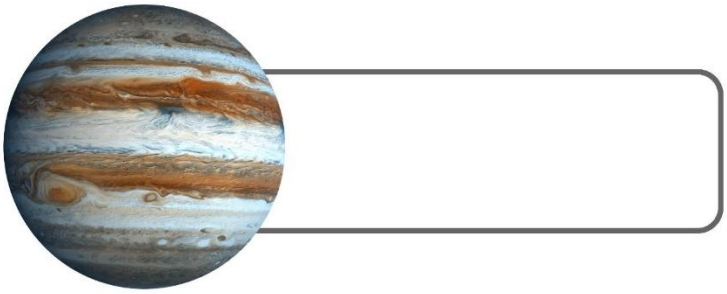

Figure 4. 65 Tags with Picture UI Element

4.4. Summary

Measuring results in graphics is highly subjective, Kinderview aims to be graphically accurate & properly animated to allow fluid interaction with their intended users. As we develop the system it becomes more apparent that we are achieving what we initially intended/planned.

Following are the results we intended to achieve:

1. Acceptable framerate on devices intended to run Kinderview.
2. Bug-less functionality on android devices & VR Emulators.
3. Minimal visual artifacts hindering user experience.
4. Fluid GUI for the intended users.
5. Keeping the design process simple for future upgrades & updates.

Chapter 5 Testing

5.1. Testing Techniques Employed for This Project

5.1.1. Usability Testing:

We have done Usability testing of our project. In this we have evaluated our project by testing it with representative users. We have evaluated the usability of our VR headset and then recorded the responses. The objective was to discover any usability issues. We have collected qualitative and quantitative data, and assessed participant satisfaction with the product. For this we have prepared a test report, found willing participants, and then did the analysis. For analysis we have used the tool Maze [4].

5.2. Test Cases

5.2.1. Test Case 1:

Figure 5.1 shows the Analysis of the question: How are you feeling while wearing the VR Headset?

Figure 5. 1 Analysis of Test Case 1

This question is asking the respondent to self-report their level of comfort while wearing a virtual reality headset. The question is trying to gather information about the physical and psychological experience of using the VR headset. The answer options provided are four different levels of comfort: 1) Comfortable, 2) Comfortable but not for long, 3) Uncomfortable, and 4) Sick. These options give the respondent a range of choices to select from, allowing them to accurately convey their level of comfort. It seems that the survey is gathering data about how the users feel after using it, in order to enhance product's design and user experience.

5.2.2. Test Case 2

Figure 5.2 shows the Analysis of the question: If sick what are you feeling?

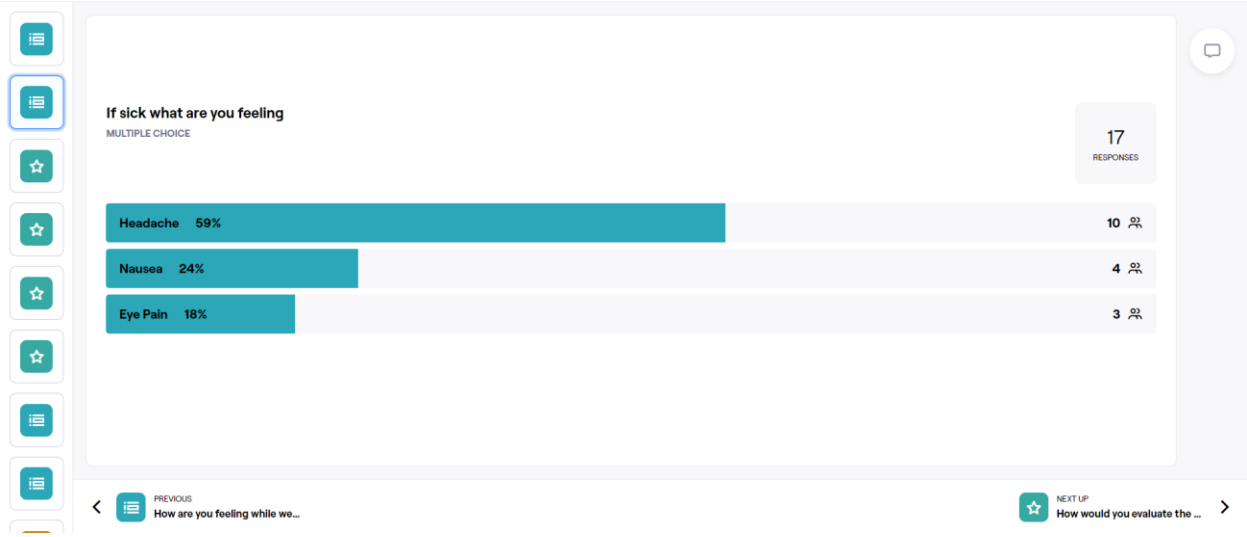

Figure 5. 2 Analysis of Test Case 2

This question is a follow-up to the previous question and it's trying to gather more specific information about the symptoms that a respondent may be experiencing if they reported feeling "sick" while wearing a virtual reality headset. The question is asking the respondent to identify which specific symptoms they are experiencing from a provided list of options: 1) Headache, 2) Nausea, and 3) Eye pain. These options are common symptoms that people may experience when using VR headsets, and the question aims to understand more about which symptoms are most prevalent among users that reported feeling sick. It is likely that this information will be used to improve the design of VR headsets or the VR experience in general to reduce or eliminate these symptoms.

It is also important to point out that the question is using "If sick" as a condition, that means that this question is only aimed to be answered by people who previously reported feeling sick, so the results are targeted and specific.

5.2.3. Test Case 3:

Figure 5.3 shows the Analysis of the question: How would you evaluate the display quality of the VR headset?

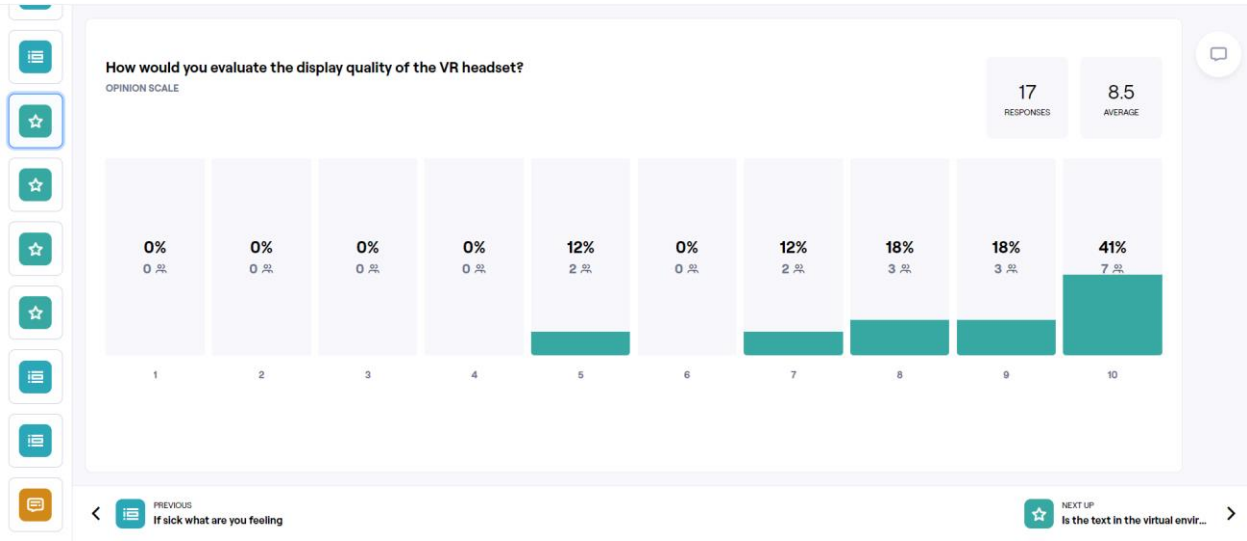

Figure 5. 3 Analysis of Test Case 3

This question is asking the respondent to evaluate the display quality of the virtual reality headset on a scale from 1 to 10. The question is seeking to gather information about the respondent's perception of the visual aspect of the VR headset. The 1 to 10 rating scale provides a quantitative measure of the respondent's evaluation and allows for comparisons across respondents. The scale is also common and well understood, which makes it easy for respondents to understand what is being asked of them. The question is trying to measure the quality of the display, which can be an important aspect of the overall user experience of the VR headset. The higher the score the better the quality of the display perceived by the user.

This question gives a numeric score, allowing the surveyor to measure the quality of the display, which can be useful for comparing different VR headset models or different generations of the same model. The results can be used to improve the display quality of the VR headset in future iterations, in order to enhance the user experience.

5.2.4. Test Case 4:

Figure 5.4 shows the Analysis of the question: Is the text in the virtual environment readable, if readable then how much?

Figure 5. 4 Analysis of Test Case 4

This question is asking the respondent to evaluate the readability of the text in the virtual environment on a scale from 1 to 10. The question is seeking to gather information about the respondent's ability to read and understand the text that appears in the virtual environment. The 1 to 10 rating scale provides a quantitative measure of the respondent's evaluation, and it allows for comparisons across respondents. The scale is also common and well understood, which makes it easy for respondents to understand what is being asked of them. This question also includes a follow-up question, "if readable then how much?" which is asking the respondent to further elaborate if they are able to read the text and how much they are able to read.

The question is trying to measure the readability of the text in the VR environment, which is an important aspect of the overall user experience and usability. A low rating indicates that the text is difficult to read, and a high rating indicates that the text is easy to read. This information can be used to improve the readability of the text in future VR experiences, to enhance the user's ability to understand and interact with the virtual environment.

The question could also be asking about the amount of the text in the virtual environment, for example, if the text is too small or too big, or if the text is spread out enough for users to be able to read easily, in which case the user would be rating how much of the text is readable.

5.2.5. Test Case 5:

Figure 5.5 shows the Analysis of the question: Are the models in the virtual environment visible, if visible then how much?

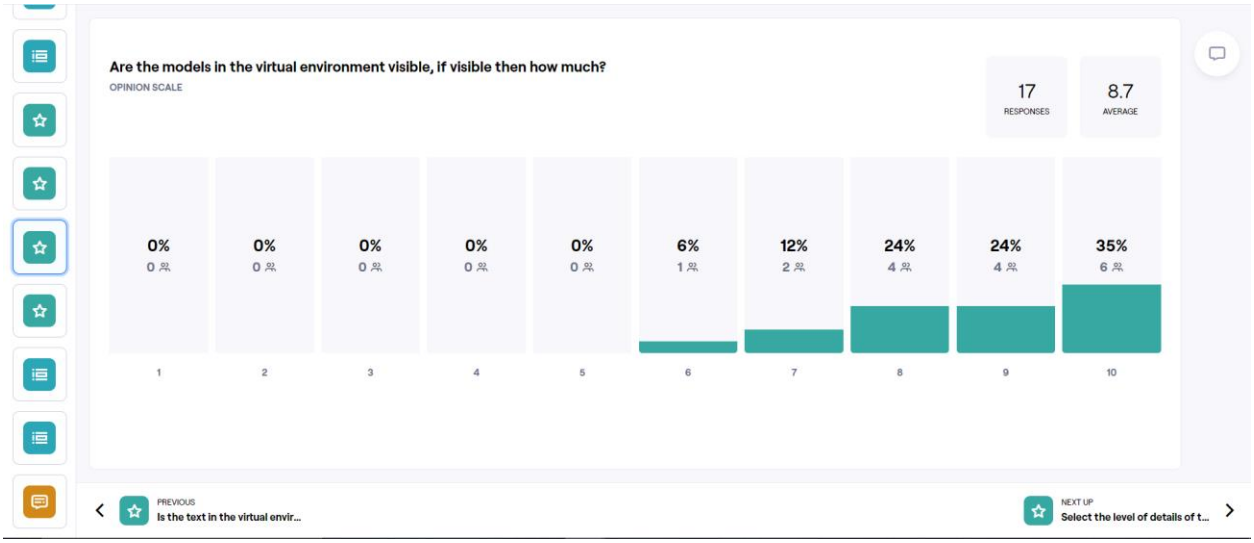

Figure 5. 5 Analysis of Test Case 5

This question is asking the respondent to evaluate the visibility of the models or objects in the virtual environment on a scale from 1 to 10. The question is seeking to gather information about the respondent's ability to see and understand the objects or models that appear in the virtual environment. The 1 to 10 rating scale provides a quantitative measure of the respondent's evaluation, and it allows for comparisons across respondents. The scale is also common and well understood, which makes it easy for respondents to understand what is being asked of them. This question also includes a follow-up question "if visible then how much?", which is asking the respondent to further elaborate if they are able to see the models and how much of it they are able to see.

The question is trying to measure the visibility of the models in the VR environment, which is an important aspect of the overall user experience and usability. A low rating indicates that the models are difficult to see, and a high rating indicates that the models are easy to see. This information can be used to improve the visibility of the models in future VR experiences, to enhance the user's ability to understand and interact with the virtual environment.

5.2.6. Test Case 6:

Figure 5.6 shows the Analysis of the question: Select the level of details of the models in the virtual environment:

Figure 5. 6 Analysis of Test Case 6

This question is asking the respondent to evaluate the level of details of the models in the virtual environment on a scale from 1 to 10. The question is seeking to gather information about the respondent's perception of the level of details of the models that appear in the virtual environment. The 1 to 10 rating scale provides a quantitative measure of the respondent's evaluation and allows for comparisons across respondents. The scale is also common and well understood, which makes it easy for respondents to understand what is being asked of them.

The question is trying to measure the level of details of the models in the VR environment, which is an important aspect of the overall user experience. A low rating might indicate that the models lack detail, and a high rating might indicate that the models are highly detailed. This information can be used to improve the level of details of the models in future VR experiences, to enhance the user's ability to understand and interact with the virtual environment.

This information can be useful for VR designers, game developers, and other creators of virtual environments, to strike the right balance between the level of detail, and the performance of the virtual environment. Since a more detailed model can require more processing power and memory, they can use this information to optimize the VR experience for the user's device.

5.2.7. Test Case 7:

Figure 5.7 shows the Analysis of the question: Do you think VR provide more in-depth educational experience?

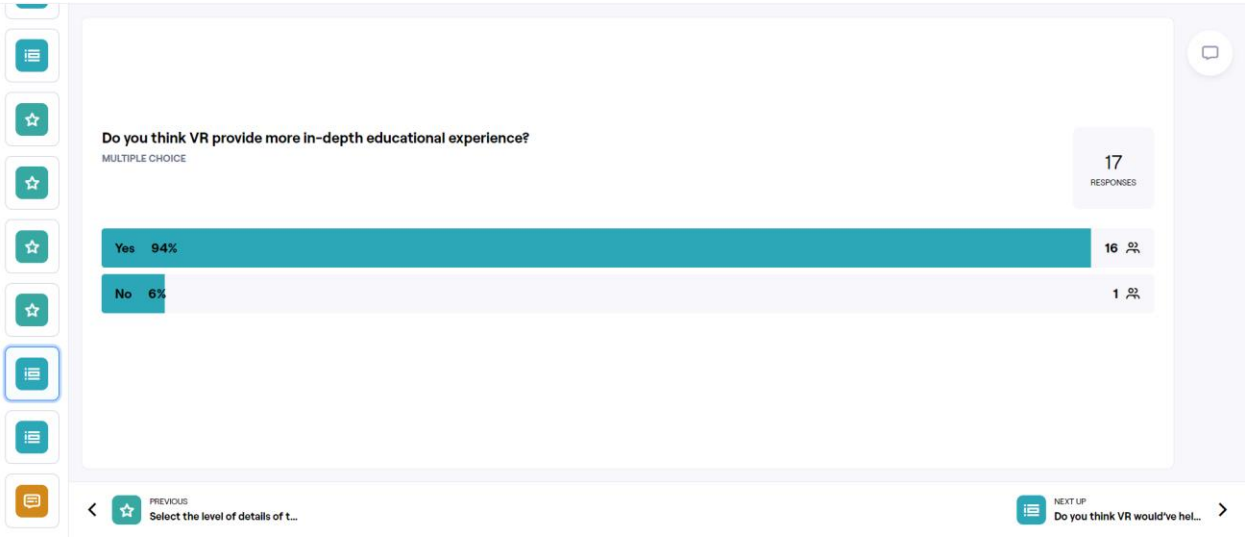

Figure 5. 7 Analysis of Test Case 7

This question is asking the respondent whether or not they believe that virtual reality (VR) technology provides a more in-depth educational experience. It is a yes or no question, which is asking for the respondent's personal opinion or belief on the subject. The answer options are either "yes" or "no", which provides a clear dichotomy and makes it easy for the respondent to answer.

This question is trying to gather information about the perceived effectiveness of VR as a tool for education. It aims to understand the respondent's belief about the extent to which VR enhances the learning process. This can be a valuable piece of information for educators, instructional designers, and technology developers who are interested in exploring the use of VR in education. The results could be used to determine whether or not to implement or expand the use of VR technology in educational settings and it can also be used as a guide to improve the current and future VR experiences,

The question is also open-ended, allowing respondents to express their own thoughts, opinions and feelings regarding the use of VR in education, providing insight into factors such as engagement, motivation and attitude towards VR as an educational tool.

5.2.8. Test Case 8:

Figure 5.8 shows the Analysis of the question: Do you think VR would've helped you while studying?

Figure 5. 8 Analysis of Test Case 8

This question is asking the respondent whether or not they believe that virtual reality (VR) technology would have helped them while they were studying. It is a yes or no question, which is asking for the respondent's personal opinion or belief on the subject. The answer options are either "yes" or "no", which provides a clear dichotomy and makes it easy for the respondent to answer.

This question is trying to gather information about the perceived effectiveness of VR as a study aid, and it aims to understand the respondent's belief about the extent to which VR could have improved their learning experience. This can be a valuable piece of information for educators, instructional designers, and technology developers who are interested in exploring the use of VR in education. The results could be used to determine whether or not to implement or expand the use of VR technology in educational settings and it can also be used as a guide to improve the current and future VR experiences.

It's also a retrospective question, meaning it is asking about an event that happened in the past, in this case, the respondent's previous studies. It could help to gauge the effectiveness of VR in the past, and it can also be used to understand if the VR technology has improved enough to be more helpful to students now.

5.2.9. Test Case 9:

Figure 5.9, 10, 11 shows the Analysis of the question: How would you evaluate VR experiences for educational purposes?

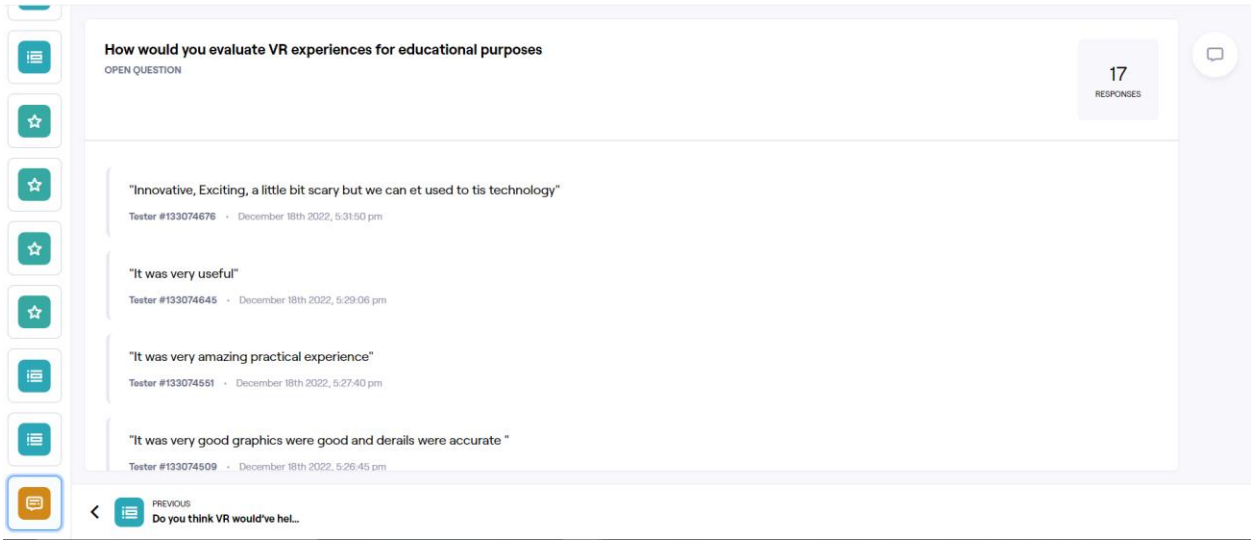

Figure 5. 9 Written Responses from Participants

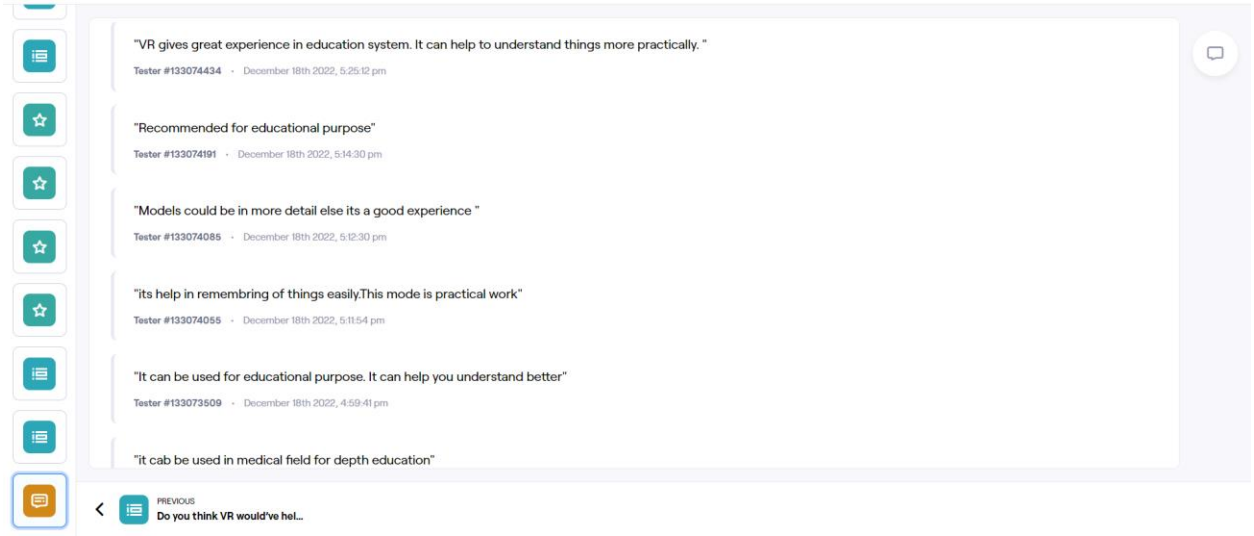

Figure 5. 10 Written Responses from Participants

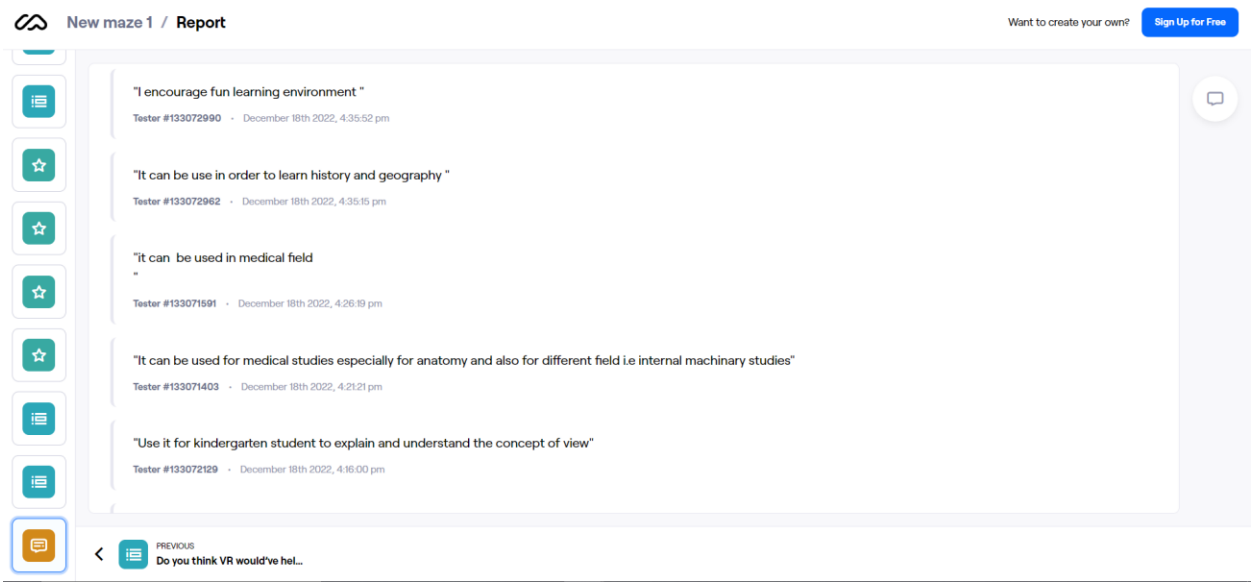

Figure 5. 11 Written Responses from Participants

This question is asking the respondent to evaluate the use of virtual reality (VR) technology for educational purposes. It is an open-ended question, which is asking the respondent to provide their own thoughts, opinions, and feelings about the use of VR in education, without providing a set of predetermined answer options.

This question is trying to gather information about the respondent's overall perception of the effectiveness of VR as a tool for education. It aims to understand the respondent's thoughts on how well VR enhances the learning process, and it's also trying to find out about any challenges, limitations or issues that the respondent may have experienced while using VR in an educational setting.

Open-ended questions provide a more detailed and nuanced understanding of the respondent's thoughts, opinions and feelings. This type of question allows the respondent to express their own thoughts, which can provide a more in-depth understanding of the subject. The results of this question can be used to improve the current and future VR experiences for educational purposes, and it can also guide the development of new VR-based educational tools, resources, or curriculum.

5.3. Test Results

5.3.1. Test Result 1:

82% of Participant were comfortable with the headset whereas 18% were comfortable but not for too long. Else nobody felt sick or uncomfortable.

5.3.2. Test Result 2:

If anybody were to feel sick there were three side effects 59% would have felt Headache, 24% would have felt Nausea and 18% would have felt Eye Pain.

5.3.3. Test Result 3:

Display quality of Headset was 8.5 Average.

5.3.4. Test Result 4:

Readability quality of Headset was 8.6 Average.

5.3.5. Test Result 5:

Visibility of the Models were 8.7 Average.

5.3.6. Test Result 6:

Detailing of the Models are 8.3 Average

5.3.7. Test Result 7:

94% of Participants suggested VR for more in-depth educational experience.

5.3.8. Test Result 8:

94% of participants thinks that VR would be helpful in studies.

5.3.9. Test Result 9:

Most of the Participants defined VR experience good and helpful. They have also mentioned that VR is great for practical purpose. Every participant has their own ideas for education expertise. One has called the experience a bit scary but still recommended.

5.4. Summary

Usability testing was performed to determine how simple and user-friendly our software product was. Our software was utilized by a small group of target end users to expose usability flaws. This primarily focused on the application's simplicity of use, flexibility in handling controls, and capacity to accomplish its objectives.

Chapter 6 Conclusions and Future Work

6.1. Contributions

Our project began with brainstorming discussions on how to tackle the subject at hand. On this initial stage, we argued about so many facts that we thought. And then we brought those ideas together and began working on the project. Each of us did our share in the endeavor and subsequently a meet up was arranged to discuss and collated our information.

Every member of a team has unique talents and shortcomings. Learning teams may be a productive way to create new abilities and hone old ones when they are well-organized and everyone is giving their full effort.

6.1.1. Contribution 1

Muhammad Huzaifa Zamir helped make the team project a success. He is the project developer and has done all the implementation. In order to help the team accomplish the project's objectives, he spent a lot of time working with team members on particular tasks related to each member's area of expertise.

6.1.2. Contribution 2

Muhammad Hashim assisted the team in brainstorming by contributing ideas and information for the assignments. He designed the 3D models and worked in documentation. He has shown excellent participation abilities across the project, in all project areas.

6.1.3. Contribution 3

Aatika Farooqui designed the UI/UX of the project making the project as much user friendly as possible. She was very committed to producing the best result. She also did scripting of the project. Her work ethics allowed us to have many in-depth great experiences.

6.2. Findings

We designed game camera. Unity does not give us that. There is no such asset present in the Unity. Reticle or GVR, which give us mouse experience in VR headset, is founded by us. VR can be used for educational purposes. One great founding!

6.3. Future Work

This app can be upgraded to AR elements

6.3.1. Improvements in the existing System

Real time object mapping and tracking can be more done in the future. A user will have the AR experience with the same application. It can be upgraded into the more high-level education.

6.3.2. Further System Designs

It could have VR headset support. It can have joystick support, which will change interfaces accordingly.

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