Mixed Reality Based 3D Simulation Tool

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Abstract

The project aims to create a virtual development tool for designers and machine architects, to build what they visualise in their minds into a virtual reality space.

- People can visualize the hidden concepts and structural features of objects or laboratory instruments.
- Virtual tools and equipment are used to simulate the functions in 3d planes.
- People can simulate their equipment inputting their physical values so that the people can evaluate the application capability of the design.

Introduction

- Mixed Reality based 3D development simulation tool is a new virtual-real-world interactive simulation project in recent years.
- Our project provides a platform to make 3D object using MR and feel like making a real world object.
- Optical see-through and video-see-through are the two types of technologies used for developing the Mixed Reality space.
- In optical see-through technology, the real-world can be seen directly in tools such as transparent glass
- In video-see-through technology, both virtual and real objects are present in an LCD (Liquid Crystal Display).
- We use a Pointer Pen that have the access to the virtual world and it help with the simulation and building of 3D Objects.

Architecture

We designed an efficient architecture.

- This architecture comprises three parts: the Pen technology, Video-see through Head mount displays, and Processing Unit.
- The stylus pen contains left and right click buttons to interact and also a 3d motion button to rotate the viewpoint.
- The basic Processor architecture contains inputs of LIDAR Sensor data and Camera data from Video-see through Head Mount Displays and Pen stimulus data from the stylus pen.
- These signals are given to the processor and the processing unit analyses and Displays or updates the viewpoint of the user in the head mount display..

Hardware

- Pointer Pen Can Manage and control the object we created in the virtual world.
- Its functionality is divided by 3 buttons, they are Left Button,Right Button and 3D Motion Button
- Left button is used for selecting and dragging the 3D object Horizontally and also vertically. Right button can show the properties of the 3D objects we choose or make. 3D motion button is used to View and Rotate the object in 360 degree.
- A video see-through head mounted display (HMD) has a different viewing point than does the real eye, resulting in visual displacement (VD).
- VD deteriorates visuomotor performance due to sensory conflict.
- Previous work has investigated this deterioration and human adaptation by comparing fixed VD and real eye conditions.

Design and Software

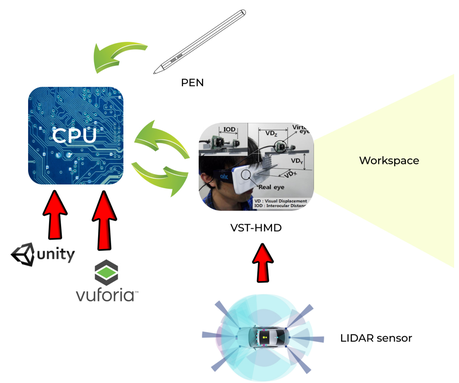

Figure 1:Why WebRTC

Unity is a powerful engine that has a number of built-in Physics components.

- The AR Plane Manager component allows you to specify the detection mode, which can be horizontal, vertical, or both.
- The design of inventory can be made in Unity game Engine and design can be added as GameObjects with behaviours given with C script in the hierarchy of GameObject.
- By adjusting a few parameter settings, we can create an object that behaves in a realistic way.
- The pen can be interfaced with the computer through an HC-05 module connected to the Arduino.

Future Scope

- AR technology both improved the students' laboratory skills .
- It helped them to build positive attitudes towards physics laboratories.
- With the advent of effective AI algorithms, that uses less computational power and memory, the project can be effectively scaled to include life-like experience.

Conclusion

- Development of 3D simulation tools using Mixed Reality is helpful and effective for the modern era of education and technology.
- This project when implemented opens up a lot of possibilities and opportunities for the exposure and advancement of the business world.
- This project is a very useful guide to the MR space such as the various development phases, analytical models, the simulation toolkit, Head mount displays and Stylus-pen technology.

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