Mixed Reality Based 3D Development Simulation Tool

Alan P Aby
Anees Babu
Muzammil T
Najim Rahman Valappil

College of Engineering Trivandrum
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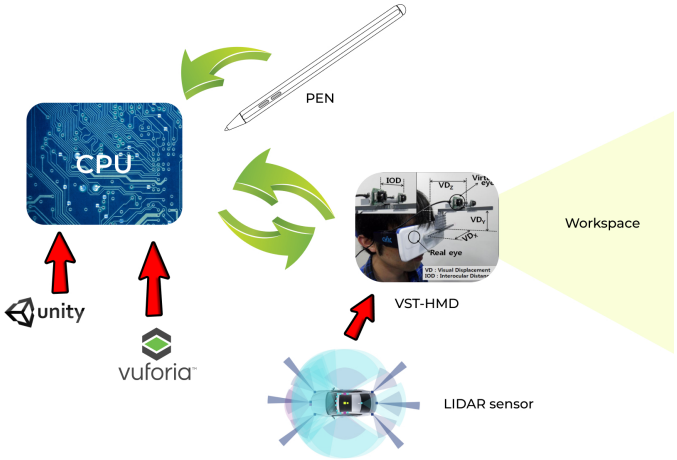
Problem Statement

- Depth analysing difficulty of the machine being designed.
- Visualisation difficulty of 3D model in a 2-D plane.
- Physical measurements are not satisfactory **relatable** in a 2D design environments.

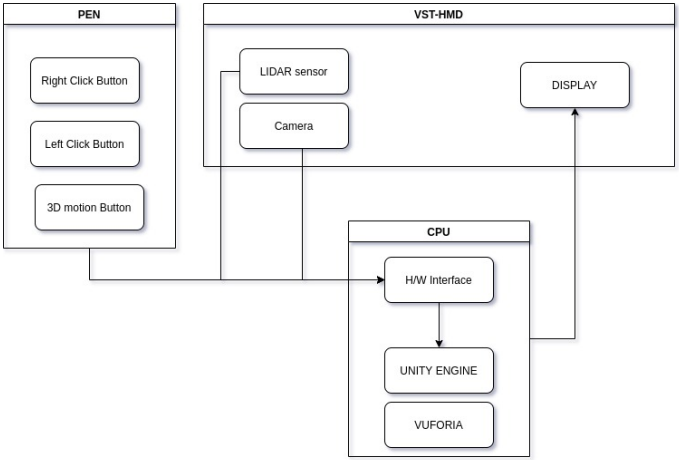
Proposed Solutions

- Depth analysing issue is solved using LIDAR sensors and 2 VGA cameras in VST HMD's
- Visualisation difficulty is solved by presenting 3D model in the environment of the user
- Measurements and physics is simulated and shown and an aesthetic feel of designing is produced.

Design


PEN
CPU
unity
vuforia
IOD
VD2
VD1
Real eye
VD - Visual Displacement
IOD - Intercocular Distance
VST-HMD
Workspace
LIDAR sensor

Architecture



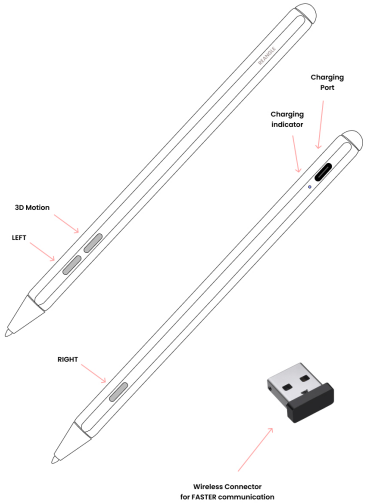
Software tools

- Inventory and other parts made as GameObjects and physics simulated using Unity PhysX Engine.

Hardware

1. The Pen Design.
   - The pen can be interfaced with the computer through an HC-05 module connected to the Arduino.
     - Left Button - selecting and dragging the 3D object
     - Right Button - show the properties of the 3D objects we choose or make
     - 3D Motion Button - used to View and Rotate the object in 360 degree.

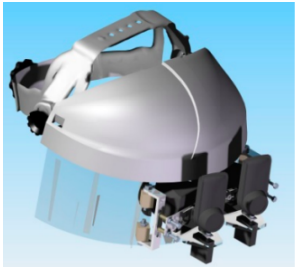
Hardware

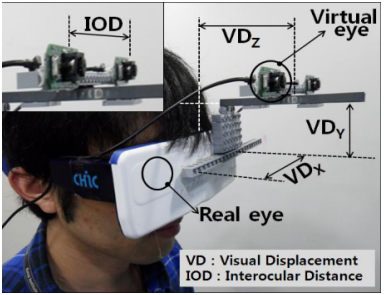

Charging
Port
Charging
indicator
3D Motion
LEFT
RIGHT
Wireless Connector
for FASTER communication

Hardware

2. VST HMD.
    - Video See Through Head Mounted Display
    - Display device, worn on the head or as part of a helmet with 2 camera rendering the external environment to the user.
    - LIDAR sensor for depth measurement.

Hardware




IOD
VDz
Virtual eye
VDY
VDX
Real eye
VD : Visual Displacement
IOD : Interocular Distance

Working Flow

- Flow Diagram

Future Scope

- The MR model we suggest can be re-modified to adjust to the demands of various other industries like healthcare, tourism etc.

  Limitations :

  - Creating Mixed Reality (MR) applications currently is one of the most challenging tasks in the field of computer graphics.
  - Traditional I/0 devices cannot be used with an MR system, hence the new system architecture and operating system exclusively for MR should be developed.
  - No widely adopted standards exist in this area.

References

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   crgj@bit.edu.cn

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   Zhenliang Zhang1, Benyang Cao1, Dongdong Weng1,2„* Yue Liu1,2, Yongtian Wang1,2, Hua Huang3

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Thank You