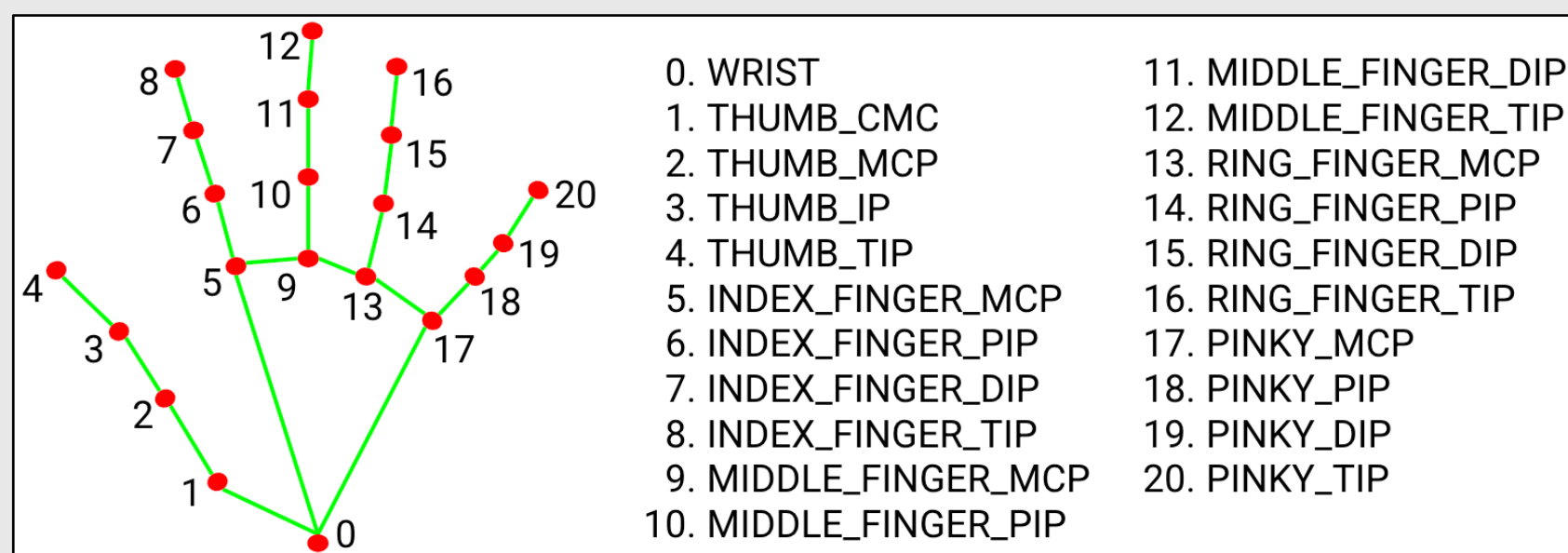


Introduction

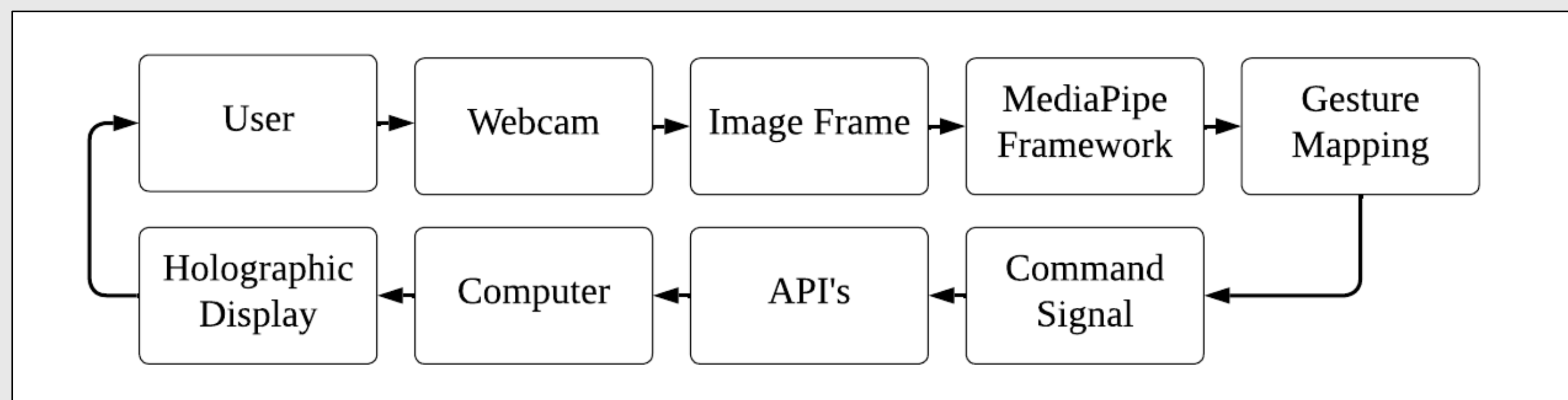
- HoloTouch revolutionizes how users interact with their computers by bringing the desktop into the 3D virtual realm through an interactive holographic projection.
- HoloTouch addresses the lack of intuitive, touch-free interaction methods for digital content. Traditional devices like keyboards and mice limit flexibility and accessibility, especially in immersive or hands-free environments.
- Existing solutions such as Microsoft HoloLens, Oculus, Leap Motion are bulky, costly, or require specialized equipment.
- HoloTouch is lightweight, low-cost, and utilizes open-source frameworks for easy integration.

Proposed Solution

- Hand gesture recognition:** MediaPipe real-time hand tracking. Below are the landmarks we used.



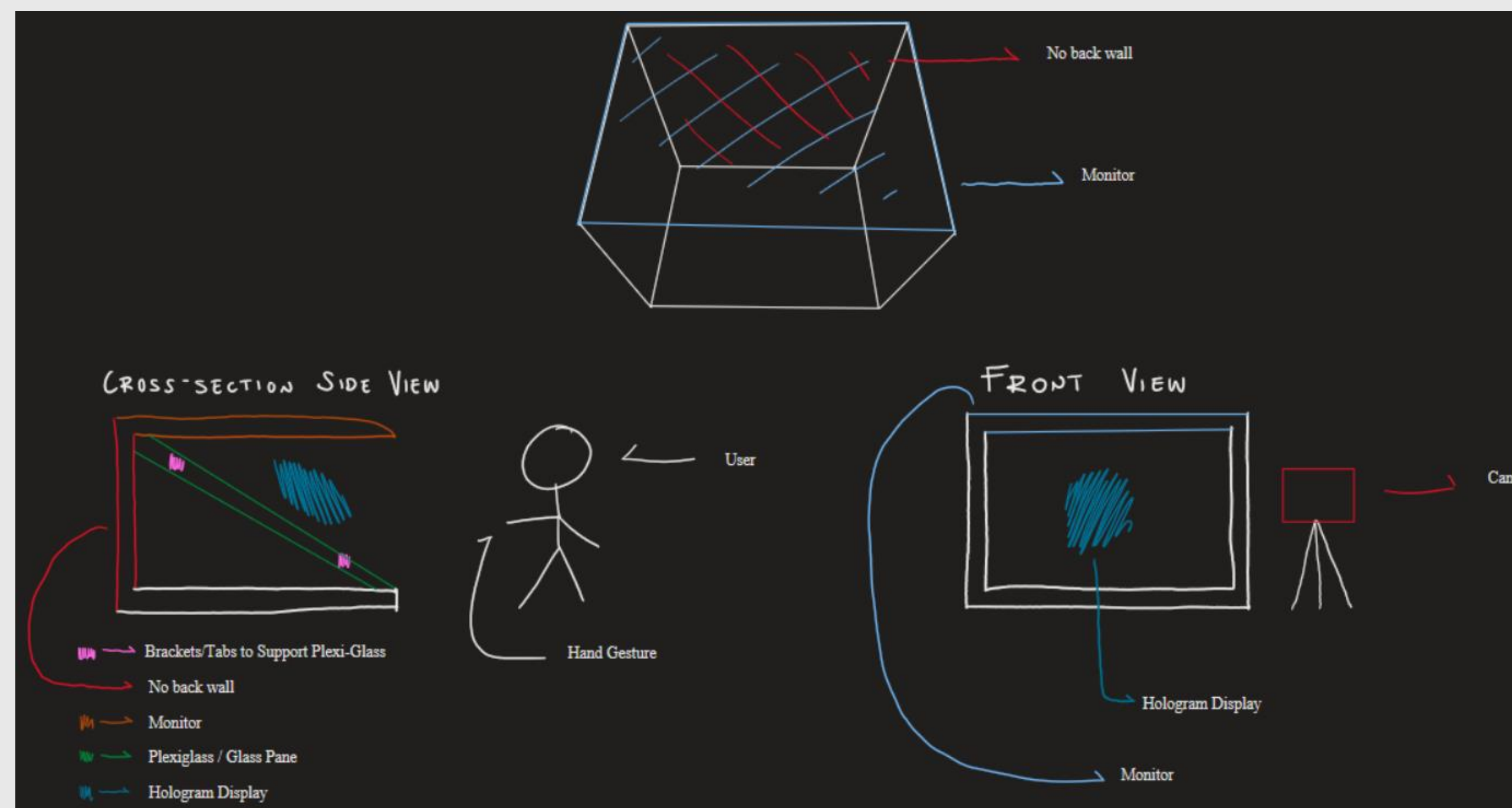
- Computer control:** PyAutoGUI and Pynput for mouse and keyboard simulation.
- Basic navigation:** cursor, left click, right click, double click
- 3D manipulation:** zoom in, zoom out, rotate left, rotate right
- Navigation for web browsers/applications:** switch tab, open tab, close tab
- And more!
- Holographic display:** A downward facing screen projects onto a clear pane which allows a 3D holographic visual.



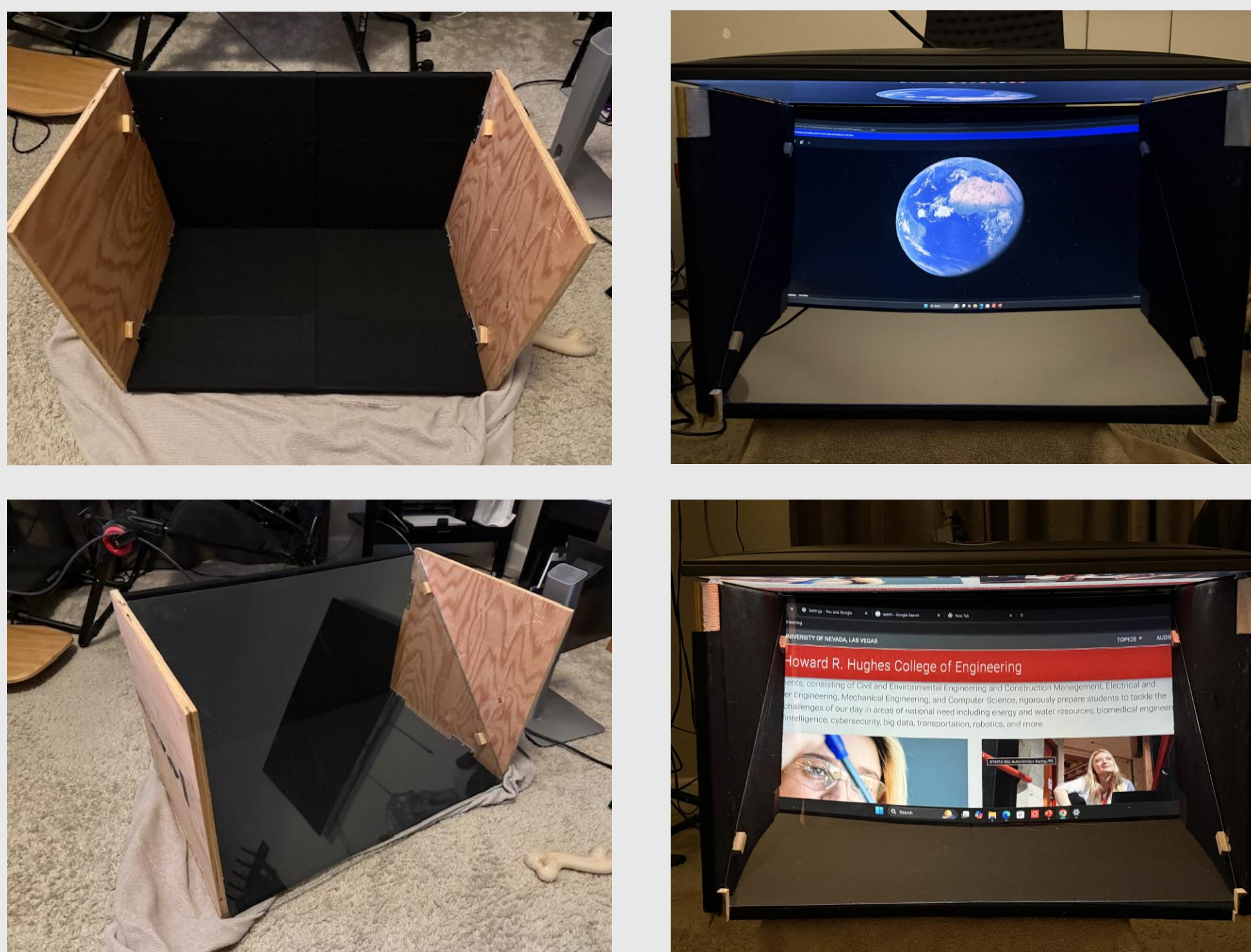
Hardware	Software
Holographic Display	Python 3.12 (Pycharm)
USB Webcam	MediaPipe Framework
Light	PyAutoGUI, Pynput
PC with display	Google Earth/Chrome
	Ultramon

Design Implementations

Set Up:

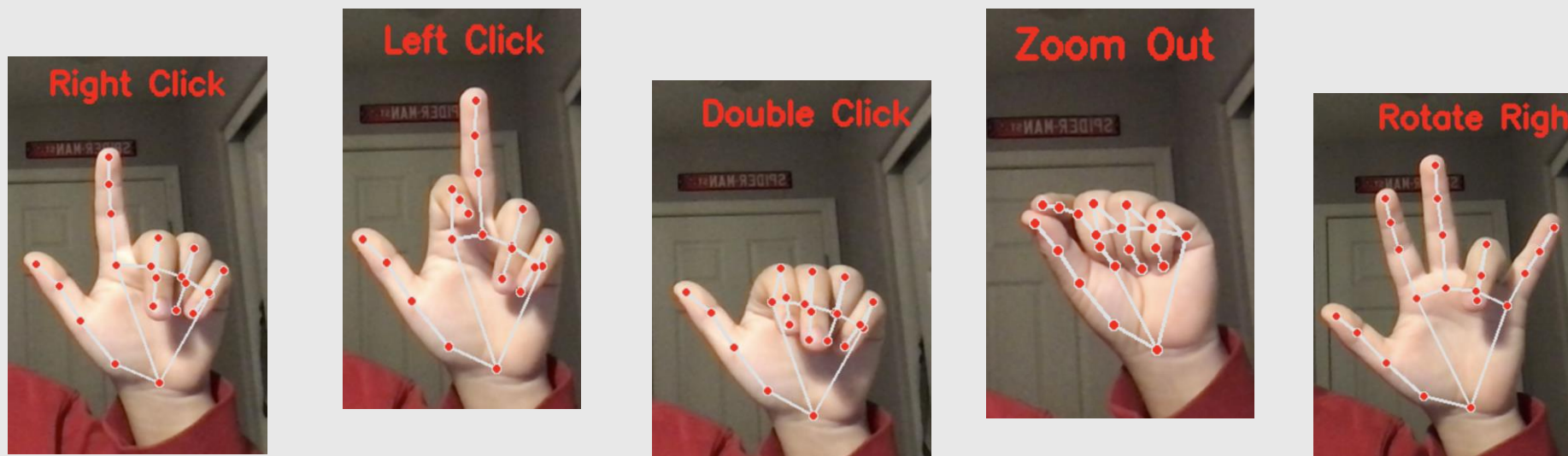


Holographic Display:



System Evaluations

- Detect landmarks using MediaPipe
- Calculate angles/distances between landmarks
- Assign and map gestures
- Trigger actions using PyAutoGUI/Pynput



Check out our
demos by scanning
this QR code!

Discussion and Future Outlook

What can be improved in the future?

- More gestures, allowing further versatility when exploring/interacting with holographic display
- Use of AI for more accurate and specific gesture control
- Use of sign language gesture detection for keyboard input
- Personalizing gestures for specific user
- Professionalized housing unit for holographic display

Potential Applications:

- Education: Interactive learning tools
- Healthcare: Touch-free interaction in sterile environments
- Design and Entertainment: Enhanced 3D modeling and gaming experiences

Conclusions

HoloTouch offers an innovative, hands-free interface for interacting with digital systems through holographic projections. Its lightweight, low-cost approach makes it accessible for various fields, showcasing the potential for intuitive, immersive human-computer interaction. We were able to successfully implement advanced gesture recognition and holographic projection technologies, providing users with a seamless and engaging interactive experience.

Acknowledgement and References

Thank you to our instructor, Dr. Ming Zhu, and the YouTube channels cited below for all the help on this project.

Citations:

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