

Holographic AI Assistant - Hologram

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The Need

- There is a growing demand for innovative human-machine interfaces. Users are seeking more natural and immersive ways to interact with AI systems.
- Current interfaces can lack the ability to provide a fully immersive and intuitive experience. Traditional screens and input methods can be limiting, making interactions less engaging and efficient. This is particularly problematic in industries that rely heavily on visual and interactive technologies.

Overview of Project

This project will develop a holographic display system that will introduce engaging and intuitive methods of interaction between users and AI. It integrates voice, touch, and gestures controls to enable users to have the user intuitively engage with the display. We intend for it to be affordable to both consumers and professionals and particularly beneficial in industries related to education, entertainment, health, and business.

System Design

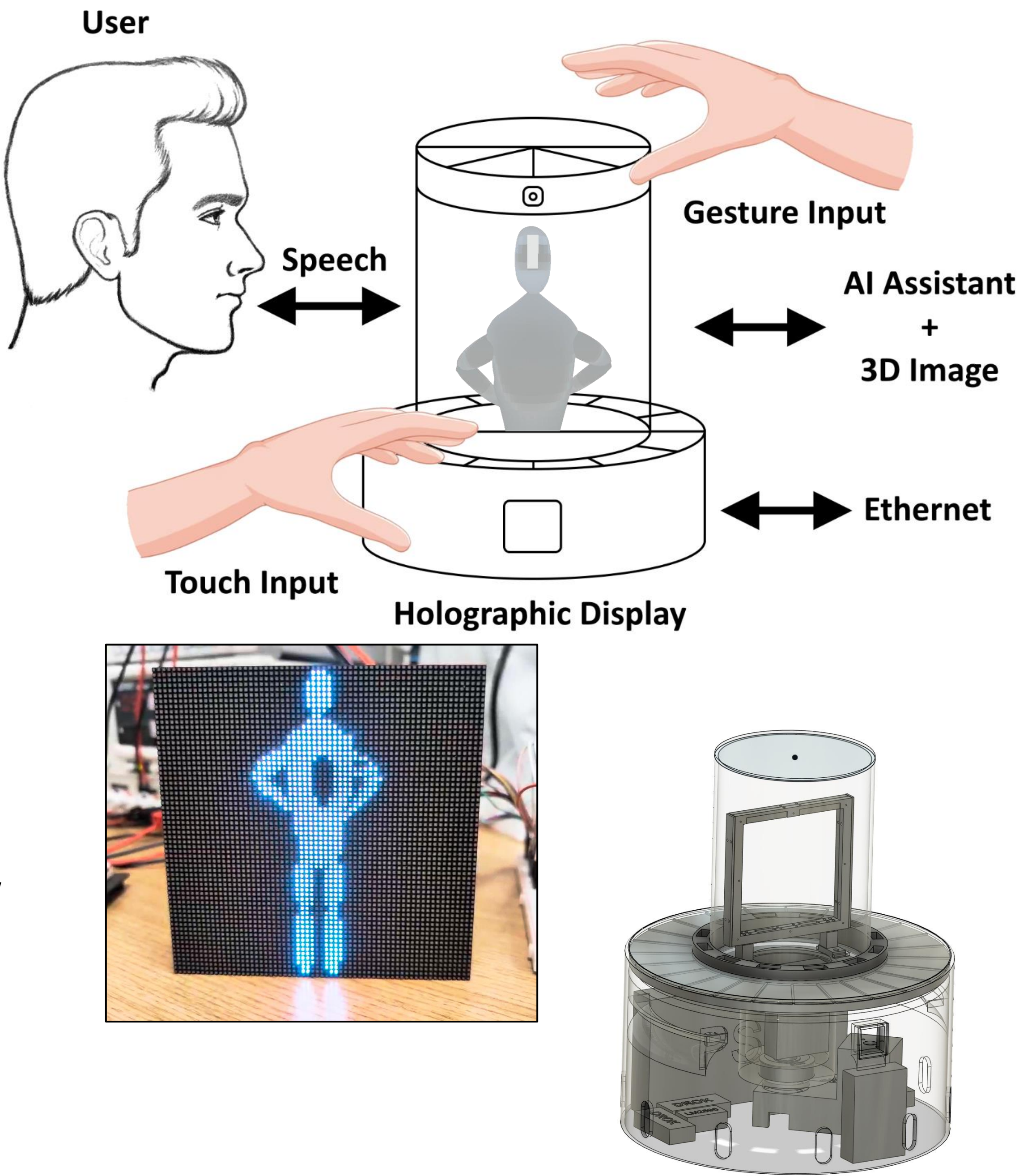
- Double RGB 64x64 LED Panel with HUB75 on RPI 4
 - 10~15 Hz Refresh rate
 - 100 slice/rotation at 12~15 fps
- UART communication from RPI 5 as general sensor and AI processing to RPI 4 as LED driver
- Hall effect sensor and IR sensor for motor RPM adjustment
- Touch & Gesture Sensor detect user inputs to adjust 3D view of the 3D model.
- Facial Recognition and Microphone is integrated with RPI 5.
- Unity 6 voxelization of 3D model using average viewport resolution adjustment with orthographic projection

Requirements

R1	Provide an affordable, immersive holographic display system that incorporates real-time 3D image manipulation, intuitive voice and touch controls, and data transmission for other interactive applications.
R2	Render real-time 3D images of at least 10000 voxels at 10 Hz with a max delay of 250ms
R3.1	Touch sensors must span the entire base of the device, have a resolution of 0.5 coordinate per square inch, and a response time of at most 30ms
R3.2	Gesture sensor must detect 4 cardinal directions with a distance up to 0.5 feet.
R4	Device must have a microphone that can accurately record voices at 60 dB at a range of 2 meters
R5	Device must be cheaper than the competitors: \$3500

Background / Design Approach

- A “swept-volumetric display” uses the persistence of light to create pixels in 3D space. By quickly moving/rotating a 2D plane of light, it creates the illusion of a 3D hologram.
- Our solution for the hologram effect is a matrix of LEDs affixed onto a platform, spun by a motor with LEDs driven so that they correlate their position in space with voxel color/light data sent by another computer.



Results and Conclusion

- There is a growing demand for more natural and immersive ways to interact with AI systems that are innovative human-machine interfaces.
- The implementation of the AI co-project into this holographic display and the capability of modular add-ons will increase user engagement with applications.
- Future work would include overhaul on voxelizer and compact design.

Acknowledgements

