

Team R.O.B



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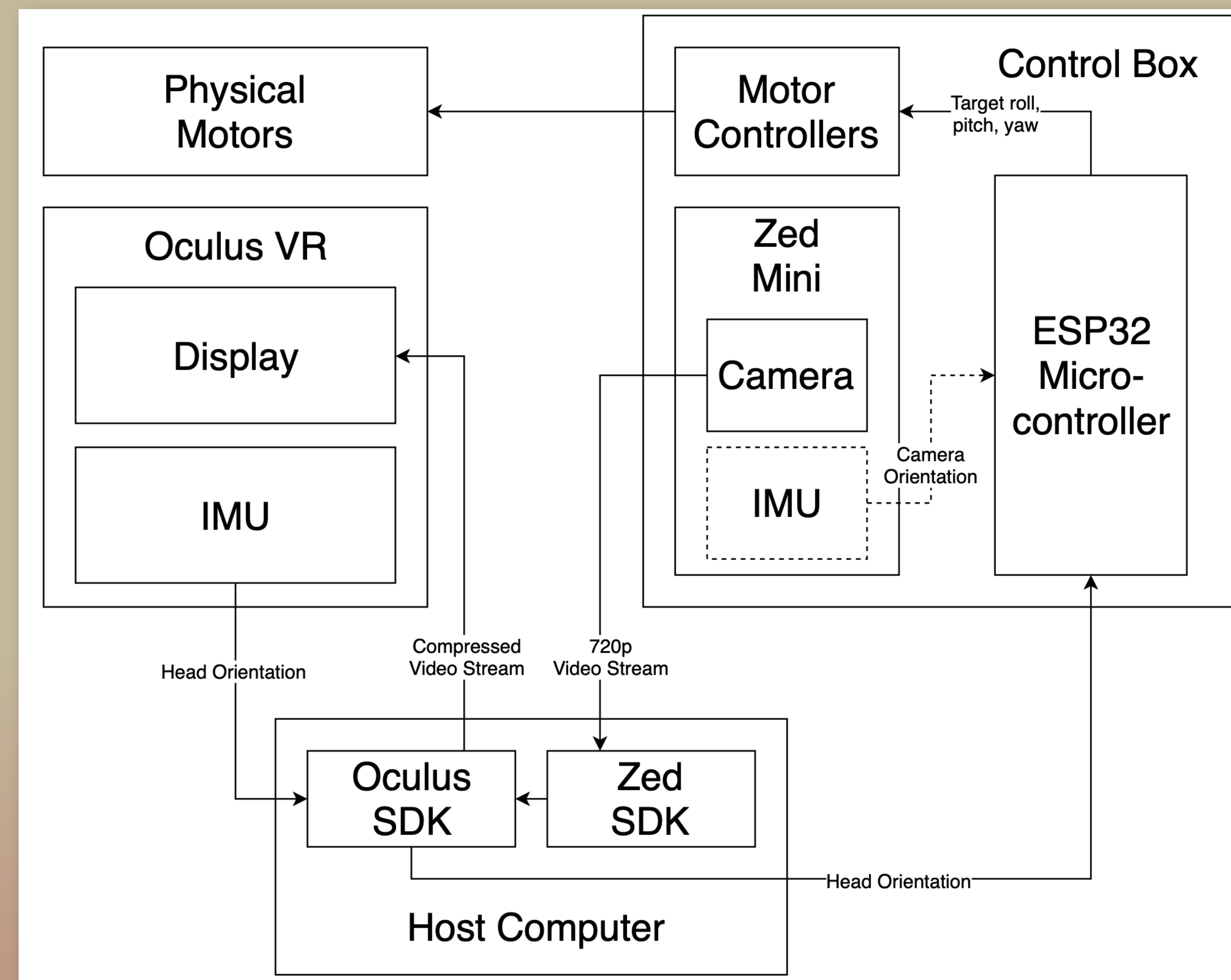
Vision

To create a camera gimbal system that provides a live feed of surrounding area to a Virtual Reality (VR) headset. The system provides user access to a live view of areas that are inaccessible or difficult to access due to physical limitations and restrictions. The camera gimbal system allows safe access to places that would be hazardous to humans such as exploring areas with high radiation, vehicles' undercarriages at border checkpoint for weapons, bombs, or any restricted items.

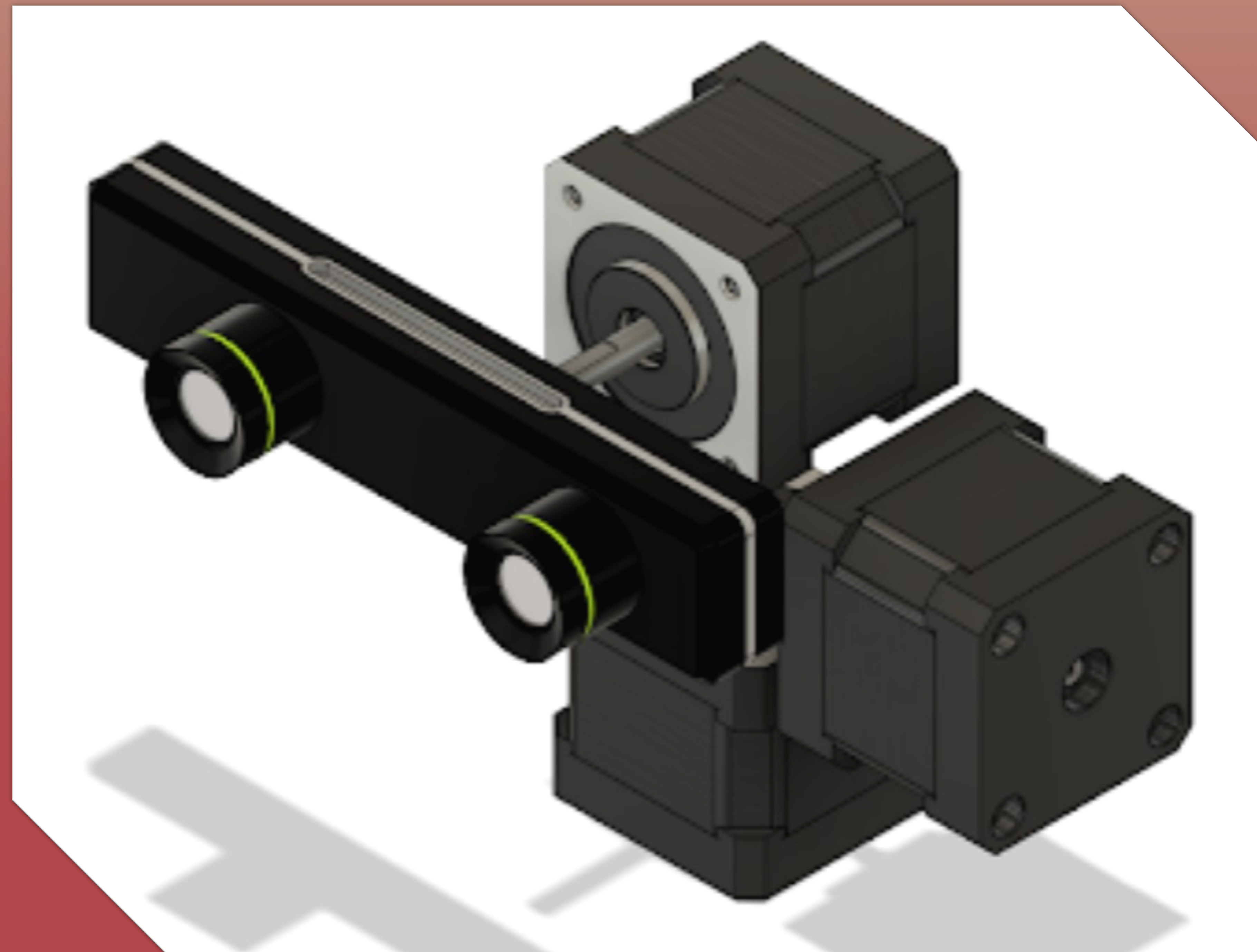
Mission

The outcome of the project is to produce a prototype of a Camera Gimbal system. The camera system captures and provide live video feeds into a Virtual Reality headset. As the movement of the VR headset changes, the gimbal system will also move synchronously while provide live video corresponding to the direction of the facing headset. The camera system utilizes one physical stereo camera on a physically designed gimbal to provide video feeds into a computing unit. The computing unit is a computer with high graphic processing power that will process incoming video feeds and provide the outputs into the VR headset.

System Architecture Design



Early Design



Key Requirements

1. Camera gimbal system shall synchronize with the user's head movement using VR headset as a reference
2. Camera shall provide live video feed into VR headset display with minimal delay
3. Live video feed shall be in color, has adequate resolution with minimal input delay, and running at least sixty frames per second
4. The time delay between user headset and the camera movement shall be minimal

Current Status

1. The gimbal system can move synchronously with the VR headset's movement
2. Camera is providing live video feed into VR headset in High Definition resolution at 60 frames per second
3. To reduce the physical movement complexity, one rotation axis was taken out. The gimbal system currently support pitch and yaw movements
4. On start-up, the gimbal system can adjust itself (homing) to match the current direction of the VR headset with a small offset differences

Future improvements

1. Adding the 3rd rotation axis (roll)
2. Miniaturize the gimbal system
3. Send communication data over wireless
4. Improve live video resolution
5. Reduce motion sickness to users
6. Increase range of movement on gimbal system