

**Project Title:** Virtual & Mixed Reality Military Training Simulation Software Development

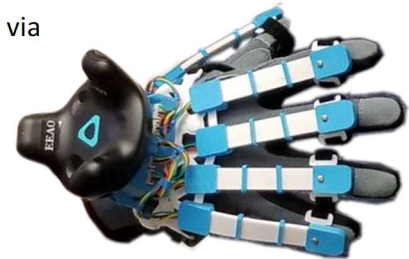
**Adviser:** Sarah King, Software Engineer, Vertex Solutions

**Background:**

Vertex Solutions is a human performance training and consulting company based in Champaign, IL. For more than 20 years, Vertex has offered an integrated portfolio of services centered on technology-enabled learning to help Government and commercial clients meet their unique human performance development needs and improve leader, individual, and collective performance.

Vertex is currently under contract to develop and support a virtual reality part task trainer (vrPTT) for AC-130U copilots at the U.S. Air Force Special Operations Command (AFSOC), virtual- and mixed-reality (VR and MR) human-machine interface (HMI) software for the U.S. Air Force's AFWERX program, and an MR diving trainer for the U.S. Navy. Vertex is also in the process of prototyping various VR and MR hardware technologies, including VR/MR gloves.

The AC-130U vrPTT combines the latest head-mounted display (HMD) technology with Leap Motion controllers to track bare-handed copilot finger movements and enable interaction with a detailed virtual cockpit control panel with dynamic feedback and micro-adaptations provided by an integrated intelligent tutoring system (ITS). Hand tracking is implemented via Vertex's VertexMultiSensor (VMS) software, which enables integration and mixing of multiple HMI technologies, including biometric sensors and alternatives to Leap Motion hand tracking. A laptop computer contains the crew station simulation, graphics processing, mission scenarios, aircraft state machine and flight dynamics, and the ITS for a fully portable capability. The AFWERX program seeks to advance the HMI capabilities currently implemented in VMS. The Navy program seeks to develop, deploy, and support VR/MR diving training systems that couple electronically to operational military hardware for maximum training fidelity.



**AC-130U vrPTT Simulation (top)  
vrPTT at Kirtland AFB (middle)  
Vertex VR/MR glove (bottom)**

**Project Description:**

Successful applicants will have experience programming in C/C++ and will participate in VR technology development efforts as required by program goals. Areas of active development are HMI sensor technology development, integration, and testing; biometric sensor integration and testing; simulated system state machine development; integration of machine learning algorithms and approaches with VR training technologies; and software integration with various commercial game engines.

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