

EMSxVR

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Further immersing the user with Electrical Muscle Stimulation feedback

Target User Group and Problem Statement

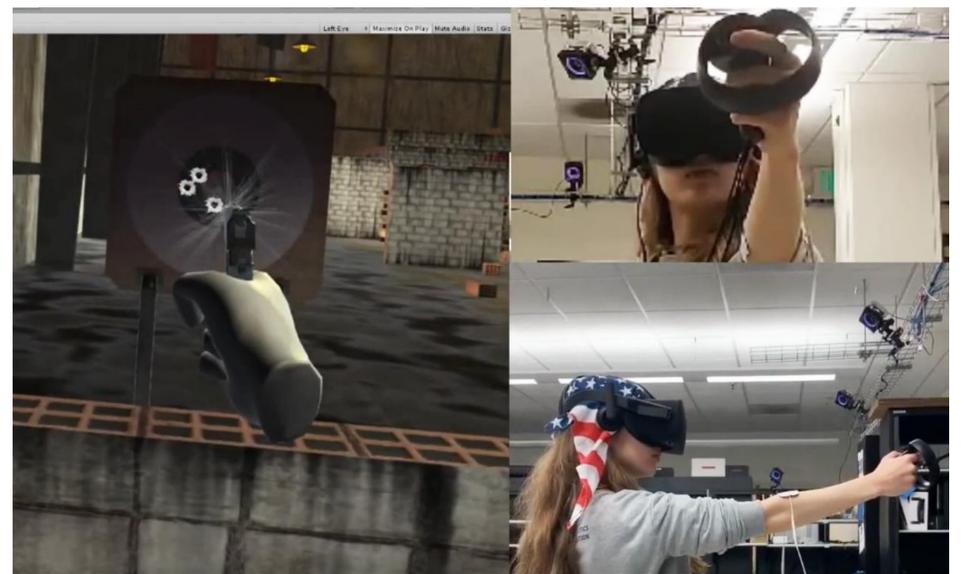
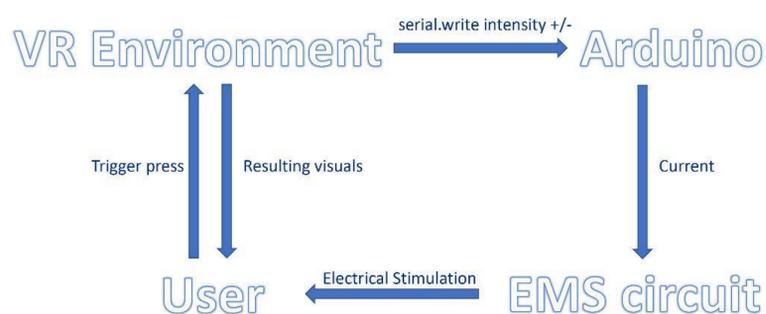
Current VR systems are able to simulate real-world interactions with comprehensive visual and audio feedback via headsets and sensors. However, haptic feedback is severely limited as it is constrained to solely vibrations from controllers. This restriction leads to a falloff in the immersive quality of a wide variety of applications ranging from gaming to medical rehabilitation where the users expect to *feel* the experience.



FDA approved EMS system which was hacked to pair with VR simulations with user feedback

Solution

The intersection of EMS with VR systems significantly expands the horizon of what is possible for haptic feedback. By connecting an FDA-approved EMS system to VR experiences in Unity through an Arduino, we are able to take advantage of the EMS feedback as a response to actions in the VR scene. We look to improve the level of immersion and entertainment quality of VR applications through our system.



Shooting range in VR viewport with user wearing two electrode pads on arms for sensation and actuation

Implementation Details

The hacked commercial EMS system sends an electrical impulse that directly stimulates motor neurons that elicits a muscle contraction. The hacked system allows the hardware to take control over the intensity +/- buttons, which are tied to an Arduino. The VR scenes created in Unity run scripts that send signals to the Arduino's serial ports to trigger the intensity buttons as feedback to certain actions or interactions.

Evaluation

Research shows that some users are more sensitive to the electrical stimulation. Please participate in our user survey to expand the sensitivity studies to better understand the user experience. This study focused on testing the results with feedback to muscle groups on the user's arms, however in the future, we would like to explore EMS with additional muscle groups on the body.

