Cross Platform Training Via Augmented Reality and Neuromuscular Control Systems

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Project Overview:
A system has been created that allows one user to control multiple vehicles of different operating environments separately as well as in tandem. The system utilizes a heads up display for sensor information and hand gesture control of each vehicle. A typical joystick and button controller is no longer needed which allows the user to keep their hands free to perform other tasks.

Fitting all the Pieces Together:

Technology:

MYO armband
- COTS product that uses 8 sEMG sensors
- 5 pre-programmed hand gestures that can be recognized and assigned to tasks

Microsoft HoloLens
- HUD displays vehicle and environmental information
- Interprets voice commands

Parrot Drone AR 2.0
- This quadcopter comes with an easily accessible API that allows for implementation of custom control systems and add on features

Devastator Tank Model
- COTS product designed to be controlled by a Raspberry Pi
- Includes 2 DC motors that drive track wheels encased in an aluminum shell

Operating Modes:

Single Vehicle Selection
- Use voice commands interpreted by HoloLens to select desired vehicle
- Hand gestures interpreted by MYO and relayed as movement commands

Tank
- 4 basic movement
  - Turn right/left
  - Forward
  - Backward

Drone
- Same basic movements as tank
- Altitude controlled by voice commands interpreted by HoloLens

Tandem Vehicle Operation
- The Drone will fly directly above the Tank
- Using object tracking the drone will maintain its position over the tank as the tank moves

Admin Client
- Can be used by a third party to control either of the vehicles
- All information sent to the HUD can be viewed in the admin client
- Includes kill switches for both vehicles

Information flow diagram showing how the devices communicate with each other

Range of motion for each vehicle