2008 Summary of Research Reports

Visiting Research Professor David Han
Weapons and Systems Engineering Department
research@usna.edu

Project: Analyses in Navigation Accuracy of Assault Vehicles with Improved GPS Augmentation and Augmented Reality Visualization
Sponsor: ONR

Statement of Work:

Currently there are efforts, supported by the ONR's Precision Navigation and Marking program, to alleviate the difficulties of amphibious assault vehicles transitting through mine cleared areas by improving their location accuracy and providing the vehicle driver improved visualization of the vehicle location and movement relative to the cleared lanes. In order to fully assess the full benefits of these efforts, analyses are needed to estimate the vehicle navigation accuracy improvement to be gained from these efforts. Key benefit to be realized from these improvements is the reduction of the threshold lane width cleared by the Mine-Counter Measure (MCM) operations while maintaining casualty level of the amphibious vehicles during the passage at minimum. The main objective of this project is to assess how the improvements in the GPS accuracy and integration of the augmented reality visualization into the assault vehicles relate to the overall vehicle's transit navigation improvements.

Project: Hand Signal Interface Between Human Operators and Unmanned Ground Vehicles (UGVs)
Sponsor: ONR

Statement of Work:

This project will focus on developing a vision based communication interface among human operators and Unmanned Ground Vehicles (UGVs). Image based algorithms will be developed for robotic vehicles to recognize hand motions and signals of human operators in the fields. Hand signal recognition algorithm is to be developed to direct the traffics of transport UGVs or to covertly signal combat UGVs in close quarter situations. Vision based motion recognition may be applied to remotely operate robotic vehicles in RF denied or heavily jammed environments. Fine motor control by motion recognition is to be studied for controlling EOD and UXO robots from a standoff location. Wireless communications among a swarm of robots can be achieved through the use of robotic limb motion based signals and their recognitions without the use of RF links. Robotic limb motion can also be used by UGVs as a communication channel back to the operator.

Project: Integrated Warfare Systems (IWS) Chair
Sponsor: NAVSEA

Statement of Work:

The IWS Chair will improve the depth and breadth of the core curriculum courses taken by all Midshipman by ensuring the relevance of the course material to improvements and advancements of Fleet Integrated Warfare Systems. The Chair will also enhance the knowledge and research capabilities of USNA faculty by reviewing the WSE discipline to identify collaboration opportunities with PEO IWS. Finally, to ensure the integration of future integrated warfare systems into academic activities, the Chair will provide recommendations through the appropriate chain of command regarding course content, laboratory demonstrations, and related activities.