2016

Expanding Unmanned System Networks for Littoral Operations using Projectile Based Nodes

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Data collection and relay network with 2-8 sec life time, 3D space dispersed

What

- An extension of the NPS MIO testbed's unmanned systems cluster with projectile-based 4-8 sec. duration nodes, capable of communicating way-points and simple maneuver commands.
- The new testbed cluster will be based on the Fire Fly (grenade type) projectile nodes, shot by a rifle, integrated with an unmanned network of Wave Glider USVs, an IRIS throwable UGV, an RMP UGV, an above deck UAV, combined with a subsurface diver network.
- We will derive lessons learned from the field experiments, a 3D simulation model, and subsequent table-top sessions resulting in new techniques and procedures for managing an unmanned network via projectile-based nodes.

How

- Research will be based on the evolution of NPS MIO testbed capabilities toward integration of projectile-based nodes into the bursty way-point and maneuver control of unmanned systems network supporting LCS actions.
- The team will analyze best solutions to integrate projectile-based control nodes into management of an unmanned systems network, as characterized below, by the grenade type projectile nodes. We plan to explore these solutions based on Rafael's Firefly 40 mm 4-8 second duration LV video networking round.
- Our approach is based on a series of feasibility/constraint analysis field experiments, followed on by the development of a projectile based network 3D simulation model in the environment of Satellite Tool Kit (STK) and Qualnet (network performance) systems. The analytical work will be concluded via table-top sessions using field experiment data capture replays and modeling of littoral mesh networking scenarios.

Why

- Novel self-organizing unmanned systems networks are needed to assist LCS, SOF and USCG crews to conduct target tracking, vessel boarding and interdiction operations in cluttered littoral environments.
- The current gap includes a lack of knowledge of how to assist unmanned surface, ground and aerial systems to self-organize for action through highly discrete, bursty, undetectable way-point and maneuver command transactions.
- Projectile-based nodes and their elusive (hard to detect/compromise) network could be indispensable for providing such way-points and guidance to unmanned systems in remote areas of littoral clutter.
- There is a significant knowledge gap of how to integrate such 4-8 sec duration nodes into unmanned systems control, assisting the LCS's mesh networking actions.

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