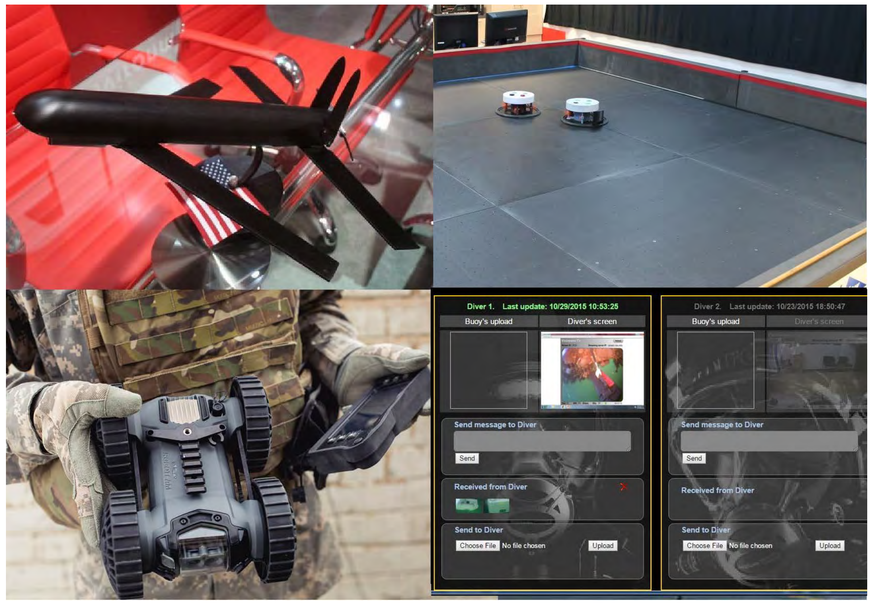
Multi-Domain Mesh Network of Short Appearance Nodes

Naval Postgraduate School



Elusive temporal network of short appearance small UUV, throw-able UGV, projectile UAV, and Cube Satellite nodes

What

- An elusive (hard to detect and hard to compromise) network compromised of the short-lived mesh network nodes distributed across subsurface, ground, near aboard air, and orbital domains in emerging maritime combat clutter
- Novel testbed infrastructure based on miniature UUVs, miniature projectile nodes shot by rifle or small mortar, IRIS throw-able UGV, projectile UAV, and cube satellite orbital nodes
- "Subsurface token ring" network, based on the UUV token communicating by short-haul touch with subsurface divers and manned-unmanned surface craft.
- Experimental integration of AeroVironment's BlackWing UAV as a projectile short appearance node for near aboard airspace zone
- Cyber-physical integration of satellite robots with Google's Terra Bella cube satellites in the orbit live to extend short-living cross domain manned-unmanned networking into the low orbit

How

- Research will be based on the evolution of NPS MIO testbed capabilities toward integration of short appearance nodes dispersed across the subsurface, ground, near aboard and low orbital space, to enable bursty elusive cyber-physical maneuver
- We'll conduct field experiments focused on feasibility and constraints analysis for the proposed network integration combined with experimental studies of fast morphing network control channels and network operation techniques
- We'll capture data and create replay-able models for simulating the short appearance network behavior to support network configuration and operation decision making

Why

- New self-organizing elusive unmanned systems networks are needed to create an asymmetric warfighting advantage, conduct cyber-physical maneuver in the emerging maritime combat clutter
- There are significant knowledge gaps 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
  - integrate and operate a multi-domain mesh network of short-lived nodes, enabled by maneuver of small UUVs, throwable UGVs, projectile UAVs, and miniature orbital nodes
  - establish an agile self-forming control channel for short appearance mesh networking nodes and how to manage such a network across subsurface, ground, near aboard air, and orbital domains.

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