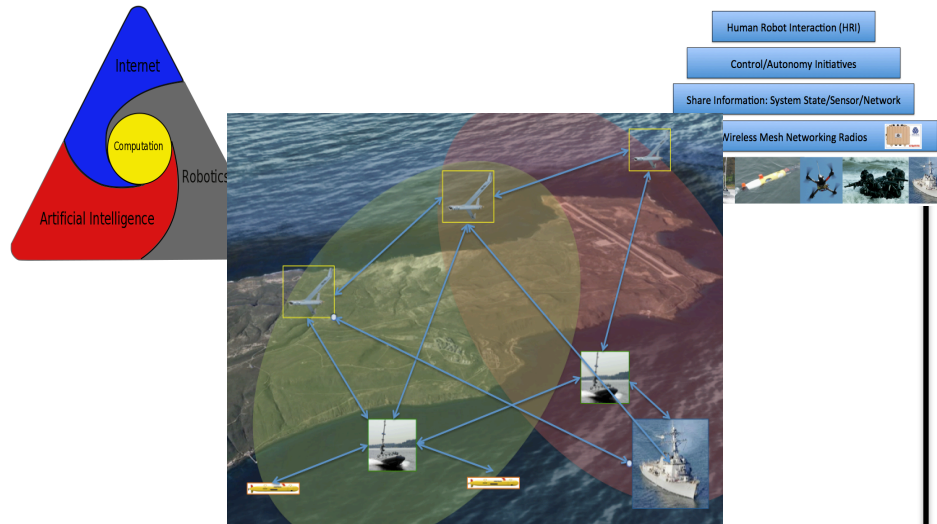
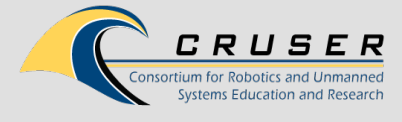


Distributed Adaptive Submodularity for UxV Network Control Systems (NCS)



How

- Modify Adaptive Submodularity approach from a centralized approach to a distributed approach.
- Include convergence proofs for the decentralized approach that utilize Spectral Graph theory for guarantees of system robustness.
- Refinement of Center of Autonomous Vehicle Research (CAVR) Robotic Operating System (ROS) based software, CPUs and mesh radio based hardware module for “add-on” to UxV systems for quick NCS assimilation.
- Develop Virtual Reality environment together with HIL simulation to enable concept experimentation with large numbers of UxVs.
- Combine together VR, HIL and physical systems into a single experiment. Permits bringing disparate deployments of AUV/USV/UGV/UAVs into a single environment

Deliverables

- A distributed, near optimal, high level controller for UxV Network Control System (NCS) based on the Machine Learning approach of Adaptive Submodularity.
- A modular plugin that includes software, hardware and communications for rapid assimilation of UxV into a NCS.
- An experimentation framework for UxV NCS algorithm and scenario testing. It combines together Virtual Reality, Hardware in the Loop (HIL) simulation, network simulation and (field deployed) physical UxV systems.
- UXV NCS experimentation utilizing UxVs together with Persistent Mesh Relay wireless communications as a single system.

Operational Impact

- Moving from a centralized approach to a distributed optimization is a challenging research problem with a high potential operational benefit.
- A hybrid UxV NCS that can work as a distributed or centralized system. Pros and cons
 - Centralized has a single point of command and control with a rapid response
 - Discentralized doesn't have a single point of failure and is more robust.
- Modular UxV NCS plugin permits taking off the shelf systems and rapidly incorporating them into the NCS.
- Novel experimentation framework permits exercising large numbers of UxVs without the cost.



FY19 Call for Proposals

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