

S&T Campaign: Sciences for Lethality and Protection
Kinetic Lethality
Flight, Guidance, Navigation, and Control

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Research Objective

Optimal engagement of complex targets using a heterogeneous mix of smart, swarming munitions in contested and GPS-limited environments.

Challenges

- Ranging and communication technology for inter-agent collaboration
- Robust collaborative navigation and decision-making algorithms
- Target detection and recognition for terminal engagement
- Simulation environments for multi-agent systems
- Advanced fire control for optimal swarm configuration

ARL Facilities and Capabilities Available to Support Collaborative Research

- ARL technical expertise in gun launched embedded processing, state estimation, guidance and navigation, tracking, and computer vision algorithms
- Inertial Measurement Unit (IMU) calibration and modeling facilities
- Well-instrumented firing range and air gun facility for small scale data collection and proof of concept demonstrations
- Unmanned aircraft for data gathering and algorithm V&V
- Real-time hardware in the loop facilities including GNSS simulator
- Shock table to test gun survivability
- Anechoic chamber
- Optics and imager characterization

Complementary Expertise / Facilities / Capabilities Sought in Collaboration

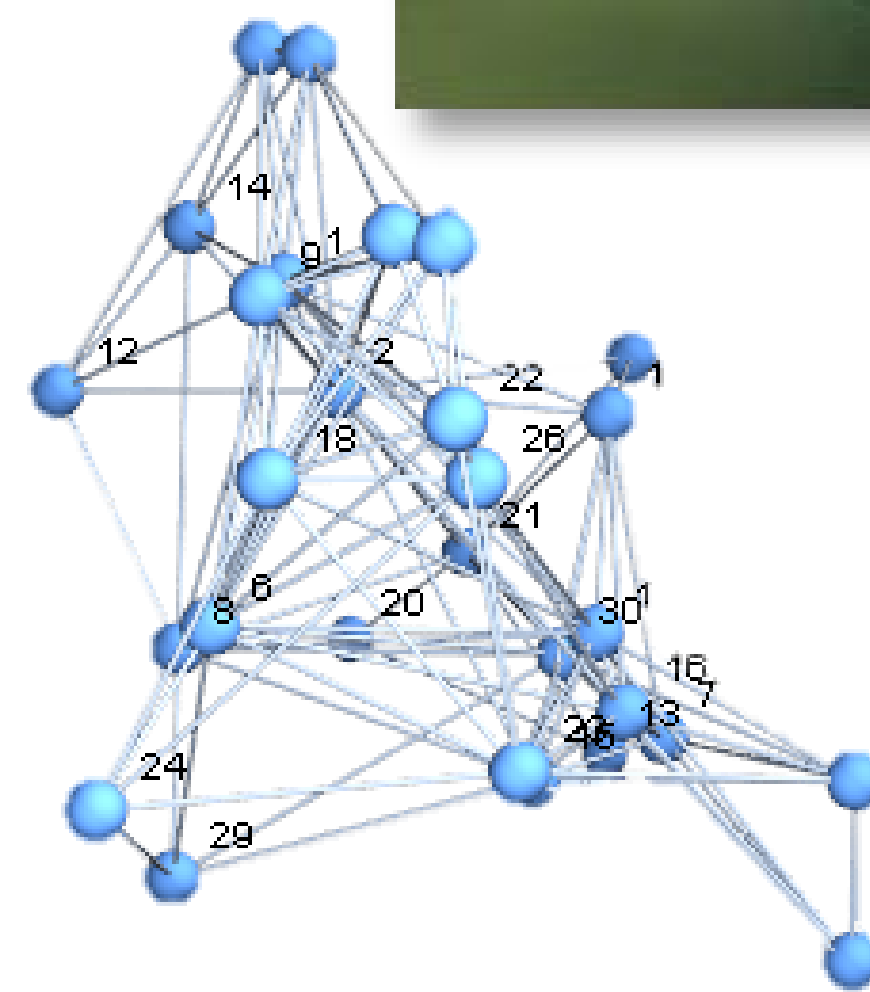
- Expertise sought in multi-agent systems, distributed algorithms, target detection, consensus, collaborative control, etc.
- Innovative new research approaches to address this research objective include biologically inspired methods, compressive sensing, novel communication methods, GPS-denied navigation, etc.



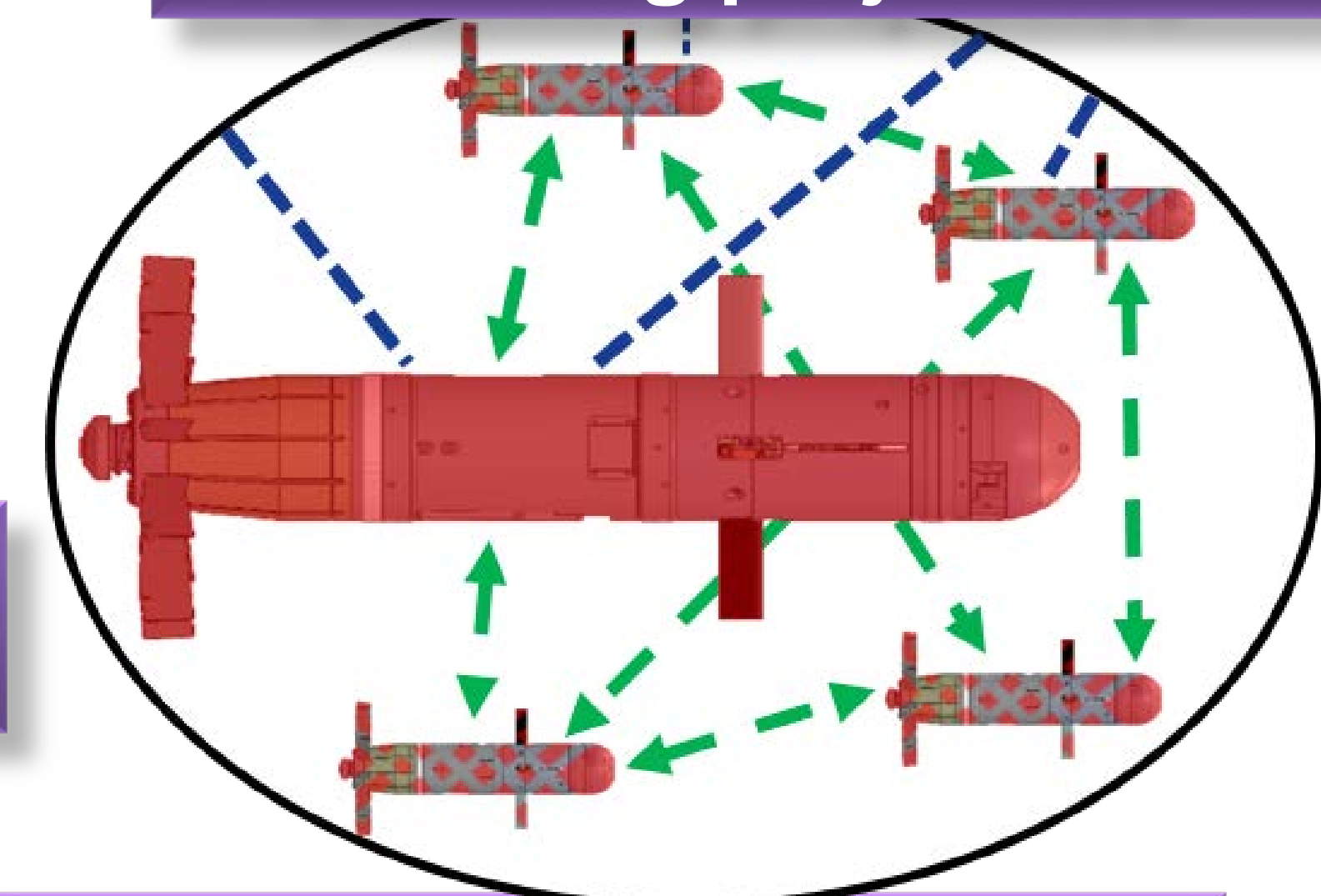
Multi-Target tracking in cluttered environments



Parent-child concept for swarming projectiles



Inter-agent ranging for localization



Collaborative area mapping and target learning for future engagements

