# Air Superiority via Decentralized Swarming Tactics and Autonomous Pursuit

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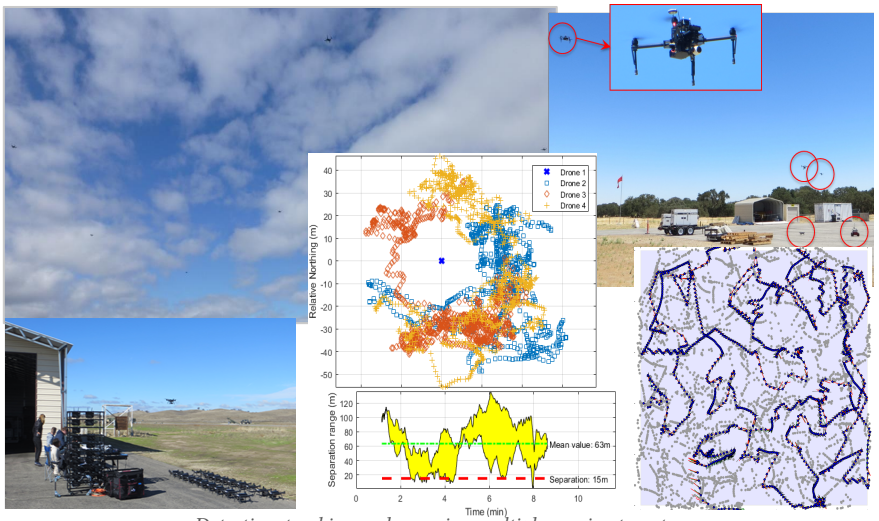
Consortium for Robotics and Unmanned Systems Education and Research




*Detecting, tracking and engaging multiple moving targets*

- Hardware-wise, the fleet of existing sUAS will be refurbished with the ranging sensors, mesh-network enabling RF radios, and global shutter imaging sensors.
- Vision-based detect-and-track algorithms and ranging-sensor data fusion algorithms will be developed and integrated onto onboard companion computer to provide the real-time inputs to UAS autopilot.
- A variety of (decentralized) swarm behaviors will be studied and a repertoire of behavior primitives (outer-loop controller settings) created using genetic optimization algorithms. Verified in simulations optimized swarm controllers together with individual or group pursuit algorithms will be integrated with sUAS swarm (autopilots) to demonstrate a high-level of autonomy missions disrupting an evading UAS swarm attack.

- The objective of this research is to build upon the previous research efforts by four universities in developing the network- and passive-sensor-guidance-capable fleet of small multirotor unmanned aerial systems (sUAS) to design, build and test the extended-range system assuring air superiority against multiple incoming threats assuming minimal human interface.
- Deliverables will include passive sensor / companion-computer / autopilot / mesh network integration solution, vision- and range-sensor-based navigation and guidance algorithms, computer simulations, and novel capability demonstration using a small-scale swarm of UAS.
- Several Masters and PhD students are expected to take part in this research effort with the test trials to be conducted at Camp Roberts, CA.

- The recent advances in low-cost small UAS with ultra-high definition video capability, moderate payload capacity, and beyond line of sight command and control have enabled tremendous opportunities in a variety of missions. Unfortunately, that also includes using these systems by hostile personnel in both foreign and domestic locations.
- Being able to possess, share and effectively utilize situational awareness data during a multi-UAS operations is a key ability and a major gap preventing UAS from enabling higher-autonomy-level capabilities. The proposed research will concentrate on designing, building, testing, and evaluating an advanced UAS swarm capability to automatically detect (using onboard passive sensors), localize, block, split and pursuit a swarm of or individual foe sUAS.

NPS
FY19 Call for Proposals

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