SWADAR

SWARM ADVANCED DETECTION AND TRACKING

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Two technological enablers are going to make drone threats more dramatic: **autonomy** and **swarming**

IMPACTS OF AUTONOMOUS DRONE-SWARM ATTACKS

- Evolving attack scenarios
- Limitations of reaction times
- Ineffectiveness of conventional DT

Timely and **accurate drone-swarm tracking** will focus the decision-making space of mitigations on the best courses of actions

DRONE-SWARM TRACKING APPLICATION

- To estimate the number of drones and to monitor their flight dynamics
- To assess the emergent behaviour and the swarming metrics
- To predict the intent of the swarm
- To aid the operator and to facilitate mitigation decision-making
- To ensure a continuous learning of swarming-attack behaviours

Drone-Swarm Tracking by an Intelligent Network for Mobile Proximal Sensing

SWADAR TECHNOLOGIES

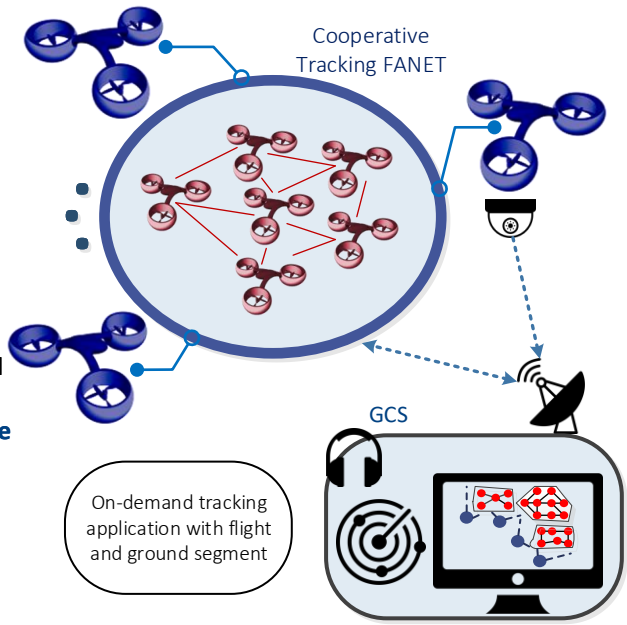
Mobile Proximal Sensing – This technology may overcome the limitations of conventional point-target tracking systems in terms of data resolution and sensor sensitivity, using **LiDARs**, **infrared cameras**, **optical cameras**, **depth cameras**, etc.

Sensor Network – Instead of tracking the swarm by centralized sensing, several sensor nodes applies a **coordination** mechanism. A **cooperative tracking network** implements a distribution of the sensing tasks and a load balancing for sensor nodes.

Automated Recognition of Cooperative Behaviours – Starting from tracking data and an **evolving swarm playbook**, we understand the unobserved cooperative behaviours of the swarm (**strategies**, **tactics** and **plays**).

SWADAR implements the network for mobile proximal sensing by means of a **defensive team of autonomous "tracker" drones**.

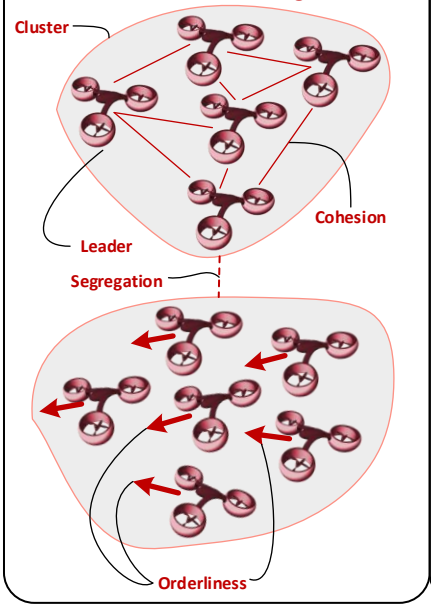
The **blue team** will build a network-centric situational awareness to follow and predict the **red swarm**.



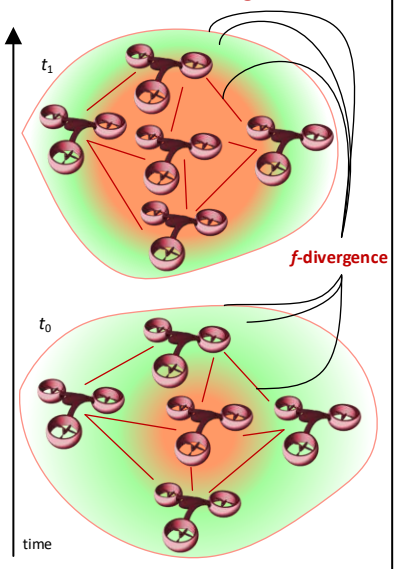
Preliminary CONOPS

① SWADAR system receives an alert
② The mission operator confirms the alert and starts the tracking mission
③ The coordination mechanism assigns the tracking tasks to the blue team
④ Blue vehicles send tracking data to a point of collection, which builds the Common Operational Picture
⑤ The attack scenario is processed for AI-based classification & recognition
⑥ COP-building and COP-recognition data are continually presented to the mission operator

Instantaneous Swarming Metrics



Variational Swarming Metrics



5-Year Implementation Roadmap