PALLADYNE AI

SwarmOS™: Edge AI for Autonomous UAV Collaborative Swarming

SwarmOS embodied AI software transforms tactical UAVs into a powerful force multiplier, enabling fleets to autonomously detect and track high-value targets while minimizing operator workload. Through autonomous collaboration and self-orchestration, UAVs form dynamic groups that operate as a self-directed team, adapting roles and executing automated fallback behaviors to sustain resilient, scalable ISR operations.

CAPABILITIES

Enhanced Operational Effectiveness

Converts UAVs into autonomous, collaborating platforms that sustain custody and tracking across an area of interest. Operators retain override authority as mission needs evolve.

Enhanced Situational Awareness

Fuses EO, IR, RF, and other sensor modalities for real-time environmental understanding and continuous target custody, even in complex terrain or degraded conditions.[1]

Autonomous, Multi-Platform Collaboration

Coordinates diverse UAV platforms into a unified fleet that optimizes coverage, shares mission information, and allocates resources efficiently.[2]

FEATURES

Self-Orchestration

Dynamically groups UAVs by mission intent, autonomously assigns roles, and manages collaboration without operator intervention.

Autonomous Handoff

Sustains tracking by reassigning targets or engaging other UAVs when a sensor fails or custody is lost.[3]

Autopilot Integration

Works seamlessly with onboard autopilot to track, navigate, and reposition.

Secure Decentralized Networking

Leverages military-grade encryption and security protocols for secure communications and resilient operations.

MULTI-SENSOR FUSION AND PERCEPTION

Integrates EO, IR, LiDAR, radar, and RF info from mobile and fixed sensing modalities for reliable tracking in complex conditions.[1]

Adaptive Sensor Management
Dynamically adjusts sensor settings to optimize coverage and reduce line-of-sight obstructions.

Collaborative Reacquisition
UAVs share information to reacquire targets when custody lapses.

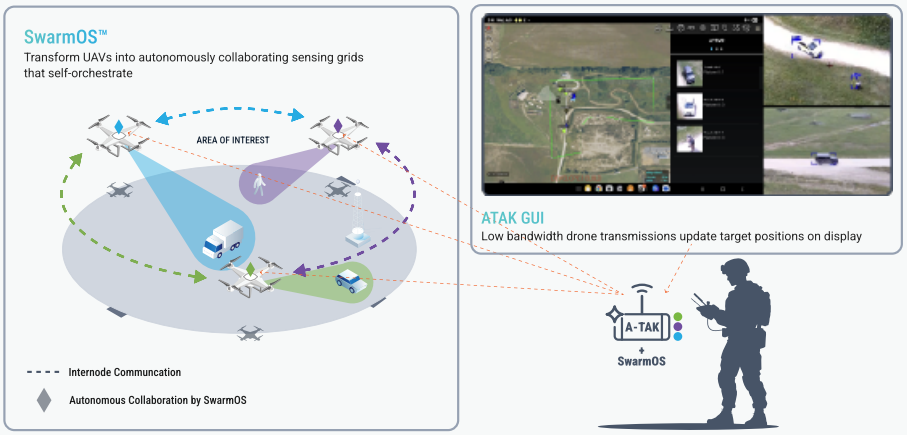
Assured Operations in Contested Environments[4]
Maintains performance in degraded GPS or RF environments.

Intuitive Operator Interface
Enhances situational awareness while minimizing operator burden.

- **ATAK Integration**
  Streamlined Android Tactical Assault Kit (ATAK) plugin with clear visuals and dynamic mission updates.
- **Dynamic Mission Management**
  Adjust regions, redefine search areas, and update tasks in real time.
- **Single-Click Multi-UAV Launch**
  Rapidly deploy multiple UAVs with configurable return-to-home settings (e.g., battery thresholds).
- **Visual Status Feedback**
  Clear cues for each UAV's status (searching, tracking, returning, etc.).

CONOP: AUTONOMOUSLY COLLABORATING DRONE TEAM MAXIMIZES SITUATIONAL AWARENESS

Enables a single operator (on-the-loop) to command-and-control autonomous drone operations that provide intel on current target tracks while searching for new targets.



TECHNICAL SPECIFICATIONS

Supported UAV Platforms / Protocols	• Fully integrated on Red Cat Holdings Teal 2 and Black Widow drones • Platform agnostic, supports additional UAVs with autopilots (including PX4) using MAVLINK[5]
Sensor Compatibility	• Supports sensor modalities commonly used for security and safety applications (e.g., EO/IR, LiDAR, radar, and RF)[1]
Processing Requirements	• Integrates with UAV platforms equipped with Qualcomm RB3 and RB5 development platforms, and NVIDIA Jetson Orin system-on-module.[5]
Communications	• Radio-agnostic
Software Security	• Leverages military-grade security protocols
User Interface	• Presented in ATAK (standalone plugin and UAS Tool) and Teal Drones WEB Controller

[1] Near-term roadmap goals include LiDAR, radar, and passive RF.
[2] Coordinated collaboration requires a common radio network.
[3] Near-term roadmap feature.
[4] If capability is supported by the hardware platform.
[5] Contact us for additional platform or processor integrations.

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