Experiment Lead

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Research Area of Interest


Current Utilization of the Technology/System

US Military, Government First Responder Organizations (federal, state, or local), Other federal entity (non-military, non-first responder), Private Industry

Technology Readiness Level (TRL) of the Technology/System

TRL-6. System/subsystem model or prototype demonstration in a relevant environment

System Description

Autonodyne creates mobile common control stations (CCS) and on-board mission computers and the autonomy behaviors that reside in both for a range of airborne vehicles including sUAS,
high-speed (0.95 Mach) DoD drones, civil urban air mobility air taxis, and remotely-piloted aircraft (e.g. MQ-9s).

The CCS is able to control multiple disimilar sUAS at the same time from the same device by a single operator. We do not need to make any modifications of any kind to the actual airborne vehicles. The system often adds more functionality to the given airborne vehicle(s) than they natively have. For example, we can have a very basic sUAS that typically required manual joystick command and with a few touches on the CCS, automatically fly a surveillance pattern. As for another example, the CCS can command a drone to perform an autonomous drone package delivery over a range of datalink networks and use computer vision to precisely land on a designated location, deliver the package and return to a designated landing area, all without human intervention.

NSWDG is currently funding an expansion of the Autonodyne CCS functionality and the larger SOCOM organization is evaluating the system as a potential solution for their sUAS operations. Both SOCOM and NSW believe that some additional experimentation in a JIFX-like environment will be helpful for improving the functionality.

New Capability

In addition to serving as a potential forcing function for SRR and EOTACS acceptance, we propose to experiment with adding several new autonomy behaviors that the JIFX range can serve as a great testing ground. Specifically:

1. Create a Perch-Stare function that will be exercised by launching several sUAS to optimum perch locations at the CAC-TF site. These perched platforms will datalink their sensor imagery back to the TOC at McMillan Field where our Common Operating Picture (COP) system will allow operators to designate a point or points of interest and send them back to the CAC-TF operators across the TAK network using the Wave Relay datalink system.

2. Operators at the CAC-TF will then build a real-time mission on the CCS and launch multiple dissimilar sUAS and UGS systems to perform a surveillance mission on that passed POI. (The new part here from our experiments in JIFX 20-1 is to have the POI passed along via CoT messages on the ATAK network by 3rd party operators at the TOC). We also hope to experiment with integrating with Edgybees to provide their augmented scene of CAC-TF data real-time at the TOC.

3. The surveilling assets will push their sensor imagery back across the TAK network to the TOC for analysis and at some point, the operators at the CAC-TF will use the "Deliver" function on the CCS application to request resupply (e.g. replacement batteries, replacement sUAS, water bottles, etc) from the TOC to the CAC-TF and a VTOL UAS.
will launch from McMillan, autonomously compute a path to the CAC-TF, perform a precision landing and deliver the requested supplies.

This will be our first opportunity with experimenting with some of those autonomy behaviors and that combined CONOP.

**Experiment Plan**

We propose to experiment with adding several new autonomy behaviors and an attempted distributed Common Operation Picture that the JIFX range can serve as a great testing ground. Specifically:

1. Create a Perch-Stare function that will be exercised by launching several sUAS to optimum perch locations at the CAC-TF site. These perched platforms will datalink their sensor imagery back to the TOC at McMillan Field where our Common Operating Picture (COP) system will allow operators to designate a point or points of interest and send them back to the CAC-TF operators across the TAK network using the Wave Relay datalink system. [Measure of data/success: Observers at the TOC will determine is usable video data is received. Operators at the CAC-TF will determine if the Perch-Stare behavior functioned as intended.]

2. Operators at the CAC-TF will then build a real-time mission on the CCS and launch multiple dissimilar sUAS and UGS systems to perform a surveillance mission on that passed POI. (The new part here from our experiments in JIFX 20-1 is to have the POI passed along via CoT messages on the ATAK network by 3rd party operators at the TOC). We also hope to experiment with integrating with Edgybees to provide their augmented scene of CAC-TF data real-time at the TOC. [Measure of data/success: Can the operators at the TOC ingest the data into ATAK, select a POI and push back to operators at the CAC-TF]

3. The surveilling assets will push their sensor imagery back across the TAK network to the TOC for analysis and at some point, the operators at the CAC-TF will use the ""Deliver"" function on the CCS application to request resupply (e.g. replacement batteries, replacement sUAS, water bottles, etc) from the TOC to the CAC-TF and a VTOL UAS will launch from McMillan, autonomously compute a path to the CAC-TF, perform a precision landing and deliver the requested supplies. [Measure of data/success: Did the operator at the TOC recieve the delivery request? Did the UAS at the TOC autonomously build a mission and launch to the CAC-TF with the supply? Did the UAS successfully make it to the CAC-TF with the supply?]

This will be our first opportunity with experimenting with some of those autonomy behaviors and that combined CONOP.