BLUE UAS FOR FIRST RESPONDERS

Over the past decade, first responders have begun integrating small unmanned aerial systems (UAS) as a resource for a variety of operational needs. UAS, often referred to as "drones," are used by first responders in support of public safety activities such as search and rescue, firefighting, and post incident reconstruction. UAS provide first responders with an aerial view of their environment and can be outfitted with various sensors tailored to different applications. The publication of the "Blue UAS Cleared List" or "Blue List" by the Department of Defense (DoD) may aid responder agencies with their acquisition processes. UAS on the Blue List or "Blue UAS" have been vetted to be compliant with DoD policy. This equipment falls under the AEL reference number 03OE-07-SUAS titled "System, Small Unmanned Aircraft."

The Blue UAS Cleared List

The Blue UAS Cleared List [1] is a list of United States- and ally-manufactured UAS vetted by the Defense Innovation Unit (DIU) to be policy approved by the DoD. Section 848 of the National Defense Authorization Act (NDAA) for Fiscal Year 2020 [2] prohibits the use of UAS or any related services or equipment from certain foreign entities. All UAS on the Blue List are NDAA-compliant and have undergone cybersecurity testing by DIU or their contractors. Each device on the Blue UAS Cleared list is granted authority to operate (ATO) from the DIU. DHS and other agencies have adopted the Blue List as the de facto standard for selection of UAS due to their requirements for obtaining an ATO being similar to the DoD's. First responder agencies often have state- or locality-based regulations on what equipment they can use in the field. State regulators and first responders, however, can choose to use or require the use of Blue List UAS to help ensure operationalized UAS are secure and NDAA-compliant.

Figure 1. Multirotor (top), fixed wing (center) and hybrid (bottom) are the primary UAS platforms.
Image credit: Easy Aerial, Sensefly and FlightWave Aero

UAS Overview

Small UAS weigh less than 55 pounds and can be operated autonomously or via remote control. Three primary UAS configurations exist: multirotor, fixed wing, and hybrid (Figure 1). A multirotor configuration uses multiple rotors to allow the UAS to lift off vertically and hover. A fixed wing platform takes off and lands horizontally, generally necessitating more space than a multirotor. A hybrid platform relies on vertical propulsion for takeoff and landing but uses a fixed wing for more efficient flight while cruising. Each configuration has benefits and drawbacks, which often center around deployment constraints, flight efficiency, and design complexity.

UAS have become a frequently used tool for first responders with nearly 1,600 fire and law enforcement agencies acquiring or using them by 2020. [3] The ability of a UAS to provide an aerial vantage point and to separate the operator from potential safety threats has led to the systems' high adoption rate and may improve the efficiency, safety, and reliability of first responder operations. Small, unmanned aircraft offer a wide variety of capabilities that may enhance first responder applications.

UAS Capability Highlights

Commercial UAS designed for first responders often include technologies that assist the operator during flight or in the identification of targets via onboard sensors. UAS features that can benefit the responder community include live streaming, obstacle avoidance, mission planning, object tracking and swappable payloads.

Live video

A live video feed directly from the UAS can contain important information for first responder missions, displaying real-time outputs of the visible light or thermal camera for the operator. (Figure 2) Not all UAS, however, have a live-streaming capability.

Obstacle avoidance

Modern UAS may include technologies that assist operators with avoiding obstacles during flight, helping prevent accidents and injuries due to the UAS making contact with physical objects. Obstacle avoidance technologies may use cameras and sensors such as ultrasonic distance sensors, lidar or radar.

Mission planning

Advanced flight controllers allow some UAS to autonomously navigate during preplanned missions. Operators may use mission planning techniques that standardize routes taken, ensure sufficient coverage of a search area, and reduce the control input necessary during flight, thus allowing the UAS operator to focus on identifying potential targets.

Figure 2. First responders observe live video feed from a Skydio X2D.

Diverse Payloads

Ever expanding payload options are being developed for UAS. Examples of payloads that may offer value to first responders include visible light and thermal cameras, spotlights, and loudspeakers.

Cybersecurity Considerations

Most agencies require cybersecurity audits, which typically assess a technology's ability to be compromised by a bad actor. Federal agencies must adhere to the National Institute of Standards and Technology (NIST) Special Publication 800 guidelines when evaluating the risk of using a technology, including UAS. These guidelines may not directly align with state, local, tribal or territorial (SLTT) agencies' guidelines. However, techniques employed by the Blue List cybersecurity audit may assist SLTT agencies that aim to deploy UAS in accordance with their own policies; those techniques include penetration testing and a software/hardware bill of material verification.

References

[1] Department of Defense (DOD), "Blue UAS," Defense Innovation Unit (DIU), [Online]. Available: https://www.diu.mil/blue-uas. [Accessed 03 05 2023].

[2] 1. Congress, "National Defense Authorization Act for Fiscal Year 2018," 2018. [Online]. Available: https://www.congress.gov/bill/115th-congress/house-bill/2810/text. [Accessed 2023].

[3] D. Gettinger, "Public safety drones, 3rd edition," Center for the study of the drone at Bard college, 2020.