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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Incorporating New UAS Technology into the Caltrans UAS Safety Management System

Seeks to update the current California Department of Transportation (Caltrans) Unmanned Aircraft Systems (UAS) Safety Management System (USMS) with Standard Operating Procedures (SOPs), training requirements/curriculum and policy recommendations to address the latest innovative UAS technology.

Modal

MAY 2025

Project Title:
Incorporating New UAS Technology into the Caltrans UAS Safety Management System

Task Number: 4312

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WHAT IS THE NEED?

Unmanned Aircraft Systems (UAS) Safety Management System (USMS) to incorporate use of new unmanned aircraft models and operations including tethered, autonomous, Beyond Visual Line of Site (BVLOS) and fixed wing UAS.

A tethered UAS is attached to, and powered from, a ground station/battery pack placed in the back of a maintenance truck which will provide hours of continuous flight instead of 20 minutes with a typical UAS. Caltrans maintenance field crews can use tethered UAS to provide continual transmission from the site of an emergency or incident to Emergency Operations Centers and Traffic Management Centers (TMCs). Additionally, tethered UAS are permitted for use in situations where cloud cover prohibits the use of typical UAS. Autonomous, BVLOS, and corridor mapping UAS operate further, higher, and at a greater frequency than traditional UAS and will expand UAS case- uses for surveying and construction. These new UAS platforms and operations will benefit Caltrans by providing additional safety, efficiency, and accuracy which will be realized in contrast to traditional/ typical UAS.

WHAT ARE WE DOING?

The outcome of the research will be used to update the current Caltrans USMS. This research project proposes to enhance the existing UAS program by evaluating new UAS technology from a Safety Management System perspective to accommodate new modalities in 1) Expanded operations,

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including beyond visual line of sight, UAS docking systems, and tethered UAS, 2) Advanced Autonomy, Vertical Takeoff and Landing (VTOL) UAS and Fixed-wing UAS, and 3) Advanced Connectivity Oversight and Management. The key deliverables include a gap analysis report, recommendations for revised policies and procedures, and an updated training curriculum. The UAS program will implement recommendations by the researchers throughout the life of this proposed research to ensure safety procedures are being addressed as we go along. At the end of the research, the UAS program plans to have merged this new research into the existing USMS. Any outstanding items not incorporated by project end will be implemented within one year of the end of project.

The project proposes the researcher will investigate novel technology operational practices, training requirements, and management oversight. They will also develop training curriculum and recommendations for policies and procedures. The investigation segment will employ a systematic approach to evaluate the operational management of deployment on supplementary equipment, logistics, crew coordination needs, and network/cellular access and provide a Caltrans USMS Gap Analysis report. The curriculum will be subsequently developed, and following this, the creation of a recommendation report.

WHAT IS OUR GOAL?

Seeks to update the current Caltrans USMS with Standard Operating Procedures (SOPs), training requirements/curriculum and policy recommendations to address the latest innovative UAS technology.

WHAT IS THE BENEFIT?

UAS adoption improves safety for Caltrans employees, contractors, and the public, increases efficiency, and produces savings. Once implemented, the research will allow Caltrans employees to safely use new UAS technology for construction, surveying, traffic operations, and emergency management.

WHAT IS THE PROGRESS TO DATE?

The project is progressing well, with significant work nearing completion on the review of existing policies and procedures, along with the development of an evaluation methodology. These foundational activities are essential for establishing a framework that will guide future assessments and operational strategies. As the team finalizes these components, they are laying the groundwork for more advanced analyses in upcoming phases.

At the same time, new initiatives have begun that focus on analyzing different aspects of operations. These include extended operations with BVLOS, UAS docking systems, and tethered UAS. Further analyses will explore advanced autonomy features, such as VTOL and fixed-wing UAS, along with improved connectivity and management oversight. Concurrently, efforts are being made to document standard operating procedures and flight training requirements, ensuring that training aligns with operational objectives and regulatory standards.