



Caltrans Division of Research,
Innovation and System Information

Research

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Project Title:
Caltrans Unmanned Aircraft Systems
(UAS) Safety Management Systems

Task Number: 3694

Start Date: March 1, 2020

Completion Date: May 31, 2022

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Caltrans Unmanned Aircraft System (UAS) Safety Management System

Develop standards, curriculum, training materials, and best practices for the establishment of Caltrans UAS Safety Management System (USMS)

WHAT IS THE NEED?

The California Department of Transportation (Caltrans) has authorized the use of Unmanned Aircraft System (UAS) to conduct UAS operations within the State Highway System and for Caltrans business. Incorporating UAS into Caltrans business practices can increase safety and efficiency, decrease cost, and help Caltrans meet its mission, vision, and goals.

The use of UAS improves worker safety by limiting worker exposure to elevated, unstable, or hard to reach locations such as bridges, cliffs, and ravines. UAS allows for faster data gathering in the field, limiting overall worker exposure. It also allows for faster inspections in case of an emergency, improving response effort.

WHAT ARE WE DOING?

The growth of UAS use has been a challenge for many entities – industry, academic institutions, and governmental departments. A recent study by DroneDeploy of their users pointed out that drone use in construction has grown over 239% in the past year, while drone use for surveying has increased by 117% (DroneDeploy, 2018). However, even with this growth, there is no existing federal or state standard for the management, oversight, training or flight proficiency of UAS pilots. The current federal regulations mandate that all pilots pass an aeronautical knowledge exam – however, this leaves the previously mentioned gaps for each organization to address.

The University of California (UC) addresses these gaps through the UC Center of Excellence on UAS Safety, led by the lead Principle Investigator and has developed its own UAS Safety Management System (USMS) approach. This Center was established in 2016,



DRISI provides solutions and knowledge that improves California's transportation system

which provides system-wide expertise, support, and training for regulatory compliance, risk management, and the safe operation of UAS, commonly known as drones, across the UC system.

This project proposes to leverage the knowledge and experience of the UC Center of Excellence on UAS Safety, in collaboration with San Diego State University and California State University, East Bay to produce recommendations, best practices, guidelines, and training materials for the establishment of a Caltrans USMS. An effective Caltrans USMS will provide the foundation to facilitate the adoption of UAS across all Caltrans districts in California, provide a robust process for addressing risk and safety, and improve overall employee safety.

WHAT IS OUR GOAL?

This project proposes to enhance the existing Caltrans UAS program by developing recommendations, best practices, guidelines, and training materials validated through literature review and innovative research.

Significant effort will be taken to address key challenges faced by Caltrans employees including harsh operating environments in extreme weather, alongside highways, and heavily trafficked airspace, as well as standardized training and proficiency requirements for pilots and crew.

WHAT IS THE BENEFIT?

The research and development will be of value to other public agencies. The UC and Caltrans participants will discuss UAS use, share best practices, and identify common challenges in the California Natural Resources Group Working Group for UAS. Within this working group, a core set of common issues are regularly discussed:

- Lack of training facilities and support
- Lack of standards for training
- Gaps in institutional knowledge

While each agency may have unique or specific needs, much of the work may be transferable and may serve as a template for California public agencies, including county and municipal UAS programs who may lack the ability to dedicate effort into developing a comprehensive UAS program.

Part of the research team has been organizing annual Hackathon events for Science, Technology, Engineering, and Math students for the past four years where participants are provided with UAS to tackle science and engineering problems. Findings of this project can contribute to similar events and learning activities on different Universities across the State of California to promote safe use of UAS and provide training for students in collaboration with Caltrans.

WHAT IS THE PROGRESS TO DATE?

April 1, 2022 - April 30, 2022

- Task 2
 - Deliverable 2:
 - In-Person driver distraction simulations Report - May 2022
- Task 4
 - Deliverable 7/8: Lessons Learned & Evaluation
 - Lessons Learned Report - May 2022
 - Completed analysis of flight instruction pedagogy - May 2022