

Research Summary

Use of UAS For Surface Transportation Emergency Response

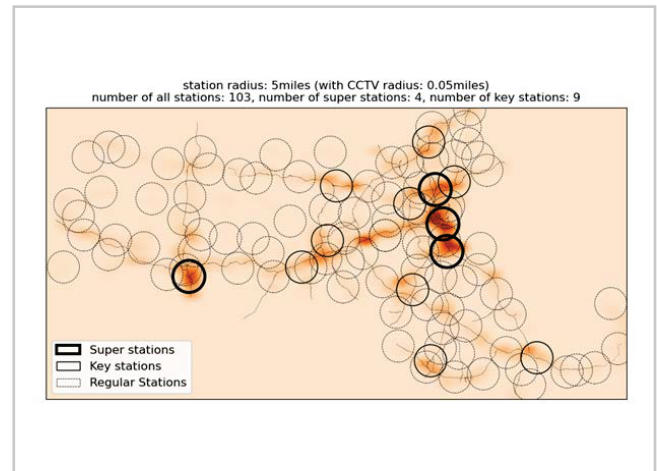
Research Need

Unmanned aerial systems (UAS, or “drones”) have great potential to improve emergency response (such as severe incidents). MassDOT is interested in developing and implementing a UAS network for incident response activities. A UAS network should account for the features of historical incidents, the operational features of UAS technology, and existing tools available to DOT.

Goals/Objectives

The project will address three critical questions:

- 1: Which types of highway incidents are most suitable for using UAS deployment?
- 2: What are the key UAS operational parameters for successful highway emergency response applications?
- 3: How can UAS be effectively integrated into highway emergency response practices?



Methodology

This research analyzed the historical emergency incidents to identify incident types most likely to benefit from a UAS network. The typical types of UAS for a UAS network was reviewed, with a focus on drone-in-a-box.

The research identified three incident scenarios most likely to benefit from a UAS network and evaluated the effectiveness of typical UAS types.

A tabletop simulation of pilot flights was conducted to assess how a drone could assist in MassDOT's emergency response activities.

A UAS network for incident response was developed.

Stakeholders were interviewed on UAS usage and future development.

Key Findings

Fire, environment/hazmat, and roadway/traffic incidents could benefit from a UAS network. Three application scenarios are likely to benefit from a UAS network, each favoring different types of UAS.

A UAS network for incident response was developed. Existing CCTV cameras can cover 43% of incidents. A UAS network could cover 25% of the uncovered incidents from four superstations.

Use of Findings

UAS can be very useful to complement existing CCTV cameras for incident response.

Short-term recommendations for MassDOT include the following:

1. Establishing a small-scale UAS network using four super stations and gradually extending to the key stations. The network will serve multiple purposes (e.g., regular roadway traffic surveillance, MBTA incidents, and extreme weather). The stations of the UAS network can change based on incident frequency and needs.
2. Equipping the UAS stations with different types of sensors (e.g., infrared, thermal sensors, LiDAR) that drones could use to serve different types of incidents.
3. Implementing a few mobile UAS platforms (e.g., placing drone-in-a-box on a truck) to serve the on-demand needs, such as response to severe traffic incidents on roads without CCTV cameras.
4. Conducting outreach to local communities (e.g., emergency managers of towns) to demonstrate the capabilities of UAS and the utility of a UAS network and air operation plan.

Project Information

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Principal Investigators:

Danjue Chen, Yuanchang Xie

Performing Organization:

University of Massachusetts Lowell

Project Champion:

Jeffery DeCarlo, Chester Osborne

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Research and Technology Transfer Section
MassDOT Office of Transportation Planning
Planning.Research@dot.state.ma.us

