

Project Title: Exploring Applications for Unmanned Aerial Systems and Unmanned Ground Systems in Enhanced Incident Management, Bridge Inspection, and Other Transportation-related Operations

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Unmanned aircraft systems (UAS) and unmanned ground systems (UGS) have the potential to change the way a number of transportation-related operations are conducted. Nowadays, an opportunity arises to leverage various innovative technological capabilities to explore their use and value in real world operating environments. Specifically, UAS, also called drones and UGS appear to have significant potential in several transportation areas which are examined in this report.

This report summarizes the literature review performed by students from three schools within the University Transportation Research Center Consortium. The students were given the task of documenting applications and demonstrations utilizing UAS and UGS in order to help NYSDOT assess the capabilities of these systems for performing transportation operations. One of these operations is responding to highway incidents including field surveying, accident information collection and reconstruction and other related activities involved in clearing highway incidents. Other transportation applications that NYSDOT is interested in include bridge inspection and traffic monitoring.

Three of the report's four sections discuss aerial systems and the fourth section focuses on ground systems. The first section presents a summary of the major provisions of the operation and certification of small unmanned aircraft systems, as well as studies and specifications of UAS used for roadway or ground mapping. The second section presents applications and specifications of using UAS to monitor structural systems including confined spaces such as pump stations and culverts, bridges, and other transportation infrastructure.

The third section describes applications of UAS for traffic condition monitoring and management. These applications include monitoring of road and traffic conditions and traffic management such as traffic incident management and traffic data collection. The final section discusses UGS, specifically connected and autonomous vehicles (CAV). It covers the communications technology and sensors used in CAVs; the levels of vehicle autonomy; the potential impacts of CAVs on public transit, safety, and infrastructure; and the current and future development of CAV technology.

The UAS research studies described in this report clearly indicate that these aerial systems are capable of performing many transportation monitoring and management operations more safely and efficiently and at lower cost than traditional methods. The UGS studies discussed in this report pertained to connected and autonomous vehicles. CAVs represent one of the most important trends in transportation today and these studies demonstrate that CAVs have great potential for improving the safety and efficiency of ground transportation networks.

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