RESEARCH

sUAS Traffic Analysis (A50_A11L.UAS.91)

In order for the FAA to maintain the safety of the NAS and accommodate new types of UAS operations, it is important to monitor the effectiveness of existing UAS regulations and forecast future UAS integration needs. Using detection data, first of its kind, this research will provide data to support those needs by analyzing sUAS traffic at several urban locations across the NAS.

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RELATED CAPABILITIES:

- Airport Operations
- Airport Traffic Control Ops
- Data/Metadata Management
- Economic and Environmental Impacts
- Flight Regulations/Guidance/Standards
- Forecasting
- Human Factors
- Modeling and Simulation
- Safety Systems/Management
- Standards Development

Discussion:

This document provides the Initial Annual Report for the Small Unmanned Aircraft System (sUAS) Traffic Analysis (A11L.UAS.91) project. It presents the progress, findings, and preliminary observations on research tasks completed in the first of three years of performance. With the growth of sUAS operations in the National Airspace System (NAS), there is a demonstrated need to identify and report these activities objectively and empirically. The current study aims to establish a framework for addressing this need to conduct sUAS traffic analysis in low-altitude airspace. The collection and analysis of this empirical data is used to inform the Federal Aviation Administration (FAA) in several critical areas: (1) identify, assess, and monitor for sUAS safety hazards; (2) determine the effectiveness of existing sUAS regulations, (3) accurately forecast sUAS traffic levels; and (4) aid in identifying and assessing future aviation risk.

To answer the project's research questions, the researchers established six focal areas to divide the effort functionally. The tasks are: (A) Analysis Tool Development and Literature Review, (B) Current State of sUAS Traffic within the NAS, (C) Compliance and Exceedances of 14 CFR§107 Operational Limitations, (D) Near Aerodrome sUAS Operations and Encounter Risks with Manned Air Traffic, (E) Forecasting Industry Growth and Potential Advance Air Mobility Implications, and (F) Communicating the Findings. Through these different taskings, the team provides clear answers to the research questions posed in this study.

The data for this research was collected via a nationwide deployment of Unmanned Aircraft System (UAS) detection equipment through collaboration with two companies. Working with these partners provides 166 UAS detection sensors deployed across 64 diverse geographical areas. This instrumentation conducts continuous, passive monitoring of detailed operational data such as identification (electronic serial number), location, altitude, speed, and remote pilot's location. Data is collected for sUAS vehicles manufactured by DJI, and their market share is estimated at approximately 76% based on sale volume, indicating the system will detect a high proportion of sUAS operations.

To facilitate the streamlined collection and processing of the data, the project has partnered with Unmanned Systems Robotics Analysis, Inc. (URSA). The team is producing customizable analyses and reports to synthesize the data received from several sources through the use of URSA's UAS & Counter-UAS Analytics Platform (UCAP). This tool leverages modern data science and Artificial Intelligence (AI) capabilities to provide rapid pattern detection, data visualization, and automated reporting capabilities.

The preliminary data has produced several insights into sUAS operations. Through the initial data analysis, the research team assessed operations in several key areas, including sUAS flights by location, airspace use, seasonal variation in operations (including holiday spikes in operations), time of day operations, operations by type of sUAS, maximum sUAS flight altitudes, the proximity of operations near airports, sUAS launch locations, sUAS retirement/abandonment rates, and estimated registration compliance. The research team also assessed a comparison of the empirical data against sighting reports.

In addition, the team assessed and estimated compliance and exceedances of 14 CFR §107, including operations from a moving vehicle, exceedance of daylight operations, beyond line of sight aircraft operations, operations near and around other aircraft, operations over people/large gatherings, speed and altitude limitations, visibility and cloud clearances, mid-air encounter likelihood, and the effectiveness of the Low Altitude Authorization and Notification Capability (LAANC) system.

The initial annual report provides a detailed analysis of these critical research areas. However, in general, some preliminary findings can be summarized. First, clear patterns emerge in sUAS operations based on seasonal variations and time of day. Second, sUAS operations appear, for the most part, to be compliant with regulations for operations in proximity to airports. Third, sUAS retirement/abandonment rates seem to be high, especially after the first 3-4 months of use. Lastly, in general, the initial findings indicate that most sUAS operations conduct their flights in compliance with 14 CFR §107 regulations. The report discusses these findings in detail, along with the supporting data. While these findings are preliminary, the results inform the FAA about the types of and patterns of operations of sUAS in the NAS. This data informs future decisions, policies, and procedures for integrating unmanned and manned operations.

READ THE FULL ANNUAL REPORT HERE

Participating Schools

Embry-Riddle Aeronautical University · Kansas State University