



IEEE UAS STANDARDS TRACKING AND STANDARDS DEVELOPMENT RELATED RESEARCH NEEDS

Authored by

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IEEE UAS STANDARDS TRACKING AND STANDARDS DEVELOPMENT RELATED RESEARCH NEEDS

ABSTRACT

The “IEEE UAS Standards Tracking and Standards Development Related Research Needs” team was formed by the IEEE Industry Connections (IC) Group to identify current IEEE unmanned aircraft systems (UAS) standards and possible research gaps. This new team comprised members of IEEE standards committees and members of the FAA Alliance for System Safety of UAS through Research Excellence (ASSURE) project “A37: UAS Standards Identification, Tracking, and Mapping.” The integrated team identified the list of standards published by the IEEE and validated whether the standards had been captured correctly. The team also identified research gaps in the current standards and, hence, possible future UAS standards development activities. As part of the effort, the team further identified multiple UAS standards developed for communications and networking, operations and applications, sensors, payload interfaces, and power research areas. The team could not identify any specific research gaps in the current standards development activities but did note a few IEEE standards development projects that need future research. Overall, participants found few general research gaps. In the future, the team should expand to include members from all unmanned aerial vehicle (UAV) working groups to better capture research gaps.

1. INTRODUCTION

Unmanned aircraft systems (UAS) and urban air mobility (UAM) are emergent aviation markets enabled by significant technological innovations. To achieve the integration of such systems into the U.S. National Airspace System (NAS) and similar air navigation service providers (ANSPs), standards must be developed regarding airworthiness, operations, and training to help guide developers, operators, regulators, and air traffic management. The Federal Aviation Administration (FAA)'s "Integration of Civil Unmanned Aircraft System (UAS) in National Airspace System Roadmap" helps set the tempo for standards development by articulating the sequence of future UAS capabilities [1]. Standards development organizations (SDOs) must work to keep pace to establish the standards needed for each capability based on inputs from industry experts and research.

The IEEE Industry Connections (IC) Group formed the "IEEE UAS Standards Tracking and Standards Development Related Research Needs" team to identify IEEE UAS standards and research gaps (i.e., opportunities for additional research that could aid the IEEE and its members in authoring new standards). The team serves as a collaboration between participating IEEE members and researchers on the FAA Alliance for System Safety of UAS through Research Excellence (ASSURE) project "A37: UAS Standards Identification, Tracking, and Mapping," which seeks to track UAS standards development activities.

The IC Group facilitates the coordination of members of the IEEE community across standards committees and working groups to identify current/ongoing/planned standards activities, locate research gaps, and trace those gaps to the UAS Integration Research Plan (UIRP) capabilities that would be enabled by new standards. Specifically, the IC Group's "IEEE UAS Standards Tracking and Standards Development Related Research Needs" team sought to meet twice to meet the following goals:

- Produce a committee-validated list of standards, confirming it completely and correctly captures the IEEE's UAS standards work.
- Discuss new and forthcoming UAS standards development activities within the IEEE.
- Identify and discuss research gaps impacting IEEE UAS standards committees' progress in developing new standards, which can potentially receive support through externally sponsored research efforts.
- Prioritize research gaps based on levels of importance to the IEEE's success in timely delivery of its supported standards activities.

This white paper presents a summary of the "IEEE UAS Standards Tracking and Standards Development Related Research Needs" team's efforts, results from its standards review and research gap analysis, and lessons learned

from the experience. Section 2 provides a background summary regarding UAS standards tracking and research gaps. Section 3 summarizes IEEE’s standards development progress in the domains of UAS and UAM. Section 4 presents research gaps identified by team members. Section 5 discusses opportunities for future IEEE/ASSURE/FAA collaboration opportunities.

2. BACKGROUND

This section provides some necessary background by addressing UAS standards tracking and UAS research gap identification and by providing an overview of the FAA ASSURE project “A37: UAS Standards Identification, Tracking, and Mapping.”

The tracking of UAS standards involves the identification of standards published, under development, or planned. Information collected by a UAS standard may include the standard’s identifier, name, description, publication status, publication date, SDO(s) and committee/working group(s) that prepared the standard, and adoption status with the FAA or other civil air authorities.

For example, the ANSI UASSC [2] has provided one of the more comprehensive surveys of UAS-related standards. The ANSI UASSC team leveraged domain-specific working groups, including those focused on airworthiness, flight operations and personnel qualifications, critical infrastructure and environment, and public safety. After the first ANSI UASSC Standards Roadmap [3], the working groups met periodically, releasing annual updates. The team has also tracked standards gaps, that is, when a standard is anticipated, but it has not been addressed by the SDOs.

SDOs might also internally track the standards they produce. Tracking standards provides internal situation awareness of what the organization produced, when, and by whom. Standards tracking can also help the SDO identify opportunities for future standards. For some organizations with one or a few working groups that develop UAS-relevant standards, the ability for the SDO to track its own UAS standards should be straightforward. For larger organizations, such as the IEEE, the role of UAS standards development is distributed across many working groups addressing standards that align with their committee’s topic.

2.1. UAS RESEARCH GAPS IDENTIFICATION

Research supports the development of new standards. For instance, the development of minimum separation standards may require modeling and simulation research to derive those boundaries. Research also supports