IEEE Transactions on Intelligent Transportation Systems

Call For Papers

Special Issue on Unmanned Aircraft System Traffic Management

MOTIVATION AND SCOPE

Advances of unmanned aircraft system (UAS) technology have spurred a rapid investment of commercial UAS use in broad public domains, such as cargo transport, agriculture support, emergency response, on-demand communication, and infrastructure health monitoring. Urban unmanned aerial transportation that can transport passengers over short distances is also on the way. With the forthcoming dense operations of UAS particularly over urban regions, ensuring airspace safety becomes an urgent issue.

Air traffic management (ATM) solutions are designed mainly for commercial airlines. There have been many advances for ATM at both strategic and tactical periods. ATM systems rely on ground human traffic controllers working with onboard human pilots to guide individual aircraft trajectories, with decisions supported by flight plans and various autonomous decision support tools. Compared to ATM, UAS traffic management encounters many new challenges. Human pilots are replaced by autopilots of limited sensing, control, and communication capabilities due to UAS payload constraints. UAS is controlled by human operators through command and control data links, which can be affected by communication issues such as inference, jamming, and limited bandwidth. UAS stability is more sensitive to weather disturbances such as strong winds due to their compact size and lightweight. At a flow level, 3-dimensional UAS mobility demonstrates much more variable, uncertain, and heterogeneous features compared to commercial airlines, as UAS are expected to offer flexible on-demand missions with a wide spectrum of flight types and capabilities. The low-altitude airspace environment becomes more complicated with mixed manned-unmanned traffic, especially in urban areas where terrain features and ground properties also need to be considered.

This special issue aims to understand the fundamental challenges that are unique to UAS traffic management and develop solutions that address these challenges. The scope of this special issue spans UAS automation, ground support, human systems, capacity and airspace management, mission planning, and contingency management. We aim to answer fundamental questions including but are not limited to the following. What does the future airspace structure look like? Should UAS traffic management be centralized or decentralized? How do we address the scalability issue considering the large volumes of UAS of variable, uncertain, and heterogeneous mobility features? How do we balance the levels of responsibilities across onboard autopilot, UAS operators, and traffic managers? How can we best deal with environmental uncertainties in UAS traffic management decision-making, and how do air and ground infrastructures together support UAS traffic management? What advances from road transportation and air transportation can we leverage to address challenges in UAS traffic management?

Addressing the aforementioned research questions requires collaborative efforts from multiple communities that span transportation, aviation, communications, networking, control, information systems, big data, computing, and cyber-physical systems. The goal of this special issue is to

provide the incentives that bring together researchers and engineers from multiple communities to collaboratively tackle the fundamental challenges for UAS traffic management.

LIST OF TOPICS: Topics of interest to this special issue include, but are not limited to:

- UAS airspace structure and safety measures
- UAS airspace capacity characterization and management
- Urban air mobility (UAM)
- Uncertain trajectory propagation
- UAS traffic uncertainty quantification
- Human-automation interaction
- Autopilot and UAS autonomy
- Multi-UAS coordination
- UAS mission planning, path planning, and scheduling
- UAS detection and avoidance
- Distributed UAS control
- Graphical games for UAS networks
- Learning, and data-driven solutions for UAS traffic management
- Contingency management at vehicle and traffic levels
- Weather studies for UAS traffic management
- Privacy, security and trustworthiness
- UAS certification, verification and validation
- UAS communication, spectrum allocation, and networking
- UAS traffic management testbed development
- Multi-UAS applications
- UAS Geofencing

PAPER SUBMISSION GUIDELINES

Paper submission should conform to the information for authors available at https://mc.manuscriptcentral.com/t-its.

IMPORTANT DATES

First submission deadline: 2/15/2020
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First revision submission deadline: 7/15/2020
Notification of final decision: 11/15/2020
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SUBMISSION AND REVIEW OF PAPERS

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