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: 4/1/2020  
Notification of first decision: 7/1/2020  
First revision submission deadline: 9/1/2020  
Notification of final decision: 1/1/2021  
Final manuscript (camera ready) submission deadline: 2/1/2021  
Issue of Publication: 4/1/2021

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Yan Wan – Dr. Yan Wan is currently an Associate Professor in the Electrical Engineering Department at the University of Texas at Arlington. She received her Ph.D. degree in Electrical Engineering from Washington State University in 2009 and then did postdoctoral training at the University of California, Santa Barbara. Her research interests lie in the modeling, evaluation, and control of large-scale dynamical networks, cyber-physical system, stochastic networks, decentralized control, learning control, networking, uncertainty analysis, algebraic graph theory, and their applications to unmanned aerial vehicle (UAV) networking, UAV traffic management, epidemic spread, complex information networks, and air traffic management. She received research grants from NSF, ONR, ARO, NIST, IEEE, Ford, Lockheed, and MITRE Corporation as subcontracts from the FAA. Her research has led to over 170 publications and successful technology transfer outcomes. She has received several prestigious awards, including the NSF CAREER Award, RTCA William E. Jackson Award, U.S. Ignite and GENI demonstration awards, IEEE WCNC and ICCA Best Paper Awards, UNT Early Career Award for Research and Creativity, UTA STARS Award, and Tech Titan of the Future – University Level Award. She currently serves as the Associate Editor for IEEE Transactions on Control of Network Systems, Transactions of the Institute of Measurement and Control, and Journal of Advanced Control for Applications. She also serves as a Conference Editorial Board Member of the IEEE Control Systems Society, Vice President for IEEE ComSoc Fort Worth Chapter, and Technical Committee Member of AIAA Intelligent Systems, IEEE CSS Nonlinear Systems and Control, and IEEE CSS Networks and Communication Systems.

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Kyriakos G. Vamvoudakis – Kyriakos G. Vamvoudakis was born in Athens, Greece. He received the Diploma (a 5 year degree, equivalent to a Master of Science) in Electronic and Computer Engineering from the Technical University of Crete, Greece in 2006 with highest honors. After moving to the United States of America, he studied at The University of Texas and he received his M.S. and Ph.D. in Electrical Engineering in 2008 and 2011 respectively. From May 2011 to January 2012, he was working as an Adjunct Professor and Faculty Research Associate at the University of Texas at Arlington and at the Automation and Robotics Research Institute. During the period from 2012 to 2016 he was a project research scientist at the Center for Control, Dynamical Systems and Computation at the University of California, Santa Barbara. He was an assistant professor at the Kevin T. Crofton Department of Aerospace and Ocean Engineering at Virginia Tech until 2018. He currently serves as an Assistant Professor at The Daniel Guggenheim School of Aerospace Engineering at Georgia Tech. His research interests include approximate dynamic programming, game theory, cyber-physical security, networked control, smart grid, and safe autonomy. Dr. Vamvoudakis is the recipient of a 2019 ARO YIP award, a 2018 NSF CAREER award, and of several international awards including the 2016 International Neural Network Society Young Investigator (INNS) Award, the Best Paper Award for Autonomous/Unmanned Vehicles at the 27th Army Science Conference in 2010, the Best Presentation Award at the World Congress of Computational Intelligence in 2010, and the Best Researcher Award from the Automation and Robotics Research Institute in 2011. He is a member of Tau Beta Pi, Eta Kappa Nu, and Golden Key honor societies and is listed in Who's Who in the World, Who's Who in Science and Engineering, and Who's Who in America. He has also served on various international program committees and has organized special sessions, workshops, and tutorials for several international conferences. He currently is a member of the Technical Committee on Intelligent Control of the IEEE Control Systems Society (TCIC), a member of the Technical Committee on Adaptive Dynamic Programming and Reinforcement Learning of the IEEE Computational Intelligence Society (ADPRLTC), a member of the IEEE Control Systems Society Conference Editorial Board, an Associate Editor of Automatica, an Associate Editor of the IEEE Computational Intelligence Magazine, an Associate Editor of the Journal of Optimization Theory and Applications, an Associate Editor of the IEEE Control Systems Letters, a registered Electrical/Computer engineer (PE) and a member of the Technical Chamber of Greece. He is a Senior Member of IEEE and AIAA.

Kostas G. Goulias – Konstadinos G. Goulias is a Professor of Transportation at the UC Santa Barbara Department of Geography since 2004. He served as Professor of Transportation in the
Civil and Environmental Engineering department of the Pennsylvania State University from 1991 to 2004, where he is also directed the Transportation Operation Program, the CyberTrans Center, and the Mid Atlantic University Transportation Center. Goulias chaired the Transportation Research Board (TRB) of the National Academies Task Force on Moving Activity Based Approaches to Practice and the Committee on Traveler Behavior and Values. Goulias edited three books and published more than 300 research reports and papers and is the co-founder and co-editor in-chief of the journal Transportation Letters published by Taylor&Francis. Goulias is the vice-chair/chair elect of the International Association for Travel Behaviour Research. His research is on Large Scale Transportation Systems Modeling and Simulation, Travel Behavior Dynamics, Sustainable Transportation, Economic Geography and Survey Methods. He has done research in Australia, Germany, Greece, Italy, Japan, the Netherlands, Portugal, Qatar, and the United States developing new data collection and modeling techniques, simulation frameworks, and expert reviews of technologies and engineering practice and policies. He holds a PhD from UCDavis (1991), a Master’s in Engineering from University of Michigan, Ann Arbor (1987) and a Laurea in Engineering (BS and MS) from Universita degli Studi della Calabria in Italy (1986).

SUBMISSION AND REVIEW OF PAPERS

Submitted papers should be original and not be under consideration elsewhere for publication. The authors should follow the journal guidelines, regarding the manuscript content and its format when preparing their manuscripts. All papers will be reviewed by at least three independent reviewers for their suitability in terms of technical novelty, scientific rigor, scope, and relevance to this special issue.