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Guest Editors' Introduction to Special Issue: Artificial Intelligence in Aviation

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The use of artificial intelligence (AI), predictive analytics, robotics, machine learning and automation in aviation has revolutionized the industry, enhancing efficiency, safety, and reliability. AI algorithms optimize flight paths, weather forecasting, hands-on training, air traffic management, and prediction of maintenance needs, thereby reducing delays, accidents, and operational costs. Robotics streamline manufacturing processes and enable precise inspections and repairs of aircraft, ensuring higher standards of quality and safety. Autonomous systems, including drones, are transforming cargo delivery and surveillance, offering new possibilities for transportation monitoring and emergency response. These advances collectively contribute to a smarter, more resilient aviation sector poised for future challenges and opportunities. The articles in this issue highlight some of the innovative exercises and applications that further demonstrate the practicality of this technology.

Special thanks to Bill Deng Pan for his work in developing and refining the new JAAER format and reformatting the articles for publication.

Meet The AI Special Issue Guest Editors

Carla A. Hackworth, Ph.D.

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Dr. Carla Hackworth serves as the FAA Aerospace Human Factors Research Division Manager (AAM-500) where she is responsible for a program of applied human factors research of field and laboratory investigations within aviation work environments. Research includes, but is not limited to, assessments of human performance under various conditions of impairment; human error analysis and remediation; agency workforce optimization; assessing the impact of advanced automated systems on personnel requirements and performance; human factors evaluations of performance changes associated with advanced multifunction displays and controls in general aviation and air traffic control; and the psychophysiological effects of workload and shift work on job proficiency and safety in aviation-related human-machine systems.

Dr. Hackworth completed her graduate work in Psychology, earning a master's degree in 1993 (University of Central Oklahoma) and a doctorate in 2001 (University of Oklahoma). To date, she has authored and co-authored over 30 publications examining aviation human factors. She is a past president of the Aerospace Human Factors Association. In 2020, Dr. Hackworth received the Aerospace Human Factors Association Henry L. Taylor Award for her outstanding contributions in Aerospace Human Factors.

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Dr. Yongxin (Jack) Liu received his first Ph.D. with a focus on Big Data Analytics in Intelligent Transportation Systems from the South China University of Technology in 2018 and received his second Ph.D. in 2021 in Computer Science with a focus on the Mathematical assurance of deep neural network from Embry-Riddle Aeronautical University. His current research focuses on Explainable AI for aviation, Unmanned Aerial Systems, Smart Manufacturing and Internet of Things. Dr. Liu's recent research project is funded under USDoT Tier 1 UTC Transportation Cybersecurity Center for Advanced Research and Education (CYBER-CARE). His research thrust in CYBER-CARE is Trustworthy AI in NextGen Transportation Systems.

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Dr. Chien-tsung Lu, Director and Professor of the School of Aviation at Southern Illinois University, brings a wealth of expertise in aviation safety, system risk management, and airline operations, cultivated through years of dedicated research and practical endeavors. His scholarly contributions are extensive, encompassing a wide array of refereed journal articles, conference proceedings, books, and presentations. Recognizing the importance of interdisciplinary collaboration, Dr. Lu has been instrumental in advancing aviation safety practices by conducting workshops and delivering training sessions. Dr. Lu encourages collaboration among experts across departments, organizations, and universities to drive research projects and develop grant proposals. His leadership roles, including Chairman of Part 121 air carrier and dean of an aviation college in China, and member of the Board of Directors of Virgin Australia Airlines, underscore his commitment to advancing higher education in international aviation fields. Dr. Lu is an FAA A&P, FCC GROL licensee, and ICMA certified Crisis Manager.