

Special Session on “Safe and Intelligent Autonomous Flight: Learning-Based Guidance and Control for Advanced Aerial Vehicles”

Organized by Yingxin Shou and Yuyan Guo

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➤ Technical Outline of the Session and Topics (100-150 words):

Outline of the Session

With the rapid development of unmanned aerial vehicles, hypersonic platforms, and advanced air mobility systems, achieving safe and autonomous flight in highly dynamic and uncertain environments has become a critical challenge. This special session focuses on emerging artificial intelligence and control methodologies for next-generation aerial vehicles, covering intelligent decision-making, learning-enabled guidance and control, safety-critical autonomy, and resilient flight systems. Particular attention will be given to the integration of data-driven intelligence with physics-based flight dynamics, robust constraint handling, multi-agent coordination, and fault-tolerant autonomous operation. The session aims to bring together researchers and engineers to discuss theoretical advances, experimental validations, and practical challenges toward reliable autonomous flight.

Topics of the Session

- o Intelligent decision-making and autonomous mission planning for aerial vehicles
- o Learning-based guidance, navigation, and control for autonomous flight systems
- o Physics-informed artificial intelligence and data-driven methods for flight control
- o Safe and robust control under uncertainties, disturbances, and operational constraints
- o Fault diagnosis, fault-tolerant control, and resilient autonomous flight systems
- o Cooperative guidance, multi-agent coordination, and intelligent interaction among aerial vehicles
- o Advanced autonomous flight applications for UAVs, hypersonic vehicles, eVTOL, and emerging air mobility systems