

Special Session Proposal

Title: Advanced Autonomous Navigation using Heterogenous Sensors under Signal-denied Scenarios

Description of the proposed special session:

Autonomous navigation based on heterogenous sensors is regarded as an advanced approach for solving the problem of positioning under signal-denied scenarios where the external signals cannot be acquired, for instance, GNSS, Wi-Fi, BLE, UWB et al. However, the performance of traditional multi-sensor navigation algorithms is limited by the cumulative error, artificial magnetic interference, and complex motion modes of carriers. Hence, the current signal-denied navigation algorithm cannot meet the increasing requirements of multiple sensors and platforms, looking for advanced autonomous navigation solutions to offer accurate and continuous location-based services under signal-denied scenarios is a timely research area. In addition, the merging sensors including LiDAR, depth camera, Millimeter wave radar et al, can also be applied for positioning and sensing purposes. Especially, with the development of AI technology, AI-driven navigation is also a merging and effective way to improve the adaptability and scalability of current structures. This special session invites new research in the area of autonomous positioning and navigation under signal-denied scenarios, for seeking improvements over the state of the art in terms of accuracy, robustness to interferences, and reliability.

Novelty and motivation:

Multi-source fusion algorithms using different location sources is a mature way to improve the positioning performance under typical urban scenes, while the problem is that there are many harsh scenarios with no external signals, the existing signal-required algorithms for instance WIFI, GNSS, BLE cannot be applied. Different from existing sessions, our special session focuses on how to solve the positioning problem under these kinds of environments with no external signals, aiming at providing accurate, continuous, and reliable location-based services for real-world applications including emergency rescue, robot navigation, intelligent inspection et al.

Scope of the session:

In this Special Session, we invite authors to submit papers related (but not limited) to:

- Enhanced inertial navigation algorithm
- Autonomous multi-sensor fusion algorithm
- Simultaneous Localization and Mapping
- Wearable and distributed sensors
- Magnetic odometry
- AI-driven positioning structure
- Multi-sensor odometry
- Cooperative navigation
- Robust navigation solution
- Environmental perception and decision making
- High-precision mapping and navigation integration

Keywords:

- SINS
- SLAM
- AI-Driven
- Odometry
- Autonomous Systems
- Robustness and Adaptivity

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**INDOOR POSITIONING
AND INDOOR NAVIGATION**

15th – 18th September 2025, Tampere, Finland

Session Chairs (Technical Program Committee):

- Prof. Hong Yuan, Aerospace Information Research Institute, Chinese Academy of Sciences, China
- Dr. Wenchao Zhang, Aerospace Information Research Institute, Chinese Academy of Sciences, China
- Dr. Yue Yu, The Hong Kong Polytechnic University, Hong Kong, China

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