



Special Session Proposal

Title: 3D SLAM and Fusion Techniques

Description of the proposed special session:

We invite submissions on theoretical breakthroughs, system designs, experimental validations, industry pilots, and future visions addressing passive localization fusion with SLAM technologies, including 3DGS applications. Topics include (but are not limited to): passive signal processing, fusion algorithms, hardware innovations, 3DGS-rendered scene representations, and real-world deployments.

Novelty and motivation:

This Special Session centers on the deep integration and synergistic advancements of three pivotal indoor localization technologies: Passive Localization, Vision-based SLAM, and LiDAR-based SLAM. A key addition is the exploration of 3D Gaussian Splatting (3DGS), a novel rendering and scene representation technique, to enhance localization accuracy, scene reconstruction, and real-time rendering. The session aims to explore how 3DGS complements passive sensing and SLAM systems by providing high-fidelity 3D scene representations, enabling more robust tracking, path planning, and visualization in dynamic environments. By integrating 3DGS with passive tags, SLAM's point clouds, and LiDAR scans, we address challenges in range, accuracy, environmental adaptability, and scalability. The session will delve into cross-modal fusion algorithms, real-world applications, and future trends, fostering collaborations across research, industry, and innovation.

Scope of the session:

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

- Fusion of passive sensing data (e.g., passive RFID, passive UWB) with LiDAR/Visual SLAM point clouds.
- 3DGS-Enhanced SLAM: Leveraging 3DGS' s explicit ellipsoid representations to densify SLAM point clouds and improve loop closure.
- Real-Time Rendering for Localization Feedback: Utilizing 3DGS' s GPU-accelerated rendering (up to 100+ FPS) to visualize passive tag locations and SLAM trajectories in AR/VR.
- Hybrid localization frameworks: Passive tags for coarse region identification + SLAM for fine-grained tracking + 3DGS for surface reconstruction.
- Signal propagation modeling for passive systems (e.g., path loss, multipath effects) and SLAM error correction.
- Edge computing architectures for real-time fusion of passive, active, and 3DGS-rendered data.
- Smart warehouses: Passive asset tracking + LiDAR SLAM for autonomous forklift navigation + 3DGS for real-time environment visualization.
- Healthcare facilities: Passive tag-based patient flow monitoring + Visual SLAM for robot-assisted navigation + 3DGS-generated digital twins for surgical planning.
- Retail environments: Passive sensor networks for item localization + AR/VR SLAM overlays + 3DGS-powered immersive product displays.
- Infrastructure management: Passive infrastructure sensors + LiDAR SLAM for structural health monitoring + 3DGS-based virtual inspections.
- Enhancing passive system sensitivity and range for dense deployments.
- Machine learning-driven noise filtering in passive signal environments.

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2026!**





IPIN2026
SIXTEENTH INTERNATIONAL CONFERENCE ON
**INDOOR POSITIONING
AND INDOOR NAVIGATION**
05th – 08th October 2026, Rome, Italy



- 3DGS for Scene Prior Learning: Training 3DGS models on pre-scanned environments to improve SLAM initialization and localization robustness in unknown areas.
- Energy-efficient backscatter communication for long-term passive operation.
- Privacy-preserving localization with passive tags and federated SLAM data.
- Next-gen fusion: Combining 3DGS' s explicit geometry with SLAM' s temporal consistency for lifelong mapping.

Keywords:

- Passive localization
- 3D SLAM
- Fusion

Session Chairs:

- Prof. Yubin Zhao, Sun Yat-sen University
- Prof. Haozhi Huang, Jinan University

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