BIM for AI-aided Smartphone Indoor Positioning Solution

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SUMMARY

This study focuses on developing a Building Information Model (BIM) derived from terrestrial laser scanning data to support precise indoor positioning and navigation. The integration of high-resolution point cloud data enables the creation of an accurate geometric and semantic representation of building interiors, forming the foundation for seamless localization. The seamless localization (i.e., seamless indoor/outdoor navigation) then becomes an additional layer of BIM. By combining BIM with data from smartphone sensors, such as Global Navigation Satellite Systems (GNSS), Inertial Measurement Units (IMU), ranges from camera images processed with Artificial Intelligence (AI) models, Wi-Fi and UWB – a future signal of opportunity, the proposed approach enhances the accuracy and reliability of real-time indoor positioning. System architecture is proposed in this paper. We assume that the results of our research will demonstrate that the integration of laser scanning–based BIM with cooperative smartphone sensing can significantly improve indoor localization performance and provide a robust basis for applications such as smart building management, emergency response, and assistive navigation systems.

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