

# AR Indoor Navigation: An Augmented Reality Approach

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**Abstract:** *This paper presents the development and evaluation of an augmented reality (AR) based indoor navigation system designed to assist users in navigating complex indoor environments, such as university campuses. Unlike outdoor navigation systems, indoor navigation faces challenges such as signal attenuation, GPS unavailability, and structural complexity. Our system addresses these challenges by leveraging AR technology to overlay directional markers and path indicators in real-time on the user's smartphone screen. The system utilizes Google ML Kit for classroom recognition, user input for destination targeting, and a combination of inertial sensors and computer vision for real-time positioning. The core navigation algorithm is built on the A-star algorithm, refined with Bezier curves for smooth path rendering. Our tests demonstrate that this method achieves both high navigational accuracy and user satisfaction in multi-floor indoor environments. This study provides insights into the applicability of AR in enhancing indoor wayfinding and highlights areas for future development, including automated indoor mapping and personalized routing*

**Keywords:** Augmented Reality, Indoor Navigation, Pathfinding, Real-Time Positioning, Sensor Fusion, AR Visualization, Digital Twin

