ABSTRACT

A comprehensive literature survey was undertaken to explore current advancements in indoor navigation systems utilizing Augmented Reality (AR), especially in settings where GPS is ineffective, such as malls, airports, and hospitals. The primary goal was to examine cost-effective, smartphone-compatible AR-based navigation models that enhance real-time user guidance, with a focus on assisting visually impaired individuals. Key evaluation criteria included localization accuracy, algorithmic efficiency (notably A*, SLAM, and NavMesh), usability, deployment simplicity, and device compatibility. Technologies like ARCore, Unity, Vuforia, and BIM integration were prevalent across studies.

A consistent trend across the reviewed papers was the adoption of marker-based or vision-based localization through QR codes, AR nodes, and virtual anchors. Several systems demonstrated the use of Unity NavMesh and SLAM for dynamic path planning, while others employed deep learning techniques (e.g., YOLOv3, CNNs) for obstacle detection and auditory feedback, greatly benefiting visually impaired users. Techniques like real-time camera-based tracking, AR overlays, gamification, and integration with NLP voice support were found to improve accessibility and user engagement.

The survey highlighted AR's potential in indoor environments without the need for GPS or expensive hardware. However, challenges such as environmental calibration, AR marker placement, and stability during user movement were noted. The findings validate the feasibility of developing an affordable, scalable, and interactive indoor AR navigation system. These insights directly inform the technological choices and system architecture for our project, ensuring it addresses real-world deployment barriers while maximizing accessibility and efficiency.

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