**BE PROJECT PROPOSAL**

**1. Name of the proposed project:**

Indoor Navigation Using AR Technology

**2. Group members**

60004210122-Kruti Shah C2

60004210147-Khushi Jobanputra C2

60004210235-Manasvi Gupta C3

60004220126-Shashwat Shah C2

**3. Domain of project:**

Machine Learning and Deep Learning

**4. Problem statement:**

Navigating complex indoor environments, such as corporate campuses, shopping malls, and large buildings, can be exceptionally challenging, particularly during emergencies when time and accurate guidance are critical. Even in non-emergency situations, individuals often struggle to locate specific destinations within these large and intricate spaces, such as meeting rooms, stores, or restrooms. The complexity of indoor layouts, inadequate signage, and the absence of natural landmarks exacerbate the difficulty of finding one’s way.

During emergencies, these challenges are magnified as the need for swift and precise navigation to the nearest emergency exits becomes paramount. Panic, confusion, and the urgency of the situation can lead to disorientation and delayed evacuations, potentially resulting in harmful or fatal outcomes. Existing navigation solutions often fall short in providing real-time, adaptive guidance tailored to the unique and dynamic nature of indoor environments. Additionally, they frequently lack accessibility features that are essential for individuals with visual, auditory, or physical impairments, further complicating safe and efficient navigation for all users.

To address these critical issues, we are developing an advanced indoor navigation system that leverages Augmented Reality (AR) technology to significantly enhance safety and ease of navigation. This innovative AR-based application assists users in quickly locating emergency exits and navigating through intricate indoor spaces with precision. The system employs voice control, offering an intuitive and hands-free user experience. Users can simply state their destination, and the app will guide them in real time using AR overlays that highlight pathways, emergency exits, and key points of interest.

**5. Research gaps identified**

In the realm of indoor navigation systems, several critical research gaps persist.

The absence of IoT integration represents a significant gap in leveraging real-time data updates to enhance user experience and system functionality.

Ensuring full accessibility for individuals with disabilities remains a crucial but underdeveloped area, requiring the establishment of inclusive design standards and features.

Furthermore, addressing the system's reliance on external factors such as Wi-Fi signal availability and device compatibility is essential to mitigate variability in positioning accuracy. Moreover, current indoor navigation technologies lack a focused approach to emergency response, particularly in providing real-time guidance to safety exits using Augmented Reality (AR) technology.

Lastly, automating the localization process of point clouds could streamline system setup and maintenance, potentially improving overall efficiency and usability.

**6. Objectives**

1. Enhancing Emergency Response: Developing real-time navigation capabilities that prioritize swift and accurate guidance to emergency exits during critical situations, minimizing confusion and ensuring timely evacuations.

2. Improving General Navigation: Enabling users to easily locate and navigate to specific destinations within complex indoor environments, such as meeting rooms, stores, and restrooms, addressing common navigation challenges in everyday scenarios.

3. Integrating AR Technology: Utilizing Augmented Reality (AR) to overlay digital information onto the physical environment, enhancing spatial awareness and providing intuitive visual guidance that adapts to real-time user needs.

4. Implementing Voice-Controlled Interface: Introduce voice control functionalities to enhance accessibility and user interaction, allowing users, including those with disabilities, to navigate hands-free and with ease.

**7. Unique contribution**

The unique contributions of our advanced indoor navigation system include:

1. Voice-Controlled Navigation: Enabling users to navigate hands-free by simply stating their destination, enhancing accessibility for all users, including those with disabilities. This feature reduces the cognitive load and physical interaction required to operate the navigation system, ensuring intuitive and seamless navigation in complex indoor environments.

2. Enhanced Safety Features: Integrating real-time safety features that prioritize emergency preparedness and response. The system provides immediate guidance to the nearest emergency exits during critical situations, minimizing panic and confusion while facilitating swift evacuations. AR overlays highlight safe routes, emergency exits, and potential hazards, enhancing user safety and security in indoor spaces.

**8. In–house/out–house project:**

It is an In-house project.