**SYNOPSIS**

**Project Title: AR Indoor Navigation App using VPS Technology**

1. **Introduction:**

In large indoor spaces such as shopping malls, hospitals, and universities, traditional GPS navigation fails due to weak satellite signals.

To overcome this, an Augmented Reality (AR) Indoor Navigation App using Visual Positioning System (VPS) technology can provide precise indoor positioning and real-time navigation. This project aims to develop an Android application that utilizes VPS, AR, and computer vision to help users navigate complex indoor environments efficiently.

1. **Objectives:**

* Develop an AR-based indoor navigation system.
* Use VPS technology to determine the user's position.
* Implement real-time AR navigation cues (arrows, markers).
* Provide a search feature for users to find locations inside buildings.
* Optimize the system

**3. Methodology:**

* Data Collection: Capture indoor environment images for VPS mapping.
* Feature Detection: Use computer vision to identify unique indoor landmarks.
* Navigation Path Mapping: Define paths and waypoints for navigation.
* AR Visualization: Display AR-based directional arrows and markers.
* Testing & Optimization: Ensure accurate location detection and improve performance.5.

4. **Technologies Used:**

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| **IDE for Development** | Android Studio |
| **Programming Language** | Kotlin/Java |
| **Augmented Reality (AR)** | Google ARCore |
| **Visual Positioning (VPS)** | Google VPS |
| **Computer Vision** | OpenCV |
| **Database** | Firebase (Free tier available) / SQLite (Completely Free) |
| **Cloud Storage** | Firebase Storage (Free tier) / Local Storage |
| **3D Models (Optional)** | Blender (Free) |

**5.Existing System**

**Description:**

* Most indoor navigation systems rely on **Wi-Fi, Bluetooth beacons, or QR codes** for positioning.
* Some systems use **manual maps and signage** for navigation.
* Traditional **GPS-based** navigation does not work well indoors due to weak satellite signals.

**Disadvantages**:

* **Limited Accuracy** – Wi-Fi and Bluetooth-based systems often have errors in positioning.
* **Requires Infrastructure Setup** – Installing Bluetooth beacons or Wi-Fi hotspots can be costly and maintenance-intensive.
* **Less Interactive** – Traditional maps and signs do not provide a real-time, immersive experience.

6. **Proposed System (AR Indoor Navigation using VPS)**

**Description:**

* Uses **Visual Positioning System (VPS)** for real-time indoor navigation.
* Implements **Augmented Reality (AR) cues**, such as arrows and markers, for navigation guidance.
* Uses **computer vision and machine learning** for feature recognition and accurate positioning.

**Advantages:**

* **High Accuracy** – VPS technology ensures precise positioning using real-world landmarks.
* **Interactive Navigation** – AR-based guidance enhances the user experience with real-time visual cues.
* **No Additional Infrastructure** – Does not rely on external beacons or Wi-Fi positioning.  
   Real-time Updates – Users can receive dynamic directions and location-based services.

**7**. **Conclusion:**

The proposed AR Indoor Navigation App will help users navigate indoor spaces with ease by combining VPS technology, AR, and computer vision.

This innovative solution aims to improve navigation in GPS-denied areas, offering a seamless and interactive user experience.

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