AI-Powered RFID Navigation Assistant for the Visually Impaired

Name:Navyashree N

EMPOWERING INDEPENDENT NAVIGATION WITH TECHNOLOGY

INTRODUCTION

•**Project Overview**:
This project aims to assist visually impaired individuals with navigation in unfamiliar
places like tourist locations. Using RFID technology, it provides real-time audio guidance
based on the user's location.
•**Problem Statement**:
Visually impaired individuals face significant challenges navigating unfamiliar locations, leading to
•dependency on others or limited mobility.

PROJECT MOTIVATION

- **Need for Assistive Technology**:
Visually impaired individuals require reliable tools to help them navigate independently.
- Difficulty navigating tourist spots or public areas.
- Limited access to real-time location-based assistance.
- **Solution Offered**:
A system that uses RFID tags to provide location-based audio alerts,
ensuring a safer and more independent navigation experience.

FEATURE OF THE SYSTEM

• **Real-Time Audio Alerts**:
Voice alerts delivered when an RFID tag is detected.

• **Portable RFID Reader**:
Lightweight and easy to carry; detects RFID tags placed at key locations.

• **Dynamic Updates**:
Cloud-based system to update RFID tag locations and content remotely.

• **Voice Interaction**:
Converts text-based information into spoken messages using a Text-to-Speech API.

TECHNOLOGY STACK

- **RFID Technology**:
Used for location-based detection of RFID tags.
- **Arduino**:
Microcontroller to interface with the RFID hardware.
- **Python**:
For logic processing, microcontroller programming, and text-to-speech conversion.
- **Cloud Connectivity**:
Dynamically update the RFID tag location and content mapping.

HOW IT WORKS

- **RFID Tags**:
Placed at various locations (e.g., tourist spots).
- **RFID Reader**:
Handheld device carried by the user to detect nearby RFID tags.
- **Arduino Integration**:
The Arduino reads and sends data from the RFID reader to the connected system.
- **Text-to-Speech**:
Converts location data into voice messages that guide the user.
- **Cloud Updates**:
The system can be updated via the cloud to ensure real-time, accurate data.

SOFTWARE SETUP

Install libraries: pyserial, pyttsx3, requests.
- **Arduino Code**:
    - Upload the provided code to the Arduino board for interfacing with the RFID reader.
- **Text-to-Speech API**:
    - Converts text-based location information to voice.
- **Cloud System**:
    - Allows dynamic updates to RFID tag locations and mapping.

USE CASE

•**User Interaction**:
The user walks through the area with the RFID reader.
•The RFID reader detects tags at various locations.
•Audio instructions are played to help the user understand their
 location and surroundings.
•**Real-World Scenario**:
•In a tourist area, the user can independently explore landmarks with
audible guidance on nearby points of interest.

FUTURE ENHANCEMENT

- **GPS Integration**:
Integrate GPS for improved location accuracy in larger areas like malls, airports, etc.
- **Machine Learning**:
Use ML for more interactive and adaptive navigation, with personalized routes.
- **Mobile App Integration**:
Implement a mobile application for seamless user experience.
- **Real-Time Data Analytics**:
Use data analytics to improve system performance and user interactions