Functional And Non-Functional Requirements

Najeeb Ur Rahman,Walaa Safadi,Aanal Raj Basaula,Constantin

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1 Purpose And Scope

Globally around One Percent of the human population is visually impaired from which ten Percent is fully blind. One of the obstacles of visual impairment is the limitation in navigation and mobility. Many tools already exist for such purposes. For instance outdoor GPS systems are available for usage. As well as traditional methods: a guide dog or a traditional cane. But these methods are not sufficient as they fail to solve the problem of local indoor navigation. The highly reliable GPS system does not provide indoor positioning in Politecnico di Torino. A cane has limitations in application. Thus what is needed is a reliable indoor positioning and navigation system to make it easier for the visually impaired to maneuver inside local facilities. MyGuide is a project aimed to help the visually impaired navigate inside Politecnico di Torino Campus. Our goal is to remove barriers, create solutions and expand possibilities to help users achieve their full potential as Polito members. MyGuide is a smart, flexible and easy-to-use indoor navigation system. It allows users to communicate their current location and the requested destination through voice commands. The feedback to the users is in the form of audio signals received through headsets combined with vibration commands delivered by a specialised walking cane. The walking cane is able to signal an incoming obstacle through vibrations.

2 Definitions

2.1 Glossary

2.1.1 User(s)
Visually Impaired Polito Members.

2.1.2 Environment
In actual practice, if, this product is to be launched, every hallway of Politecnico di Torino is a possible environment. But currently we are considering only smaller section of them for testing purposes.

2.1.3 Dead Ends
Any unexpected interruption on the route. Those interruptions include closed doors, hallways closed for maintenance.

2.1.4 Position of user
The proximity of the user in Polito Hallways.

2.1.5 End destination
Indicated by user from a list of different Polito rooms, bars, study rooms, library, and others. (to be defined more explicitly upon retrieval of Polito Map)

2.1.6 Priority of functional requirements
From 1 to 5 with decreasing priority.

2.2 Actors
System actors include direct users navigating the corridors of polito. MyGuide is to be implemented for the usage of the visually impaired with any degree of blindness.

3 System Requirements

3.1 Functional Requirements
Functional Area And Description

1. Navigation

2. Multi User System

3. Generating Best Route

4. User Preferences

FR 1.1: Detect Position
MyGuide should be able to detect continuously the current position of the user inside Politecnico di Torino hallways. **Priority No.1**

FR 1.2: Update Route
MyGuide is able to update the route (shortest) continuously according to detected position of user and dead ends. If encountered with a dead end the system can re-calibrate a new route to the end destination. **Priority No.1**

FR 1.2: Route Guidance
The mobile application communicates the route to the user through voice commands. It notifies of upcoming turns through hallways, doors, and upon arrival to end destination. Priority No.1

FR 3.1: Generating Route
According to the detected position of user inside a hallway and the specified end destination by the user (inputted as text or voice), the system generates a route between the 2 points according to the shortest path. **Priority No.1**

FR 4: Switch MyGuide Cane ON/OFF
User is able to activate/deactivate the vibrating cane anytime during the usage of the system depending on the personal preference of the user. **Priority No.1**

3.2 Non-Functional Requirements

1. Supporting Technologies
MyGuide implementation should be feasible using technologies that are accessible to the end-users. **Area : Usability**

2. Device Software Compatibility

The mobile interfaces must be compatible with Android. **Area : Portability**

3. Obstacle detection

The system allows for obstacle detection within the range of 1 meters. **Area : Space Efficiency**

4. Language

The language should be localized to the preference of the user. **Area : Delivery**

5. Time Response

MyGuide must perform in a proper time constraint that reflects average walking speed, motion and obstacles in the environment. **Area : Performance Efficiency**

6. Multi User System

MyGuide is able to consider the presence of more than one user in the same environment. All the features of the system should operate properly for all users.

Open Issue

1. The beacons do not tend to provide a steady reading of the distance. The data keeps fluctuating in every reading, making it difficult to exactly pinpoint the location of the person.
2. The obstacle detection system would also detect passerbies as obstacles.
3. Used moving average to smooth the fluctuating reading, but the system response time decreased.