Indoor Navigation System for Visually Impaired People

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Overall Project Goals and Specific Aims

Overall goal

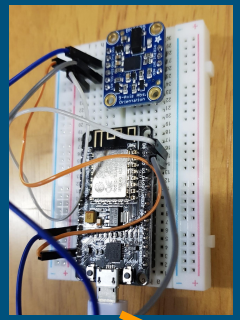
- Provide a voice command system to help blind people navigate in indoor locations

Specific aims

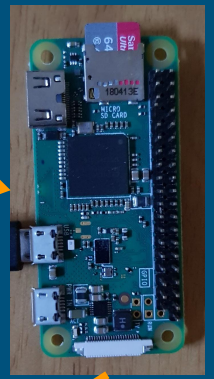
- Implementation of an Ultra-wideband (UWB) real time localization system
- Calculation of shortest path from user’s location to destination
- Android app with speech recognition and text to speech synthesis
- Usage of bluetooth beacons to improve upon accuracy of the system
- Integration of the three subsystems via communication protocols

Technical Approach

BNO055



MQTT broker



UWB anchors

MQTT

UWB tag

Bluetooth beacon

Android smartphone

- Speech recognizer
- Text to speech
- Beacon interface

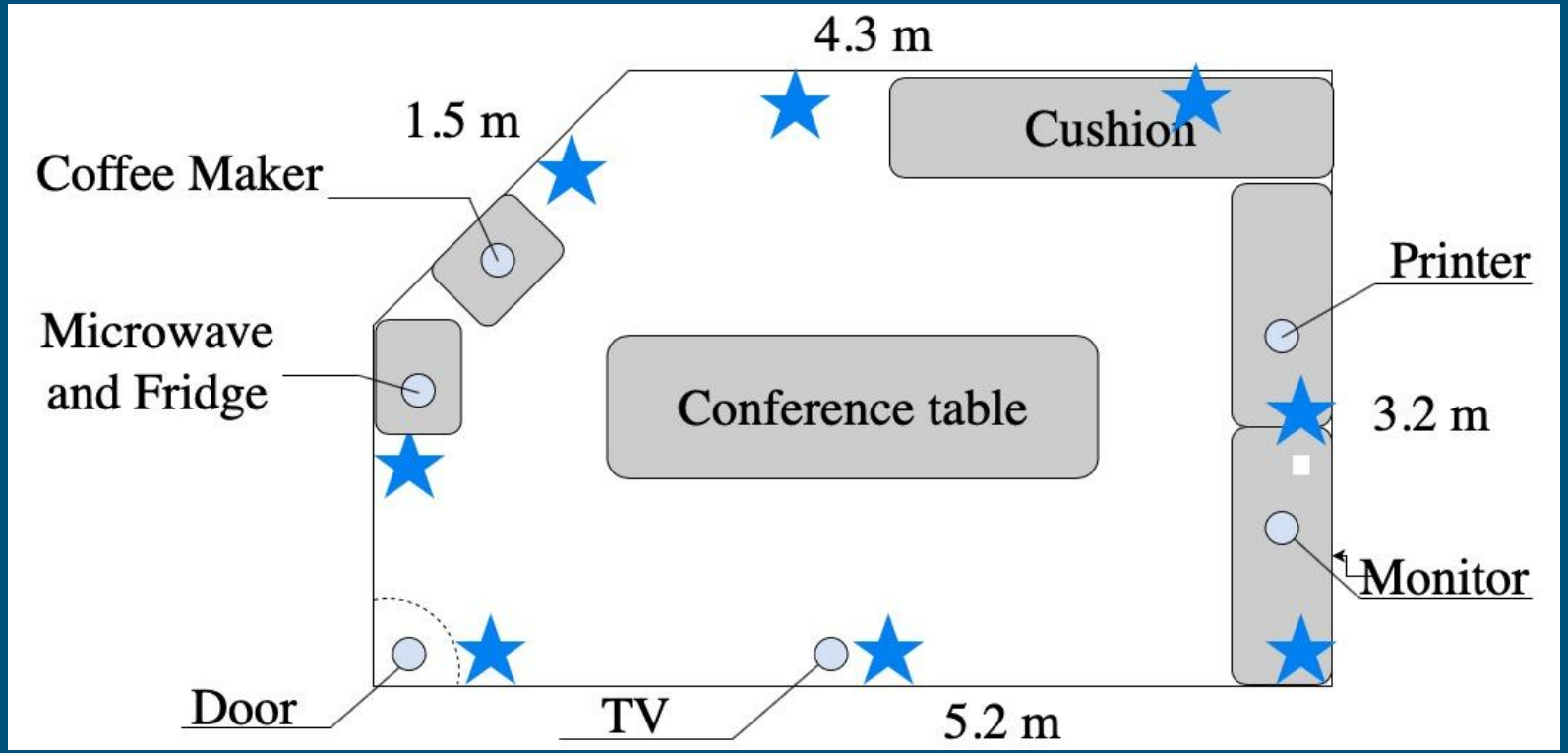
HTTP

Server

- Shortest path calculation (A*)

MQTT via WebSocket

Technical Approach- UWB Anchors' locations



Current Status and Next Steps

Current Status:

1. UWB real time location system with 20 cm error rate
2. App prototype with speech recognition, text to speech synthesis and beacon sensing
3. Shortest path algorithm coded
4. Communication with subsystems already implemented

Next Steps:

1. Adding E-sense earables
2. Make the tag wearable
3. Improve on the accuracy of the navigation algorithm
4. Fix pose estimation of orientation sensor
5. Keep testing the system

Demo

Midterm Demo

Pose Estimation Demo