Helping the Visually Impaired Map the Real World

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**Introduction**

The objective iGuide is to relieve the visually impaired of mobility issues in indoor environments. Such mobility issues include inability to explore new or infrequent environments due to confusion and unfamiliarity.

iGuide is an Unsighted Indoor Navigation System (UINS) that is developed on Android and communicates with Bluetooth Low Energy (BLE) Beacons to navigate users to their desired location. It requires BLE Beacons to be setup at fixed positions, forming a mesh of localized map for iGuide to navigate around.

The main interaction between iGuide and its users are through Text-to-Speech (TTS) and Speech-to-Text (STT).

- TTS is used to deliver navigational instruction
- STT is used to identify input of destination choice

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**How it works**

Finding the user’s initial position – Trilateration requires at least three known locations and their respective distances before it can be performed. This has to be ensured during setup of Beacons at the indoor location.

After trilateration – user location has been located, iGuide proceeds to request for a destination choice. Directions to the nearest beacon will then be conveyed to the user.

Thereafter, the navigation algorithm will guide the user beacon to beacon at the shortest available path, based on Dijkstra’s algorithm.

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To navigate the user, iGuide must know where the user is currently facing – the current orientation of the device.

A compass is implemented to obtain azimuth values by making use of the sensors available in Android:

- TYPE_GRAVITY
- TYPE_MAGNETIC_FIELD
- TYPE_ROTATION_VECTOR

This feature is heavily reliant on how the user is holding the device, and the accuracy of the sensors – checked programmatically to ensure that the sensors are at SENSOR_STATUS_ACCURACY_HIGH before commencing navigation.

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*This project is planned for submission to an ACM/IEEE conference on Human Computer Interaction*