Intersect-Assist

User and Installation Guide

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1. Introduction

1.1 Motivation

Intersect-Assist is an application built to enrich the abilities of members of the visually impaired community. Specifically, it's built with the purpose of assisting visually impaired individuals with the two of the main tasks required in intersection crossing:

- Mapping information regarding intersections.
- Traffic Light detection.

The motivation behind this system came to the team after they observed multiple members of the visually-impaired community as they navigated through intersections in the city of Montreal. As a result, the goal of this project is to provide these members with a sense of security and autonomy when crossing an intersection. We hope that this system can one day transcend the prototype phase and provide visually-impaired users with the ability to explore new cities or even areas.

1.2 Word of Caution

Although this application can greatly diminish the cognitive requirement of performing those tasks, it is very important that users still rely on their own skills in navigating through intersections.

2. Installation Instructions and Requirements

2.1 Hardware Requirements

To use the Intersect-Assist application, the requirements right now are the following:

- An Android Smartphone.
- A pair of headphones (preferably bone conduction for safety).
- A lanyard to hang the phone around the neck.
- A laptop to download the APK file.

2.2 Installation Instructions

1. Start by downloading the APK file on your laptop from source supplied in the document.
2. Connect your android smartphone to your laptop via usb. You may be prompted to either "Charge your phone" or "Connect it as a Media Device". Choose the latter.
3. Copy the APK file from your Download destination to a folder of your choice on your Android device.
4. Disconnect your phone and proceed to the folder you chose in the previous step on the phone.
5. Locate the APK file and tap it to begin the installation. Note that you may be required to modify your security settings to allow for installation of third-party applications.

2.3 Talkback Activation

As mentioned in the previous section, the Intersect-Assist application is built for the visually impaired community. As such, it is an absolute requirement for users to activate TalkBack (Voice Assistant) in their smartphone. To do so, please proceed to Applications -> Settings -> Accessibility -> Vision -> Voice Assistant and switch this option on. Once you've completed this step, you may start the application.

If you are not familiar with the Voice Assistant feature, don't worry. There are four main features you should know:

1. Single tap a button to obtain its name.
2. Double tap a button to select it.
3. Swipe right (or left) for the next (or previous) button on a given page.
4. Scroll through pages by swiping with 3 fingers right or left.

However, for the Intersect-Assist application, only the first 2 features will be necessary.

3. Navigating through the application

When the user enters the application, they are greeted with a page titled "Intersect Assist" which shows two buttons: "Mapping Information" and "Light Detection". These buttons are arranged in a vertical manner stacked one on top of the other. The top button is "Mapping Information" and the bottom one is "Light Detection".

3.1 Intersection Mapping Mode

When an intersection is reached, to obtain the intersection information, the user would press the "Mapping Information" button. This would provide the name of the streets in

that intersection, the configuration of the intersection and information about each street. This information is provided in a spatial manner. For example:

Audio from both ears to simulate information is spatially in front of the user.
"Intersection: St-Catherine and Guy, 4-way configuration."

Audio from the right ear only, indicating to the user that this relates to information from their right.
"St-Catherine is a one-way street, three lanes."

Audio from both ears to simulate the information is spatially in front of the user.
"Guy is a two-way street, four lanes."

If the user wishes to repeat the information which was provided, they simply have to press the "Mapping Information" button.

3.2 Light Detection Mode

When the user wishes to start the light detection system of the application, they should simply choose the "Light Detection" button in the page above. Once this button is clicked, the user is presented with a new page titled "Detection in Progress" which contains one button, titled "I'm Done", spanning the size of the page.

When the user enters this page, the application will check when the pedestrian light turns green. It is important to note that for this part of the application to work, the phone must be hung around the neck using a lanyard and the camera's field of vision must **not** be hindered.

As it awaits, the system will repeat the message “Waiting for light to turn green”. Once the light turns green, the system will output “The light is now green. You may cross when you feel safe.” This is when the user should cross the intersection. The user should activate the “I’m Done” button once they’ve finished crossing the intersection. This action will take the user back to the first page, titled “Intersect Assist”.