



Category: Mechanical and Aerospace

Student: Yeoh Keong Cheng

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School of Mechanical and Aerospace Engineering

Poster Title: Application and User Studies of Assistive Technologies for the Blind in Navigation

Supervisor: Asst Prof Li King Ho Holden

Collaborators*: Dr Zhang Li, Mansiu Tse, Muthupillai Jayaraj Muthukumae

Problem

Visually impaired persons usually face inconvenience in getting from one place to another. Current methods like the white cane is limited in addressing their needs. This projects aim to **create an assistive device to further enhance their navigation capabilities.**

Project Overview

This project revolves around **micro-controller coordination** to employ various sensors and actuators for device-aided navigation.

Object detection, recognition and GPS tracking will be the focus of the assistance.

Variables

Object Detection	GPS	Object Recognition
Different objects placed at varying distance to test precision and sensitivity of prototype	GPS module tested in varying outdoor locations for precision	Success rate of identifying various objects using camera module

Main Hardware Components

- Particle Photon Micro-Controller

Chosen for its **compact size** and **user friendly** interface.

- HC-SR04v2 Ultrasonic Module

Suitable range of up to **400cm**, Easy to integrate.

- Adafruit Ultimate GPS

Compact and **low power consumption**. Also has up to **66 channels** for increase position accuracy.



Figure 1:
Conventional White Cane



Figure 2: Prototype on Roller Cane

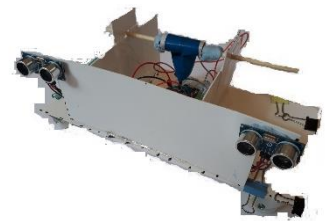


Figure 3: Ultrasonic Module Prototype

Procedure

HC-SR04 continuously sends ultrasound to sense for object.

- Depending on object position, either 1 or both sensor will detect at varying distance.

Object's distance approximated through algorithms, and audio prompt is given .

User able to switch between **2 different mode** for situation optimization (indoor vs outdoor)

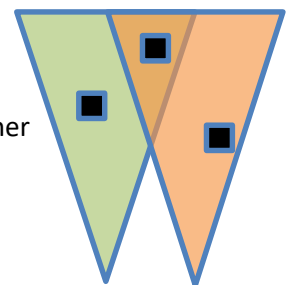


Figure 4: Dual Sensor System