

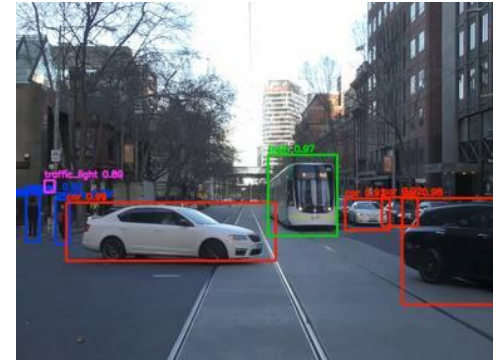
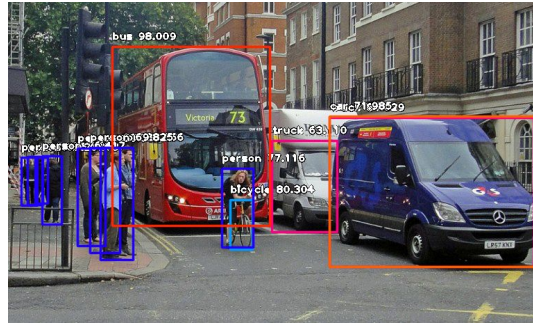
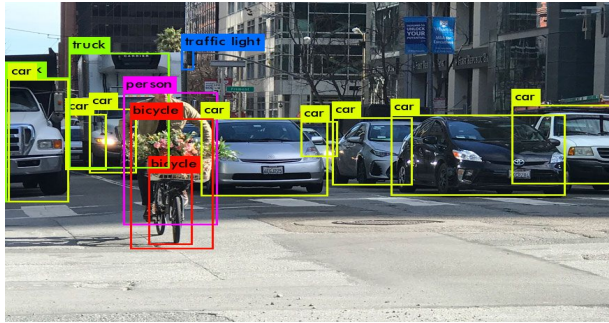
Smart Hat

60090021 Nipat Lampisan

61090041 Titivat Auetumrongsawat

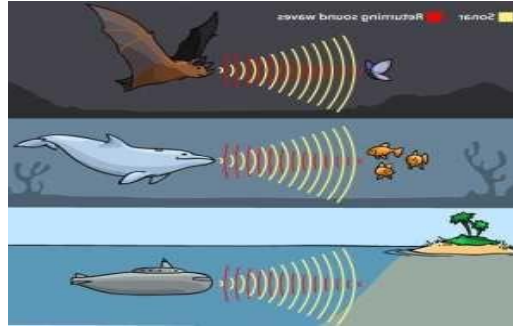
Main Features part A

Part A: Object detection: to detect object with pi camera then tell it in voice. The object that this program detect the important thing like stop sign, car, toilet and other transportation. The reason that program detecting this object because this transportation may be coming to toward blind so they would know how to react like to that transportation like to avoid the transportation or to walk in like a bus.



Main Features part B

Part B: Instead of using a camera to sense the surroundings like in Part A, we use various sensors. The ultrasonic sensor is better at measuring distance than a camera, so we use it to caution the blind person if there is an obstacle near the person's head. The wifi sensor is used to scan the surrounding area for coffee shops and restaurants. This is so that the user does not have to spin around in every direction for the camera to detect everything. The panic button and led blinking for traveling at night are extra features that are useful for people without sight.

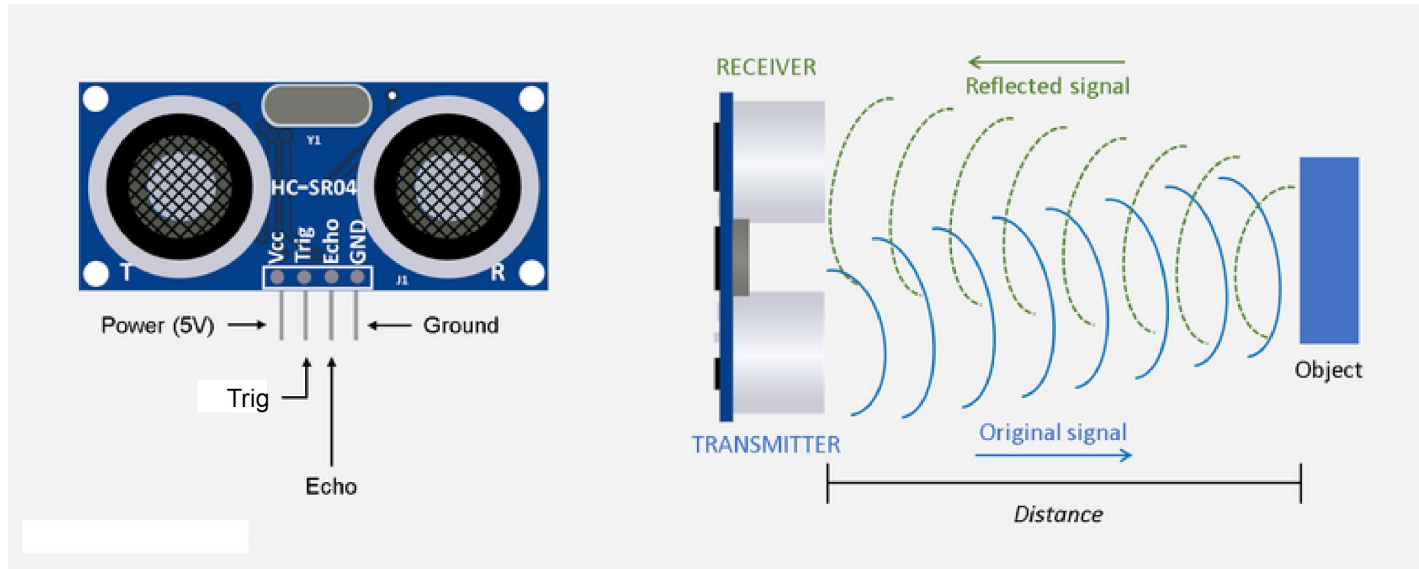


Main Features (Part B)



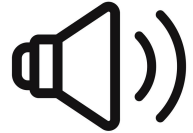
Ultrasonic sensor

- Outputs the word “danger” to speaker if distance is less than 5 cm
- Has the highest priority will interrupt any other messages to speaker



Wifi Coffee Shop/Restaurant Scanner

- On button press, scans the area for wifi signals
- Outputs the names to the speaker, lower priority than distance sensor

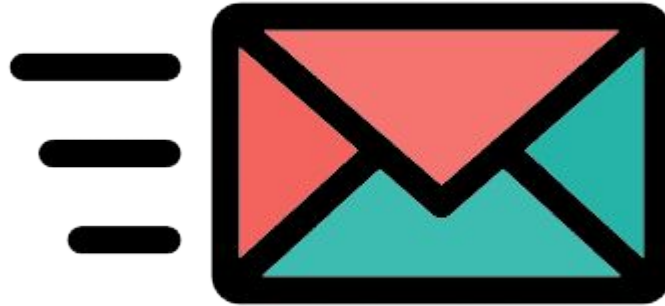


Wifi/bluetooth
antenna



Panic Button

- Sends an email to emergency contact on the push of a button
- For when the user is in need of medical assistance or is in danger



Background/Theory/Technology

-HardWare:

Pi camera

Ultrasonic sensor

Joystick

LED

Raspberry Pi 2,3

-Software:

Tensorflow

OpenCV

Espeak

Edev

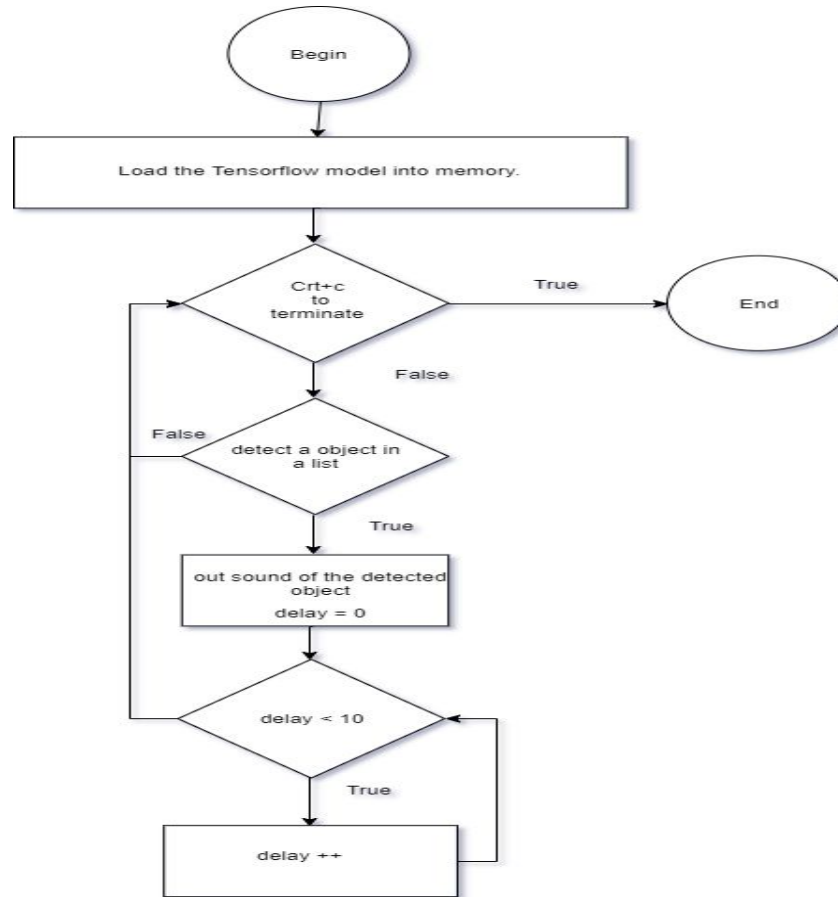
wiringPi

-Language:

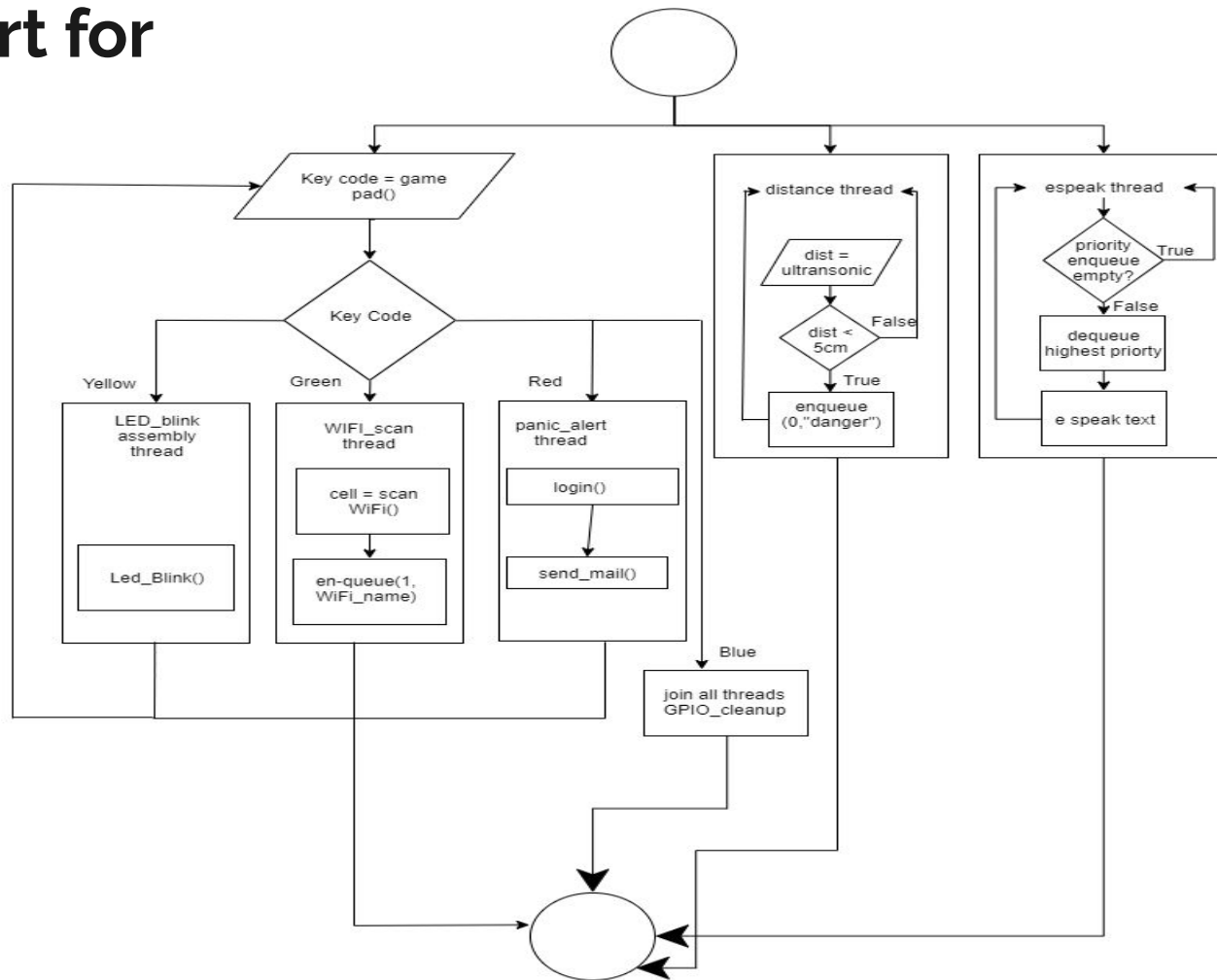
Python

Assembly

Flow Chart for Part A



Flow Chart for Part B



Experiment Results(Part A)

First I started of with using TensorFlow to perform object detection during Picamera capturing image. It perfectly fine but very slow in detecting object.

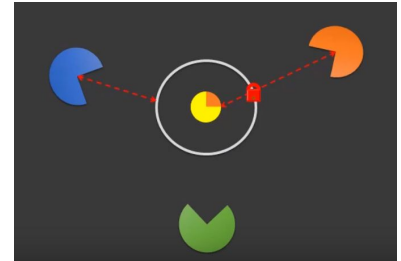
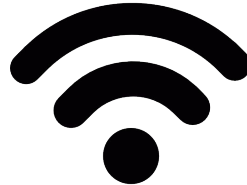
Then I try to make the objectectation faster by creating my own model with end up no working and I can not create model with the same number of detection on object as the old model , so I end up using the same model.

The code perform by loading Tensorflow model in to memory then Pi camera capture image for the tensorflow model to perform detection then check in the dic on what should be the sound output and delay when it detect thing in the dic

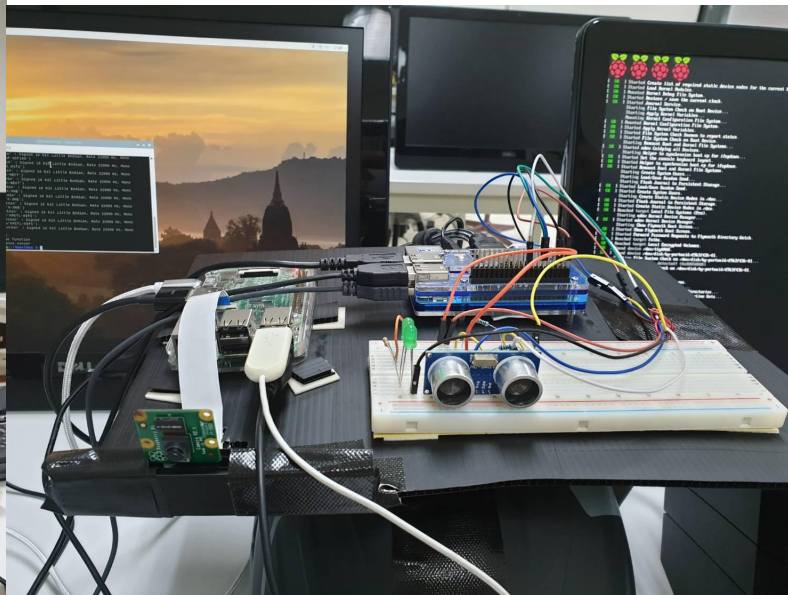
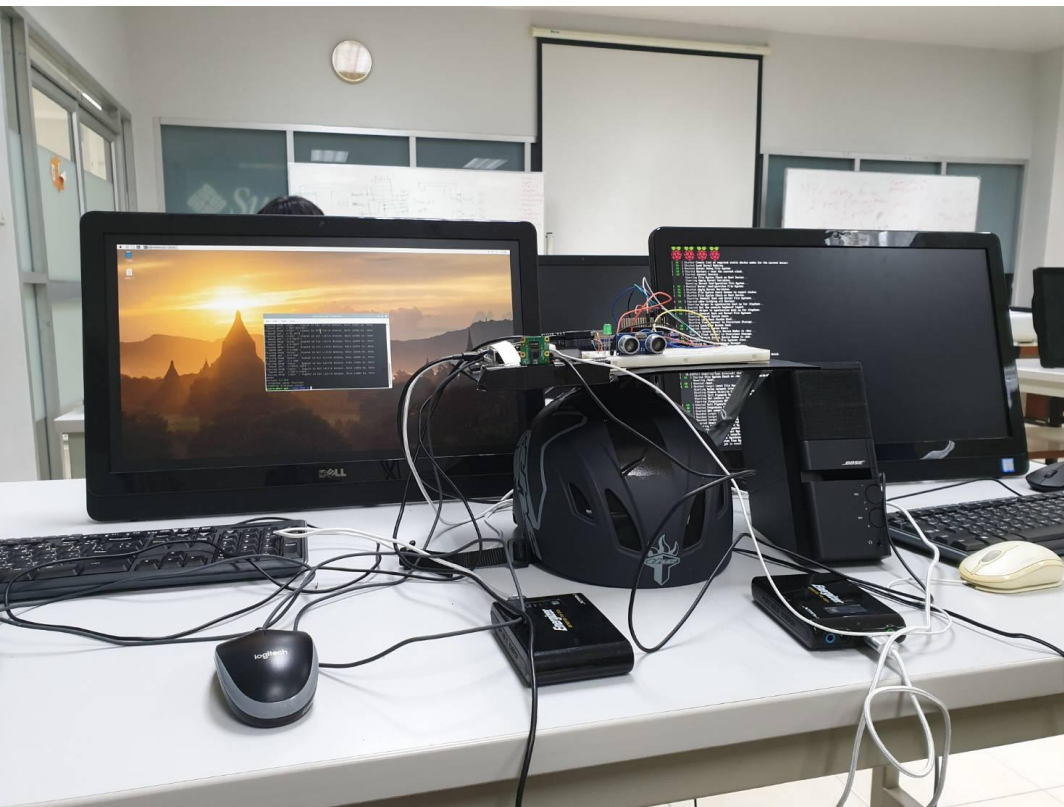
It work as it should be as a objectation, but it perform very slowly around 10 second until it can detect something.

Experiment Results (Part B)

- Ultrasonic sensor was only accurate to around 1 meter, and it can be affected by surrounding noises
- Range limitations to wifi scanning, and sometimes there is too many signals
- Due to use of threading, some threads do not terminate when the program attempts to halt
- In this project we used shared memory parallelism, instead of using locks and semaphores, I found it easier to use a priority queue to enforce synchronization and prioritization
- Panic button email notification takes a long time to process since it needs to create a connection to the gmail server



Photos



Conclusion

- Implemented features will aid blind people in avoiding the most dangerous of obstacles and objects in the real world
- Pi Camera will help detect dangerous things such as cars and knives while ultrasonic sensor will help detect ceilings and wirings that could hit a person's head
- Visually impaired can also sense in a more immediate way through the wifi scanner and they can rest easy knowing that if they are in danger they can always press the panic button
- In the future we hope to improve the accuracy and the delay time of our sensors and add on more features to our project



Youtube Video

<https://www.youtube.com/watch?v=S7z6a-B9tAc&feature=youtu.be>