Opticle: Guided Vision for the Visually Impaired

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Introduction

Problem: Visual impairment impacts millions of people around the world every year.

Focus: Creating a supplementary device for visually impaired individuals that uses haptic feedback to alert the user of immediate obstacles and auditory output to guide the user.

Goal: A wearable solution for visually impaired individuals to feel more confident navigating their environment.

Immediate Obstacle Detection
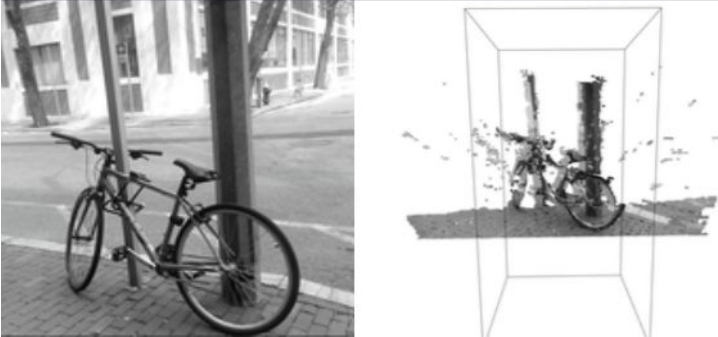
Results & Conclusions

- Successfully detects immediate obstacles within a 2m x 1m x 1.7m region of space in front of the user.
- Promptly alerts user of immediate obstacles using haptic feedback.
- Successfully detects objects of interest and provides directions to detected object
- Provide directions at distance intervals based on highest confidence detection and median depth over previous second
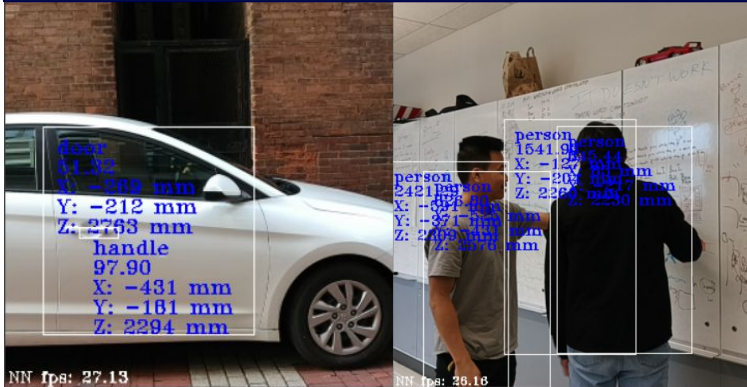- Device is portable and can function up to 90 minutes

Acknowledgements

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Logic Flow Diagram
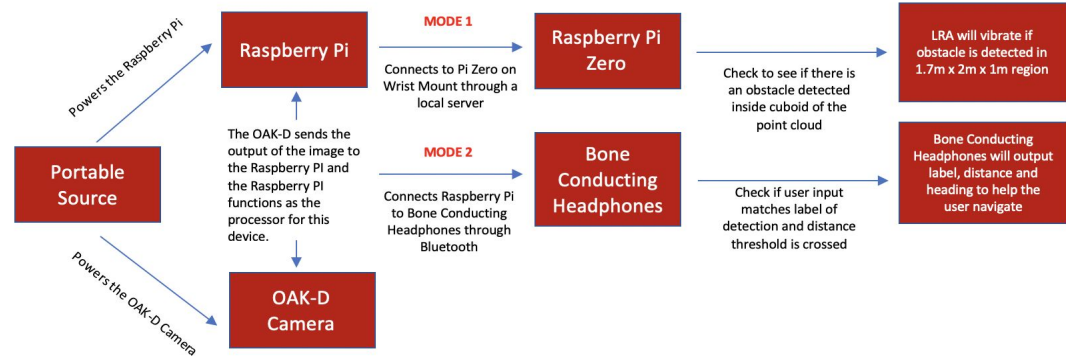
Guidance to Objects of Interest

Tools Utilized

- Python
- Depth AI
- Open3D
- OpenCV
- Google gTTS
- mpg123 audio player
- TCP/IP
- RaspberryPi (4, Zero)
- Speech Recognition
- Onshape (CAD)

Future Work

- Retraining model to improve accuracy and reliability of object detection
- Identification of cars via make/model
- Improving product design (e.g. more compact, smaller wrist mount)
- Improving instructions given to the user via headphones
- Making device weather resistance/waterproof
- User Control (e.g. vibration intensity)