Magic Sleeve

by Visions without Collisions

Team Members: Crystal Lai, Lindsay Barnhart, Thomas Dolan, Stuart Dorff
Project Advisors: Pooria M. Yaghini

November 16, 2018

Background/Purpose

According to the World Health Organization, nearly 1.3 billion people in the world suffer from some form of vision impairment. One of largest challenges that visually impaired people face is navigating the outside world. They are prone to many accidents, and our ever changing world makes its harder for people with vision impairment to be certain that their next step is safe. Our project goal is create a device that allows those with vision impairment better navigate through life.

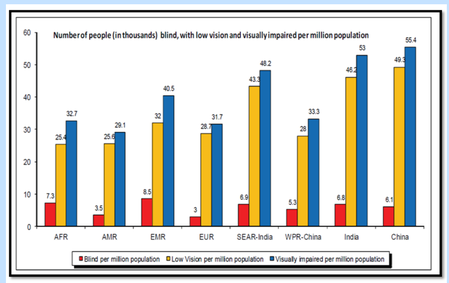


Figure 1: Statistics on Vision Impairment

Materials

- Sensors and Wires
- Vibration Motors
- Bluetooth Module
- Arduino
- Raspberry Pi
- Two cameras
- Sleeve
- Electronics Demo Space

Figure 2: Raspberry Pi with two Camera Module ports

Process

Vibration Motors	For the vibration motors, our ideal size 10-15mm and the greatest sensitivity for vibrations on human skin is 120-220 Hz.We will make a grid on the forearm where each motor can turn on and off independently
Raspberry Pi Microcontroller	For the Raspberry Pi microcontroller, we decided on the compute module 3 and compute module IO board. We are using machine vision to read the input from the two Raspberry Pi cameras. Then we will calculate depth using the camera angle and the distance to the side of the screen. Dividing the triangulated 3D space to a 2D matrix represents the motor's grid
Arduino	Once the environment is mapped to a 2D area, the Raspberry Pi will communicate with the Arduino Mega to turn on the correct motors using a Bluetooth Module.

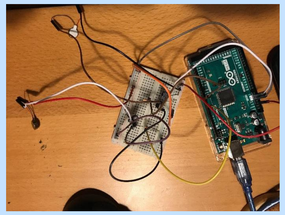


Figure 3: Testing of Vibration Motors

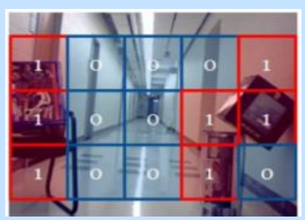


Figure 4: Example of the mapping of the depth based on calculations

Timeline

Completed Tasks:

- ❖Week 1-2: Finalize project idea and components
- ❖Week 3-5: Order parts, test motors and Raspberry Pi
- ❖Week 6: Order all parts and begin creating protection circuit

Future Tasks:

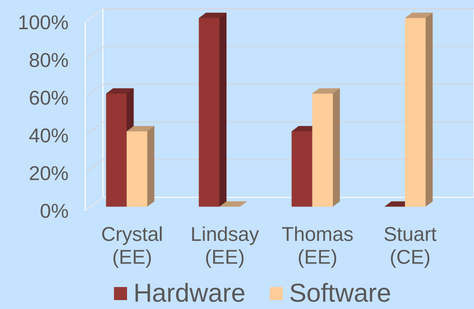
First Quarter

- ❖Week 7-10: Begin coding and development

Second Quarter

- ❖Week 1-2: Testing & Documentation
- ❖Week 3-4: Debugging software and hardware
- ❖Week 5-9: Recording and Editing Video Tutorials
- ❖Week 10: Finalize documentation & presentation

Responsibilities



References

Bills, Cooper, et al. "Vision-Based Obstacle Detection and Avoidance." *Vision-Based Obstacle Detection and Avoidance*, pdfs.semanticscholar.org/afb1/81d8ffa99d2f381edc40a165013ad669a9b0.pdf.

Yasir Dawood Salman, Ku Ruhana Ku-Mahamud, & Eiji Kamioka. (2017). Distance measurement for self-driving cars using stereo camera in Zulikha, J. & N. H. Zakaria (Eds.), Proceedings of the 6th International Conference of Computing & Informatics (pp 235-242). Sintok: School of Computing.

UCI Samueli School of Engineering | Department of Electrical Engineering and Computer Science