Magic Sleeve
by Visions Without Collisions

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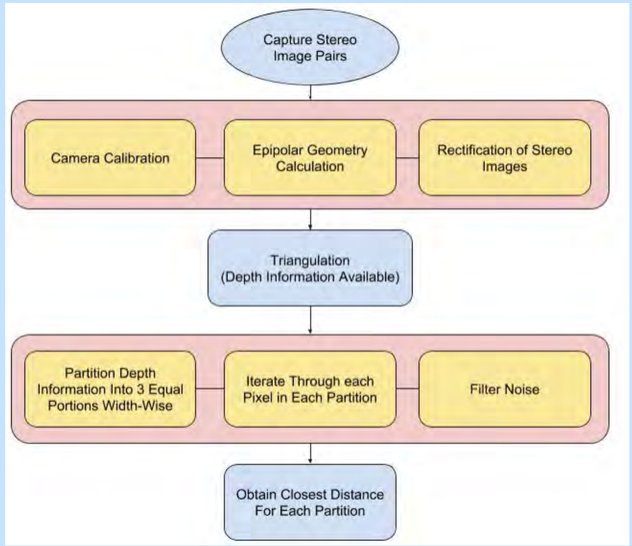
Abstract

One of the largest challenges that the visually impaired face is maneuvering through their environment. Our goal was to create a device that allows those with vision impairment to better navigate their surroundings. We used computer vision to analyze depth, then relayed this information to the user via vibration motors on a sleeve.

Distance Algorithm Flow Chart



How the Magic Sleeve Works

- Intel Realsense Camera attached to Raspberry Pi 3B via USB 2.0 (Figure 1)
- Depth information is partitioned into 3 sections, equal in width and height
  - Closest object in each subsection is found, then sent to matrix of motors

Figure 1: *Raspberry PI and Intel Realsense Camera, used for collecting and processing depth data*

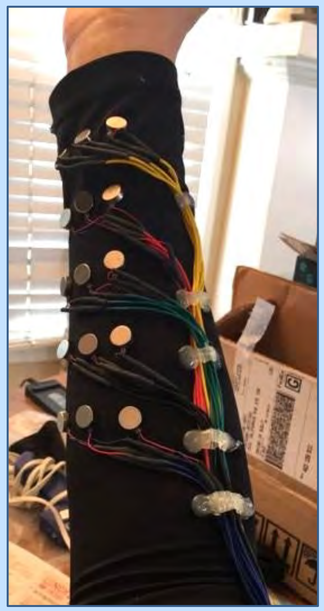


Figure 2: *Magic Sleeve*

- The Pi sends depth data to motors via its GPIO pins
- 15 Motors are connected to demultiplexers to reduce the amount of wires
- Each motor represents approximately 2 feet in the real world.
  - The Magic Sleeve (Figure 2) gives depth information 3 feet to the user's sides and 15 feet ahead of them

Figure 3: *Depth algorithm color mapping where red represents farther distances and blue, closer*

Conclusion

Through our efforts, we were able to create a prototype of the Magic Sleeve that calculates the distance of objects closest to the camera and relays this information to the user through vibration motors.

We plan to make further progress on the sleeve in the future. Some ideas are different modes to communicate information regarding sidewalks and stairs to the user and creating a voice controlled app.

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.