Digital Guide Dog

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Problem Statement



There are about 10 million visually impaired people in the US. It always hard for them to go outside to fit in the world with all the inconveniences. They usually go out with guide dogs, but it's not easy to train a dog to be a qualified dog. It might cost more than 48,000 dollars for training a guide dog. In this project, we would like to create a system called "Digital Guide Dog" to offer them an easier way to avoid hitting any obstacles in a path.



Outcome at this point

Field test in front of the Marston Hall









Depth Data Quality Evaluation

Test object: standard soccer ball diameter: 9" Tools: Tape measure





Software Design Framework





Block Diagram **Power Source** Camera 2 Balancer Camera 2 UART Raspberry Pi WIFI Hardwired Monitor(Testing Vibrator purpose)



Design: Microcontroller

Raspberry Pi 4

- 1. Easily programmable for sensors
- 2. More inputs and interfaces can be reserved for later sensor feedback control





Design: Sensor Camera

- The D435 sensor include two industrial cameras, one IR projector and RGB module
- 2. It has a wider field of view, enabling applications such as robotic navigation and object recognition.
- 3. Good capture rate for fast moving objects.





Hardware Specification Table - Cameras

Features	Use Environment	Maximum Range
	Indoor/Outdoor	Approx. 10 meters. Accuracy varies depending
	Image Sensor Technology 3μm x 3μm pixel size	on calibration, scene, and lighting condition.
Depth	Depth Field of View (FOV): Approx. 90° x 60° x 95°	
Components	Camera Module: Intel RealSense D430 + RGB Camera	
Physical	Length x Depth x Height 90 mm x 25mm x 25mm	Connectors: USB-C

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Gantt Chart





Breakdown of Tasks

- Hui Sun: hardware engineer
- He Zhang: software engineer generated the depth film
- Dongxun Sun: software engineer, data analyst



Issues

The depth video needs to have better fluidity





Solution Design - Wearable





Budget

- Raspberry Pi 4 Model B & SD Card: \$98
- Intel RealSense D435: \$180
- IMU Sensor: \$22
- Others: \$30
- Totally: \$330



Future work

- Using machine learning technique to analyse data gathered from camera
- Getting the vibrator ready for field test
- Change the power source from outlet to power bank
- Improve the performance of the deepth film to make it more fluid
- Make the device wearable



Team Website



Team



Prof. Christopher V. Hollot

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Gudants randow in Electrical and Computer angiovering experient graduate in May 1200. Weising as the project manager and data analysis in hits project including cleaning data, data analysis and product passible objects in the path string machine learning. In the machine, and appropriate macage maintain the entry project on the right rank, make mere every task. In failuded on time, communicate with the advice and keep May updated the wheele min. I have a strong interest in the development of single obje microcomputer, I ang good at the development of somer and control synthese and system is chosed of the based on the densers of things, Manity me commercian and event the thingging of the complexel planning the interface of the memory characterist during tigs of the compresent planning control theory of the

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debugging in the later stage.

Graduate students in ECE, expected to graduate in May 2020, Working as the software engineer, responsible for implementing the software architecture and algorithms

used in this project.

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The Project of Digital Guide Dog

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How much does a guide dog cost?

The cost to put one guide dog team – as our guide dog recipients and their guide dogs are known – into service is \$48,000. That cost include the breeding, raising, and training of the dog, instruction for the guide dog user, and instruction for the guide dog team.



Thanks for your attention