Digital Guide Dog

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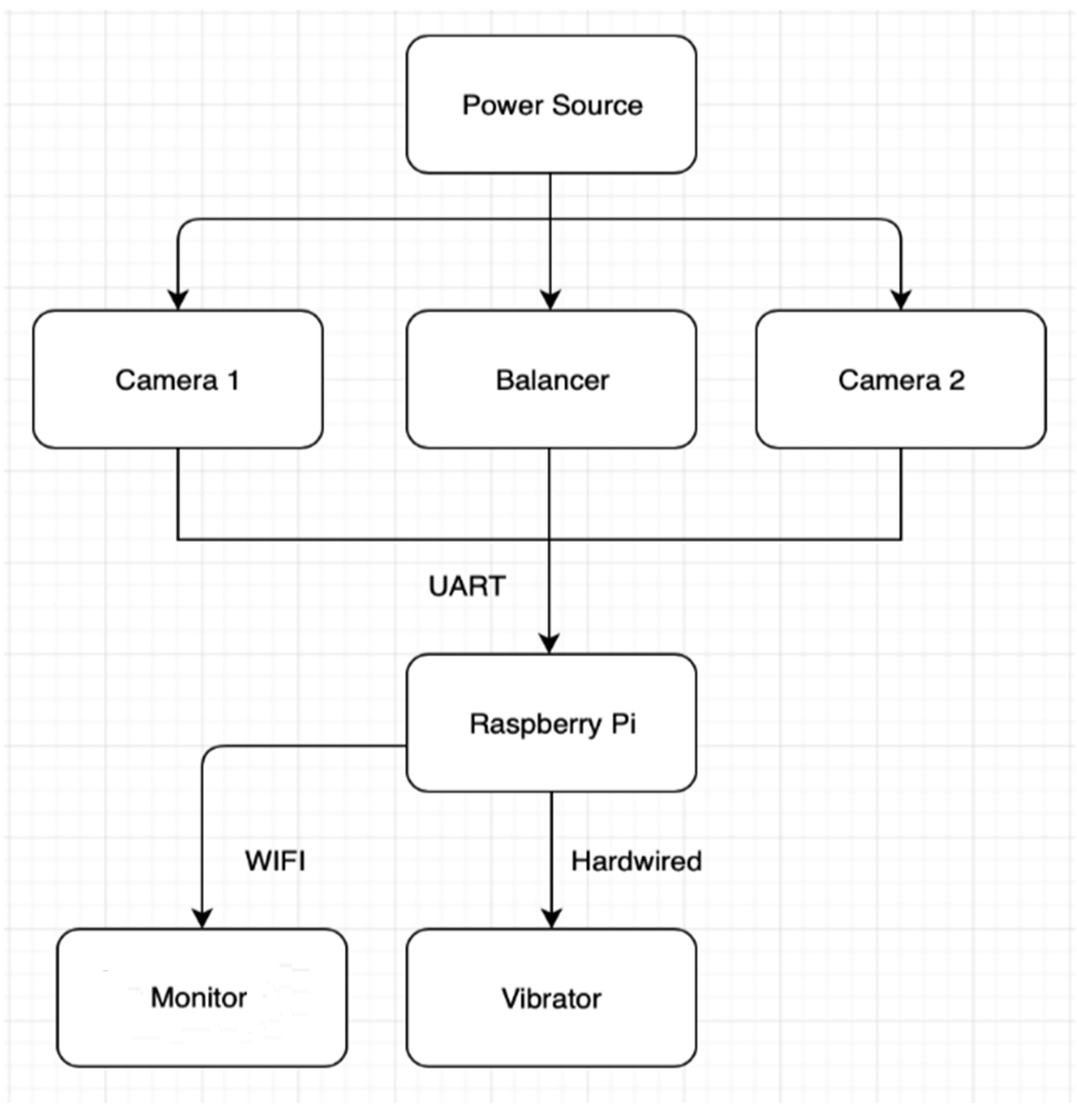
Abstract

There are about 10 million visually impaired people in the US. It is difficult for them to navigate obstacles in their way. We introduce Digital Guide Dog to help impaired people sense obstacles in front of them, giving them a chance to enjoy the world around them. The system consists of two main components: a small wearable device that detects the distance to obstacles and software that processes the information.

Block Diagram

Our solution (DGD) is a small wearable device. The device is worn on a belt on the user's waist.

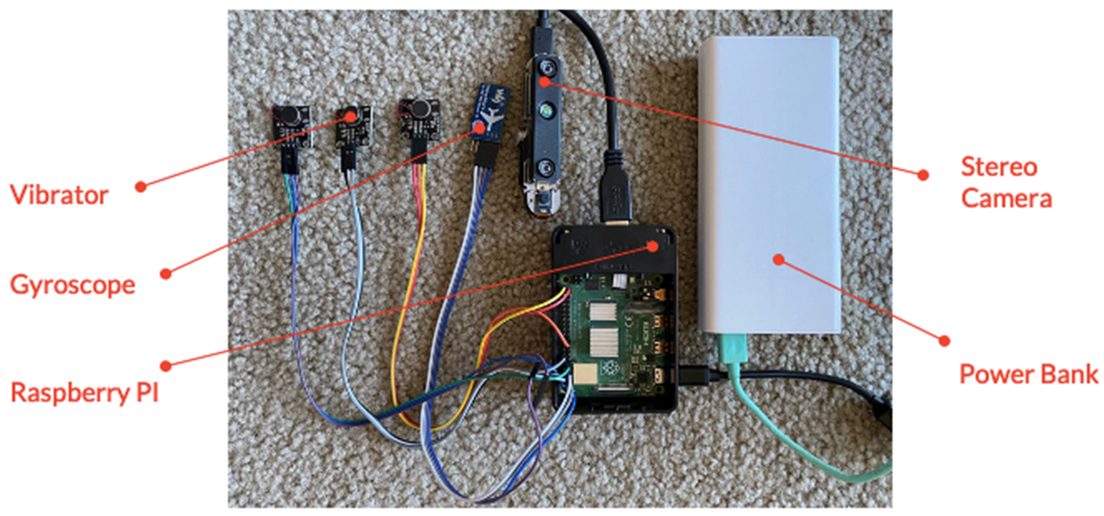
- **Cameras on the front of the unit collect video and send it to a Raspberry Pi for obstacle distance analysis.**
- **The frequency of a vibration sensor increases with the distance of the obstacle.**
- **Once cameras are placed in wrong positions and detected by the IMU sensor, the obstacle distance calculation fails and triggers the alarm.**



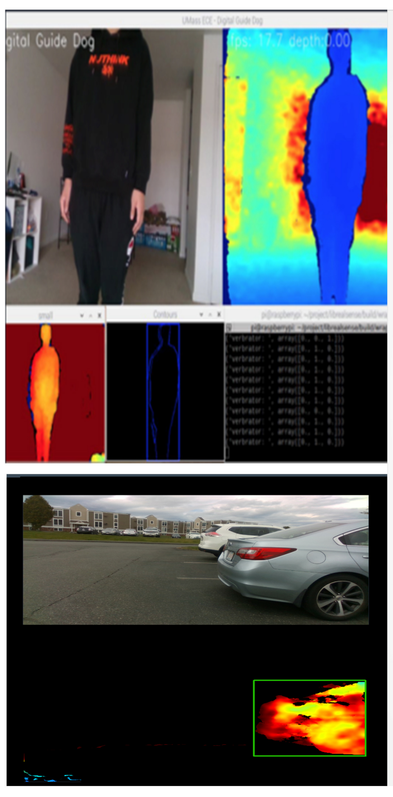
Specifications

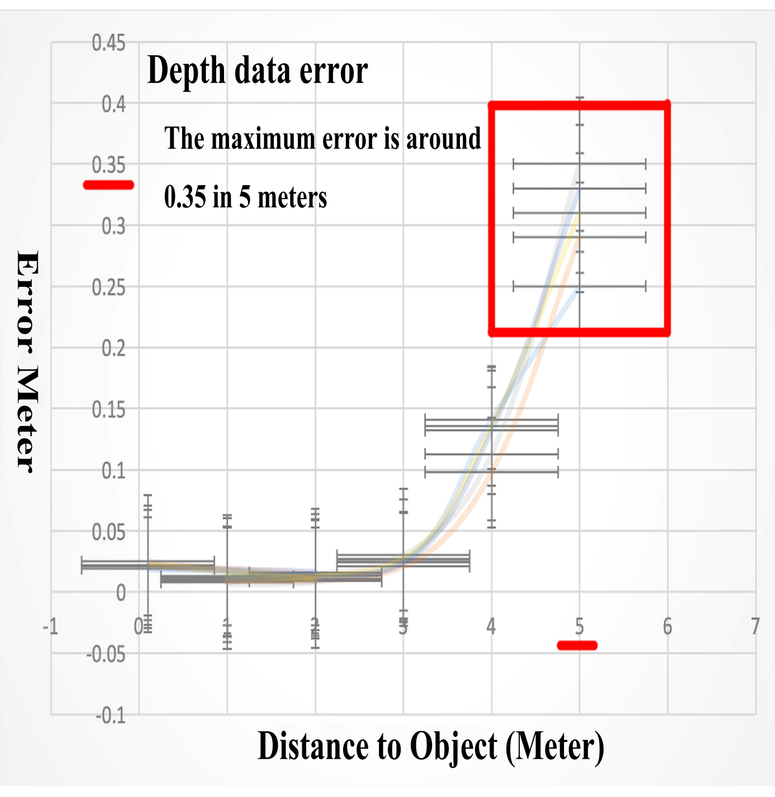
Features	Use Environment	Maximum Range
	Indoor/Outdoor	Approx. 10 meters. (accuracy depends on calibration, scene, and lighting)
	Image Sensor Technology	
	3μm x 3μm pixel size	
Depth	**Depth Field of View (FOV):**	
	Approx. 90° x 60° x 95°	
Components	**Camera Moudle:**	IMU Sensor
	Intel RealSense D430 RGB Camera	3 Vibration Sensors
Physical	**Length x Depth x Height**	**Power**
	90 mm x 25 mm x 25 mm	5V, 2A

System Overview



Results





DGD can sense the distance of obstacles in real time. The frequency of the vibration sensor varies with the distance of the obstacles.