

Design and implementation of Third EYE for the Blind People By using Optical Character Recognition in Raspberry Pi Microcontroller

Sayan Ghosh¹

Aryan²

Mr.M.Karthikeyan³

¹and ²Student, Department of Computer Science and Engineering

³Assistant Professor, Department of Computer Science and Engineering

SRM Institute of Science and Technology

Kattankulathur

Abstract: Incapacity is the condition of an individual wherein one needs to rely upon others for their own necessities. Visual weakness is one of the handicaps of a person. To date various techniques had been proposed to improve the way of life of outwardly hindered and dazzle individuals. As yet buying items in the grocery store without others uphold is precarious one for them. We propose a camera-based assistive content perusing structure to help dazzle people advertisement text names and item bundling from hand-held articles in their everyday lives. To confine the article from jumbled foundations or other encompassing items in the camera see, we rest propose an antiquated and dynamic movement based strategy to eat a region of interest (ROI) in the video by requesting that the client shake the object. The sound guidelines will help them inside the grocery store dependent on the continuous situations. The extreme point of this framework is to dispose of others uphold for outwardly disabled individuals in shopping and give them an advantageous and modern environment. On executing this framework, it encourages the visually impaired individuals shopping, save the client's time and advances business sales. We investigate UI issues, and evaluate strength of the calculation in extricating and perusing text from objects with complex foundations. In this Shopping streetcar innovation to distinguish the item positioned because of AI and precision area discover him.

Keywords: Audio Instructions, Ultrasonic Sensor, Webcam, Raspberry pi.

1. INTRODUCTION

1.1 What Is Visual Impairment?

Visual debilitation, otherwise called vision hindrance or vision misfortune, is a diminished capacity to see to some extent that causes issues not fixable by regular methods, like glasses. Some likewise incorporate the individuals who have a diminished capacity to see since they don't approach glasses or contact focal points. Visual weakness is regularly characterized as a best amended visual sharpness of more regrettable than one or the other 20/40 or 20/60. The term visual deficiency is utilized for complete or almost complete vision misfortune. Visual inability may cause issues with conventional consistently works out, for instance, scrutinizing and walking around flexible getting ready and gear. The most typical explanations behind visual shortcoming from one side of the planet to the other are uncorrected refractive mistakes (43%), waterfalls (33%), and glaucoma (2%). Refractive blunders incorporate partial blindness, far-sightedness, Presbyopia, and Astigmatism. Waterfalls are the most well-known reason for visual impairment. Various issues that may cause visual issues fuse age-related macular degeneration, diabetic retinopathy, corneal obfuscating, youth visual deficiency, and various diseases. Visual shortcoming can in like manner be achieved by issues in the mind because of stroke, untimely birth, or injury, among others. These cases are known as cortical visual impedance. Assessing for vision issues in youths may improve future vision and informational achievement. Screening adults without indications is of problematic benefit. Examination is by an eye test.

1.2 How a Person Can Be Termed As “Blind”?

Visual deficiency is an inherent and pediatric eye infection described by expanded pressing factor inside the eye or intraocular pressure (IOP). It causes visual field misfortune just as cuts off the optic nerve. Early finding and treatment of glaucoma in patients is basic since glaucoma is set off by vague degrees of IOP. Additionally, another test in precisely diagnosing glaucoma is that the illness has four causes:

- 1) Inflammatory Ocular Hypertension Syndrome (IOHS)
- 2) Extreme verities angle closure
- 3) Corticosteroid-induced
- 4) A heterogenous component related with primary change and persistent aggravation.

Furthermore, regularly pediatric glaucoma varies enormously in cause and the executives from the glaucoma created by grown-ups. Right now, the best indication of pediatric glaucoma is an IOP of 21 mm Hg or more noteworthy present inside a youngster. Quite possibly the most well-known reasons for pediatric glaucoma is waterfall evacuation medical procedure, which prompts an occurrence pace of about 12.2% among babies and 58.7% among 10-year-olds.

1.3 Common Impairment Scenarios:

One of the principle factors keeping individuals with visual impedances from taking part in the public eye and being free is the difficulty associated with strolling starting with one spot then onto the next independent. To travel autonomously, they should constantly refresh their direction and position to find their way and keep away from snags and risks. This can be upsetting and risky, and can increment attentional burden, particularly in new territories. Direction and versatility are fundamental segments of this usefulness.

2. LITERATURE SURVEY

2.1 Related work

2.1.1 E. Cardillo, V. Di Mattia, G. Manfredi, P. Russo, A. De Leo, A. Caddemi, G. Cerri "An Electromagnetic Sensor Prototype to Assist Visually Impaired and Blind People in Autonomous Walking", Journal, 2018.

The electromagnetic sensor to help the independent strolling of outwardly debilitated and dazzle client. It is realized that individuals influenced by visual sicknesses typically stroll by white stick. The microwave radar on the customary white stick making mindful the client about the presence of an impediment in a more extensive and more secure reach. The current Electronic Travel Aids gadgets shows better execution, commotion resistance and decreased measurements. Latest advancements of this examination are introduced, the scaling down of circuit board and radio wires.

2.1.2 Mrs. Shilpa Reddy K, Mounika S.k, Pooja K, Sahana N "Text to Speech for the Visually Impaired", Journal, 2017.

An assistive substance scrutinizing framework to assist ostensibly hindered individuals with examining works from various inquiries in their step by step lives. Pre-taking care of fuses steps like dull scale and binarization, question of interest affirmation. The usage of OTSU figuring to change over the faint scale picture into binarized one. The content areas from the got picture are then isolated and seen by using optical character affirmation programming (OCR). The rule estimation in OCR to be explicit MODI is

<http://annalsofrscb.ro>

used here. This removed substance of various literary styles and sizes at that point can be seen autonomously and a short time later united in a word giving its yield as sound using Text-to-talk using the SAPI libraries.

2.1.3 Mallapa D. Gurav¹, Shruti S. Salimath, Shruti B. Hatti, Vijayalaxmi I. Byakod, Shivaleela Kanade “A Reading aid for the Blind People using OCR and Open CV” *Journal* 2017.

Optical character affirmation (OCR) is the ID of printed characters using photoelectric devices and PC programming. It converts pictures of composed or printed text into machine encoded text are changed over into sound yield. OCR is utilized in machine cycle like psychological processing, machine interpretation, text to discourse, key information and text mining. OCR the character code in text records are handled utilizing Raspberry Pi gadget on which it perceives character utilizing tesseract calculation and python programming and sound yield is tuned in. OCR for design acknowledgment to perform Document picture examination (DIA) we use data in lattice design in virtual computerized library's plan and development. It advances Python programming as fundamental programming language.

2.1.4 Suchita Wankhade, Mrunali Bichukale, Shruti Desai, Shraddha Kamthe, Archana Borate “Smart Stick for Blind People with Live Video Feed”, *Journals* 2017.

The capacity and ability of vision to person is a significant factor of our life. But some individual whose unfit and have absence of vision since they are outwardly weakened. One brilliant framework which is only keen devise which become supportive for that outwardly weakened extrovert can be recognize deterrent with assistance of it daze stick. Blind individual get feel for when cell phone get vibration alarm or give some oral voice message to that individual.

2.1.5 Miss. Kirti P. Bhure, Mrs. J. D. Dhande “Object Detection Methodologies for Blind People” *Journal*, 2017

Vision is the main sense. Image assumes indispensable part in the human impression of the general climate. Digital picture handling is the field which measures the computerized picture by utilizing advanced PC. The object distinguishing proof is the troublesome undertaking for outwardly impeded individuals. There are numerous applications that can be utilized for this errand, there are still constraints that require really improving. It gives the overview and an investigation of different assessments for the advancements that utilized in the item distinguishing proof undertaking. For the ostensibly debilitated the chance of unmistakable substitution can be used.

2.2 Existing System:

In the existing system manual activity is required. Time necessity is more. Chance of material misses. It does not show charge status. The efficiency of the existing system is less. It utilizes RFID Technology.

3. PROPOSED SYSTEM

We have portrayed a model framework to peruse printed text available held articles for helping blind people. In request to tackle the normal pointing issue for daze clients, we have proposed a movement based technique to identify the object of interest, while the visually impaired client essentially shakes the item several seconds. The programmed ROI discovery and text limitation calculations were freely assessed as unit tests to guarantee adequacy and vigor of the entire framework. We thusly assessed this model arrangement of assistive content perusing utilizing pictures of hand-held articles caught by ten visually impaired clients face to face. Two adjustments were applied to plan for the framework test. In the first place, we taught dazzle clients to put hand-held article inside the camera see. This framework additionally assists with looking through any item from rack in the departmental store. This framework whenever recognized any item, additionally assists with coming to at where search thing is accessible. This proposed framework not just assists the outwardly hindered individuals with assisting senior with peopling and non-debilitated individuals.

<http://annalsofrrscb.ro>

3.1 Advantages

The system is low cost. Automatic framework for perusing course readings will be carried out that converts printed books to computerized text, yet in addition peruses them as a sound yield. Our proposed calculation can successfully deal with complex foundation and different examples, extract text data from both hand-held items and close by signage.

3.2 Architecture

The most recent cell phones are outfitted with numerous valuable contributions for research, including, however not restricted to

- Camera (often multiple)
- Microphone (often multiple)
- 3-axis Accelerometer
- 3-axis Gyroscope
- Proximity
- Ambient Light
- Touch
- Magnetometer (compass)
- GPS

These gadgets are incredible, reasonable and flexible exploration stages that make instrumenting a vehicle for information assortment available to the overall population just as the scholarly community.

The whirligig signals are a more clear sign of vehicle turn development, given that they measure pivot rate, and by utilizing the accelerometer and magnetometer related to the spinner, we can get a more accurate perusing of gadget mentality (direction).

The location can be isolated into two classes: horizontal (turning) T and longitudinal L developments. These categories contain device gyroscope values $G = \{g_x, g_y, g_z\}$ in rad/s, device accelerometer values $A = \{a_x, a_y, a_z\}$ in m/s², and device Euler angle rotation $E = \{e_x, e_y, e_z\}$ in radians from a reference attitude R.

The types of events detected by the device are:

- Right turns (90°)
- Left turns (90°)
- U-turns (180°)
- Aggressive right turns (90°)
- Aggressive left turns (90°)
- Aggressive U-turns (180°)
- Aggressive acceleration
- Aggressive braking
- Swerve right (aggressive lane change)
- Swerve left (aggressive lane change)
- Device removal
- Excessive speed

Since Android is perhaps the most utilized working framework nowadays its standard that a large portion of the drivers will have android based cell phones. There are two pieces of the application.

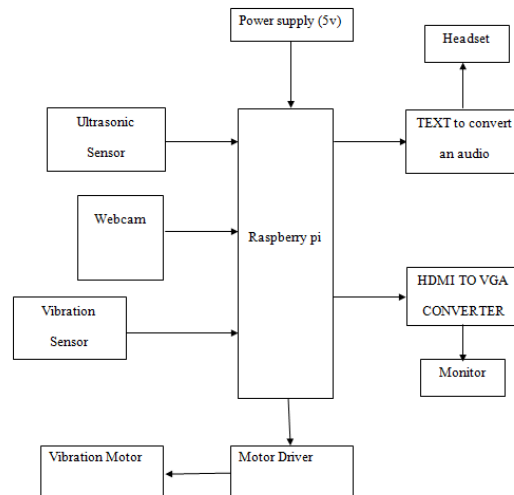


Fig. 1 Block Diagram

3.3Components Description

Hardware used

- Raspberry Pi 3
- HDMI to VGA converter
- Buttons or IR sensor
- Webcam
- Speakers / Headphones
- SD Card
- Monitor, Keyboard, Mouse
- Power cable

Software Used

- **Raspbian OS**

Raspbian is a Debian-based PC working framework for Raspberry Pi, created by a little group of designers. It isn't partnered with the Raspberry Pi Foundation, however the establishment gives a Raspbian picture which is recorded as a formally upheld working framework. Raspbian is kept up by Mike Thompson and Peter Green et al. which finished the underlying form in June 2012. The working framework is as yet under dynamic turn of events.

- **Python**

Python is a broadly utilized undeniable level, universally useful, deciphered, unique programming language. Its plan reasoning underlines code meaningfulness, and its grammar permits software engineers to communicate ideas in less lines of code than conceivable in dialects like C++ or Java. The language gives builds expected to empower composing clear projects on both a little and huge scope. Python bolsters various programming standards, including object-arranged, basic and utilitarian programming or procedural styles. It includes a powerful sort framework and programmed memory the board and has a

<http://annalsofsrcb.ro>

huge and thorough standard library.

3.3.1 Raspberry Pi

- Fitting the preloaded SD Card into the Pi.
- Attachment the USB console and mouse into the Pi, maybe through a USB Hub. Interface the Hub to control, if fundamental.
- Attachment the video link into the screen (TV) and into the Pi.
- Attachment your additional items into the Pi (USB Wi-Fi, Ethernet link, hard drive and so on) This is the place where you may truly require a USB Hub.
- Guarantee that your USB Hub (assuming any) and screen are working.
- Fitting the force source into the fundamental attachment.
- With your screen on, plug the opposite finish of the force source into the Pi.
- The Pi should boot up and show messages.



Fig. 2 Raspberry Pi

Details Of Raspberry Pi

- Broadcom BCM2837 64bit ARMv7 Quad Core Processor fueled Single Board Computer running at 1.2GHz
- 1GB RAM
- BCM43143 WiFi ready
- Bluetooth Low Energy (BLE) on board

<http://annalsofrscb.ro>

- 40pin expanded GPIO
- 4 x USB 2 ports
- 4 shaft Stereo yield and Composite video port
- Full size HDMI
- CSI camera port for interfacing the Raspberry Pi camera
- DSI show port for interfacing the Raspberry Pi contact screen show
- Micro SD port for stacking your working framework and putting away information
- Upgraded exchanged Micro USB power source (presently bolsters up to 2.4 Amps)
- Expected to have a similar structure factor has the Pi 2 Model B, anyway the LEDs will change position

3.3.2 Power supply:

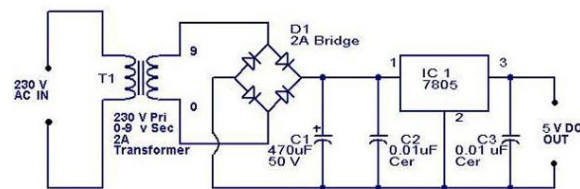


Fig. 3Power Supply

3.3.3 Transformer

A transformer is a static piece of which electric force in one circuit is changed into electric force of same recurrence in another circuit. It can raise or lower the voltage in the circuit, yet with a relating lessening or expansion in current. It works with the guideline of shared enlistment. In our venture we are utilizing a stage down transformer to giving a vital stockpile to the electronic circuits. Here we venture down a 230volts ac into 12volts ac.

3.3.4 Rectifier

A dc level acquired from a sinusoidal info can be improved 100% utilizing an interaction called full wave correction. Here in our venture for full wave amendment we use connect rectifier. From the essential scaffold setup, we see that two diodes (say D2 and D3) are leading while the other two diodes (D1 and D4) are in off state during the time frame $t = 0$ to $T/2$. Accordingly for the negative pattern of the information the directing diodes are D1 and D4. Along these lines the extremity across the heap is something similar.

3.3.5 Filter

To acquire a dc voltage of 0 Hz, we need to utilize a low pass channel. So a capacitive channel circuit is utilized where a capacitor is associated at the rectifier output& a dc is gotten across it. The sifted waveform is basically a dc voltage with unimportant waves and it is eventually taken care of to the heap.

3.3.6 Regulators

<http://annalsofsrcb.ro>

The yield voltage from the capacitor is more separated and at long last managed. The voltage controller is a gadget, which keeps up the yield voltage steady regardless of the adjustment in supply varieties, load varieties and temperature changes. Here we utilize fixed voltage controller specifically LM7805. The IC LM7805 is a +5v controller which is utilized for microcontroller.

3.3.7 Ultrasonic Sensor

A Ultrasonic sensor is a gadget that can quantify the distance to an item by utilizing sound waves. It allots distance by sending a sound wave at a specific repeat and tuning in for that sound wave to ricochet back. Comprehend that a few items probably won't be distinguished by ultrasonic sensors. Ultrasonic sensors are gadgets that utilization electrical-mechanical energy change, the mechanical energy being as ultrasonic waves, to gauge distance from the sensor to the objective item. Ultrasonic waves are longitudinal mechanical waves which travel as a progression of compressions and rarefactions along the heading of wave spread through the medium. Any stable wave over the human hear-able scope of 20,000 Hz is called ultrasound.



Fig. 4 Ultrasonic Sensor

3.3.8 Camera Description

Logitech HD Webcam comes fitted with auto concentrate wide-point focal point that has more modest central length to catch a greater amount of your subjects. This sort of focal point works out positively for inside photography so you can appreciate astonishing pictures on your journal or work area at home or office. Also, with its up to 720p HD video-recording limit (unique PC arrangement required), you see excellent HD picture on your screen that is clear, sharp and nitty gritty. Shadings likewise look distinctive and excellent. Further, Logitech Fluid Crystal Technology upgrades the video quality by making your visits' presentation liquid and immaculate. Programmed Light Correction include redresses brilliance related blunders to give you improved survey insight.



Fig. 5 Webcam

3.3.8 Vibration Sensor

The Vibration module dependent on the vibration sensor SW-420 and Comparator LM393 to recognize if there is any vibration that past the limit. The limit can be changed by the on-board potentiometer. At the point when this no vibration, this module yield rationale LOW the sign show LED light, And the other way around. No stun, vibration switch was shut conduction state, yield of low yield, the green pointer

light. Stun, vibration switch quickly disengaged, the yield side yield high, the green light doesn't sparkle. The yield can be straightforwardly associated with the microcontroller through the microcontroller to distinguish high and low.

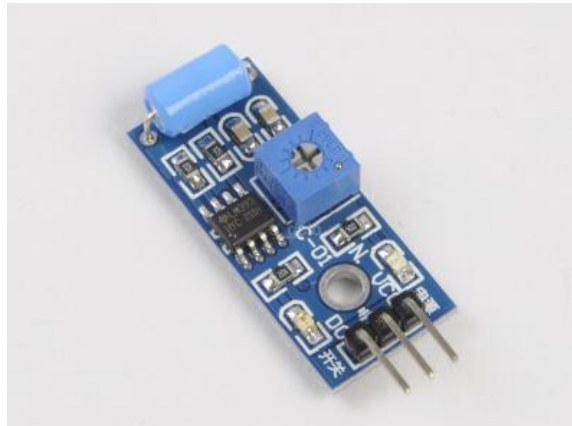


Fig. 6 Vibration Sensor

3.3.9 Vibration motor

Vibration engine is a coreless DC engine and the size of this engine is minimized. The primary motivation behind this engine is to alarm the client from accepting the call by without sound/vibrating. These engines are relevant for various applications like pagers, handsets, phones, and so forth.

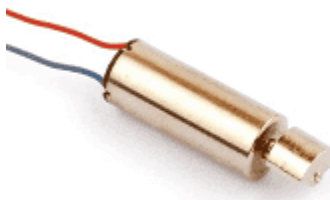


Fig. 7 Vibration Motor

4. WORKING

This is the framework used to help the visually impaired individuals. We are utilizing webcam to catch the picture which contains a few writings. The messages in the picture are prepared in Raspberry Pi and changed over to a book document by utilizing tesseract OCR. Then the changed over text document will be changed over into voice signal by espeak calculation. Then the changed over voice will be played through headset. Also we are utilizing ultrasonic sensor to recognize any item before individuals and the distance between the article and individuals will be found and Played through headset. To read text from hand-held items, we have considered webcam to remove print text data from the article. Ultrasonic sensor are utilized to recognize the item by utilizing OCR and reverberation, trigger. Both the calculation are executed in raspberry pi3. Tesseract (OCR) and distance count are utilized to discover the snags identification, it convert text to discourse. The sound are tuned in by the individual through headset.

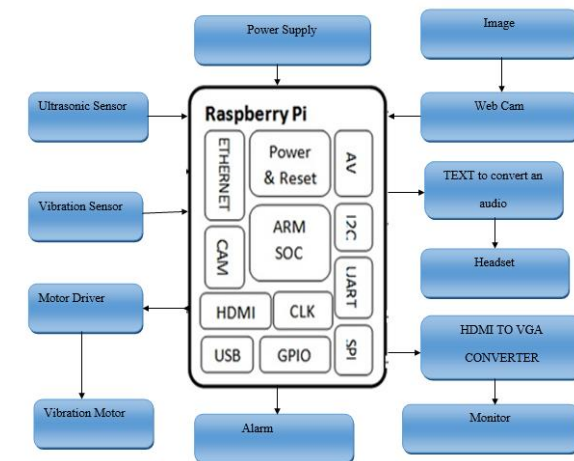


Fig. 8Working Model Diagram

5. RESULT

In the snag identification measure, the floor location is vital and the presentation of our framework depends on floor discovery. For sure, for the situation that we can't distinguish the floor precisely, the framework won't identify the snags. The program has been tried with a dataset in numerous indoor situations. The outcomes showed that the ground plane was recognized by and large in the indoor climate.

Notwithstanding, there still exist a few circumstances wherein it could fizzle. For instance, the light condition is excessively solid for Kinectcamera. In another case, when an obstruction comprises of an enormous flat plane, in the present circumstance, the even plane of the snag could be wrongly distinguished as the ground plane, the outcome showed that the divider and the free deterrent are recognized in basically all cases. Subsequent to estimating the genuine distance between the client and the obstructions, we further have contrasted this worth and the outcomes got by the deterrent recognition program and the outcome showed that the mistake was immaterial ($<2\%$).

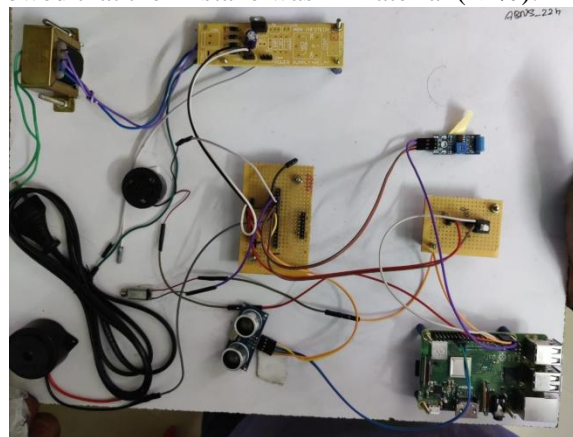


Fig. 9 Working Model

6. CONCLUSION AND FUTURE WORK

In this paper a technique for snag recognition in OCR was proposed. A heap bearing surface investigation followed by the order of focuses into hindrance classes which are at last grouped makes express separating of anomalies pointless. That way the indispensable idea of impediments in vegetated rough

terrain territory is represented. Moreover the idea of a momentary memory was effectively embraced to cover dazzle points of the sensor framework.

The carried out framework was assessed utilizing the semiautonomous tele-activity mode in the difficult nonurban situation during the second ELROB3. RAVON was the solitary vehicle highlighting self-ruling deterrent shirking in the field and gained a good third spot. Moreover a few kilometers of trials were completed completely self-governingly yielding hearty outcomes in impediment shirking and moving. In blend with the guard framework the proposed vegetation separation approach is a useful asset to recognize easy routes on a material premise. However the robot is in creep mode still exceptionally lethargic. To remunerate this an extra assessment unit for the laser information is right now being worked on. Instead of considering the laser test focuses just a measurable voxel entrance examination will be utilized to tell adaptable from strong substances.



Fig. 10 Working Model

7. REFERENCES

- [1] A. Aladrn, G. Lpez-Nicols, L. Puig, and J. J. Guerrero, "Navigation assistance for the visually impaired using RGB-D sensor with range expansion," *IEEE Syst. J.*, vol. 10, no. 3, pp. 922–932, Sep. 2016.
- [2] T. Amemiya and H. Sugiyama, "Orienting kinesthetically: A haptic handheld wayfinder for people with visual impairments," *ACM Trans. Accessible Comput.*, vol. 3, no. 2, 2010.
- [3] B. And, S. Baglio, V. Marletta, and A. Valastro, "A haptic solution to assist visually impaired in mobility tasks," *IEEE Trans. Human-Mach. Syst.*, vol. 45, no. 5, pp. 641–646, Oct. 2015.
- [4] S. Bhatlawande, M. Mahadevappa, J. Mukherjee, M. Biswas, D. Das, and S. Gupta, "Design, development, and clinical evaluation of the electronic mobility cane for vision rehabilitation," *IEEE Trans. Neural Syst. Rehabil.Eng.*, vol. 22, no. 6, pp. 1148–1159, 2014.
- [5] B. B. Blasch, R. G. Long, and N. Griffin-Shirley, "National evaluation of electronic travel aids for blind and visually impaired individuals: Implications for design," in *Proc. RESNA 12th Annu. Conf.*, 1989, pp. 133–134.
- [6] D. Gutierrez-G ´omez, L. Puig, and J. J. Guerrero, "Full scaled 3D visual ´odometryfrom a single wearable omnidirectional camera," in *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Oct. 2012, pp. 4276–4281.
- [7] S. Gupta, P. Arbelaez, and J. Malik, "Perceptual organization and recognition of indoor scenes from RGB-D images," in *IEEE Conference on Computer Vision and Pattern Recognition*, June 2013, pp. 564–571.

- [8] H. Takizawa, S. Yamaguchi, M. Aoyagi, N. Ezaki, and S. Mizuno, "Kinect cane: Object recognition aids for the visually impaired," in The 6th International Conference on Human System Interaction (HSI), June 2013, pp. 473–478.
- [9] Z. Wang, H. Liu, X. Wang, and Y. Qian, "Segment and label indoor scene based on RGB-D for the visually impaired," in MultiMediaModeling, ser. Lecture Notes in Computer Science, C. Gurrin, F. Hopfgartner, W. Hurst, H. Johansen, H. Lee, and N. O'Connor, Eds., vol. 8325. Springer International Publishing, 2014, pp. 449–460.
- [10] B. Peasley and S. Birchfield, "Real-time obstacle detection and avoidance in the presence of specular surfaces using an active 3D sensor," in IEEE Workshop on Robot Vision (WORV), 2013, pp. 197–202.
- [11] H. Schafer, A. Hach, M. Proetzsch, and K. Berns, "3D obstacle detection and avoidance in vegetated off-road terrain," in IEEE International Conference on Robotics and Automation, 2008, pp. 923–928.
- [12] Y. H. Lee and G. Medioni, "A RGB-D camera based navigation for the visually impaired," in RGB-D: Advanced Reasoning with Depth Cameras Workshop in conjunction with RSS, 2011.