

Obstacle Detection and Text Recognition for Visually Impaired Person Based on Raspberry Pi

Mrs. Ritika Dhabliya

*Department of Electronics and Telecommunication Engineering, SRIT Raipur India
ritikadhabalia@gmail.com*

Article History

Article Submission

12 March 2020

Revised Submission

28 May 2020

Article Accepted

17 June 2020

Article Published

30th June 2020

Abstract

Autonomous travel is a notable test for visually impaired people and furthermore the expanding accessibility of cost proficiency, superior and versatile advanced imaging gadgets has made a gigantic open door for enhancing conventional checking for record picture securing. We propose a camera based visual help system utilizing raspberry pi for content perusing, movement of items and the sentiments of outwardly hindered people face various challenges to play out their everyday errand. They are absolutely or halfway subject to somebody for help. Their issues have made them to lose their would like to live in this contending society. They look for help from others to control them entire day. This paper expects to make the outwardly debilitated individual completely autonomous in all perspectives. The proposed framework depends on a virtual eye, which conveys to the outside encompassing through a camera. The camera goes about as a consistent wellspring of data to the framework. The information is gotten through the camera. They got signals from the information gadgets are dissected utilizing picture handling in LABVIEW and it reacts to the outwardly debilitated individual through discourse preparing units. The handled data about environmental factors will be educated through the speaker (yield unit) by which outwardly weakened individuals can move and make their work effectively all alone. Also the outwardly weakened individual can naturally control a portion of the home apparatuses like fan utilizing remote correspondence framework.

Keywords: *Raspberry pi Controller; GSM; LABVIEW, Speech processing*

I. Introduction

Till date daze individuals are figuring out how to go with strolling stick and snag identifying stick and different gadgets. These have improved their way of life altogether from nothing to something except for haven't set them absolutely free [1][2]. They show them odd among other individual, which prompts multifaceted nature in them. In this way the helping gadgets accessible in present situation are not adequate for supporting them totally. So as to beat these disadvantages, we have planned a framework, which would be of massive bit of leeway in contrast with the gadgets that are utilized by outwardly weakened individuals today. This task has highlights which encourages the outwardly debilitated to gain a fake vision through feeling of hearing. This framework is fit for satisfying the essentials of outwardly debilitated and helping them in turning out to be free similar to ordinary people. This framework goes about as a virtual eye for the visually impaired individuals and liberates them in all perspectives [3].

To improve the capacity of individuals who are visually impaired or have huge visual weaknesses to freely get to, comprehend, and investigate new indoor and outside situations, we propose another structure utilizing a solitary camera to distinguish and perceive the signs, content and impediments to give sound as a yield. we remove and perceive the content data related with the distinguished articles. We first concentrate content districts from indoor signs with numerous hues [4][5]. At that point content character confinement and format examination of content strings are applied to sift through foundation impedance. The item type, direction, and area can be shown as discourse for dazzle voyagers. To improve the capacity of individuals who are visually impaired or have critical visual disabilities to autonomously get to, comprehend, and investigate new indoor

conditions, we propose another system utilizing a solitary camera to identify and perceive the face, snags, signs consolidating content data related with the recognized article. So as to segregate comparative articles in indoor situations, the content data related with the recognized items is extricated [6].

II. Related Works

In order to find different rooms (i.e. an office, a lab, or a restroom) and other structure pleasantries (for example an exit or a lift), they joined this entryway discovery with content acknowledgment. First they built up a powerful and productive calculation to identify entryways and lifts dependent on general geometric shape, by joining edges and corners. The calculation is sufficiently conventional to deal with enormous intra-class varieties of the article model among various indoor situations, just as little between class contrasts between various items, for example, entryways and lifts. Next, to recognize an office entryway from a washroom entryway, they removed and perceive the content data related with the identified articles. Here first content areas from indoor signs with numerous hues were removed. At that point content character confinement and format investigation of content strings are applied to sift through foundation obstruction. The extricated content is perceived by utilizing off-the-rack optical character acknowledgment (OCR) programming items. The item type, direction, and area can be shown as discourse for dazzle voyagers [7][8].

Here they proposed a camera-based assistive structure to help dazzle people to peruse content names from chamber protests in their day by day life. To start with, the item is identified from the foundation or other encompassing articles in the camera see by shaking the item. At that point we propose a mosaic model to open up the content mark on the chamber object surface and reproduce the entire name for perceiving content data. This model can deal with chamber questions in any directions and scales. The content data is then removed from the opened up and flatted marks. The perceived content codes are then yield to dazzle clients in discourse. Test results show the productivity and viability of the proposed structure from various chamber objects with complex foundations.

Mindful Research and Innovation (RRI) is a methodology that foresees and surveys potential ramifications and cultural desires concerning exploration and advancement, with the expect to encourage the structure of comprehensive and reasonable research and development. While RRI incorporates numerous perspectives, in specific sorts of activities morals and especially protection, is seemingly the most delicate subject. The goal in Horizon 2020 development venture Eyes of Things (EoT) is to manufacture a little elite, low-power, PC vision stage (like a brilliant camera) that can work freely and furthermore inserted into a wide range of relics. In this paper, we portray the activities taken inside the undertaking identified with morals and security. A security by-structure approach has been followed, and work proceeds with now in four stage demonstrators [9][10].

This paper depicts a direction framework for dazzle and mostly located individuals with the point of adapting in the known and obscure interior and outer spaces without the help of human aides. This work speaks to a huge advance forward in the use of creative innovative answers for increment autonomy and improves the personal satisfaction for individuals with inabilities. This paper depicts the specialized and utilitarian design of the framework for direction and direction of a visually impaired individual utilizing accessible present day innovation. The portrayed framework comprises of an advanced sensor for deciding the area by dead retribution method, infrared stamps in space and handheld gadget that gives voice direction guidelines.

Here they proposed a camera-based assistive system to help dazzle people to peruse content marks from chamber protests in their day by day life. To begin with, the article is distinguished from the foundation or other encompassing items in the camera see by shaking the item. At that point they proposed a mosaic model to unwarped the content mark on the chamber object surface and remake the entire name for perceiving content data. This model can deal with chamber protests in any directions and scales. The content data is then extricated from the unwarped and flatted marks. The perceived content codes are then yield to dazzle clients in discourse. Trial results exhibit the productivity and viability of the proposed system from various chamber objects with 3rcomplex foundations.

III. Proposed Methodology

The camera is used to capture the objects in front of it; the captured image is then processed in the PC. The captured image is compared with the images that are already fed to the system and object is identified. On identification it informs the user about object using predefined voice output through speaker.

The second part is a navigator system based on keypad and voice output system. The keypad is connected to the system using a microcontroller. The buttons in the keypad are programmed to store names of the different rooms. When a button is pressed a voice based announcement is obtained as output informing about the room selected, for confirmation the person needs to repress the same. The destination can be reached using camera and speaker by object identification method.

The third part of the system deals with controlling loads. The keypad also contains buttons for controlling loads through wireless communication. When a key is pressed, the data from microcontroller is encoded and transmitted using an antenna. The received data is decoded and given to driver by microcontroller which is used to drive a load selected using a relay.

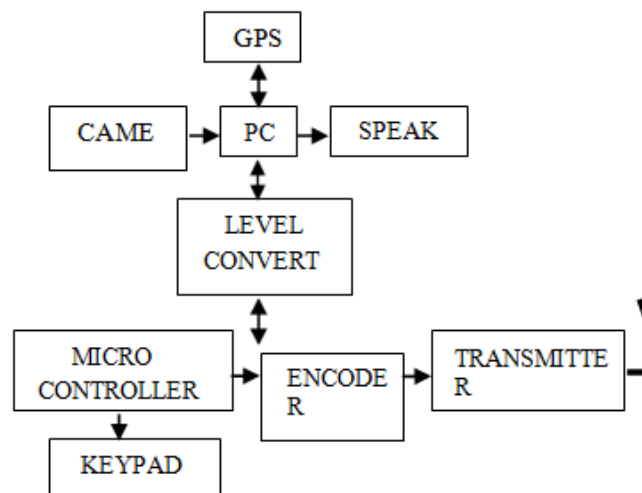


Fig 1: Structure of the proposed system's transmitter

Camera is set over the head since the edge of inclusion saw is ideal. The field of view is of significant concern since it chooses the territory secured to be moved to the client. These cameras are picked with a pixel estimation of 8-10. Picture goals required for this module is moderate on the grounds that lone varieties and change in the area of articles in picture are thought. Keypads are a piece of HMI or Human Machine Interface and assume a significant job in a little inserted framework where human connection is required. Network keypads have straightforward engineering and interfacing no sweat. So it very well may be built utilizing basic SPST Switches.

The 4x4Keypad is a universally useful 16 catch network keypad. The segments are taken as I/p and the columns are driven as o/p, this technique of perusing the console is called filtering. So as to identify which key is squeezed from the lattice, we make lines low individually and read the segments. In the event that any of the catches is squeezed in succession, it will take the comparing section to low state which demonstrates that a key is squeezed in that line. In the event that button 1 of a line is squeezed, at that point Column 1 will turn out to be low, in the event that button 2, at that point column2, etc. The keypad gives an outwardly engaging approach to get numeric information to the control framework.

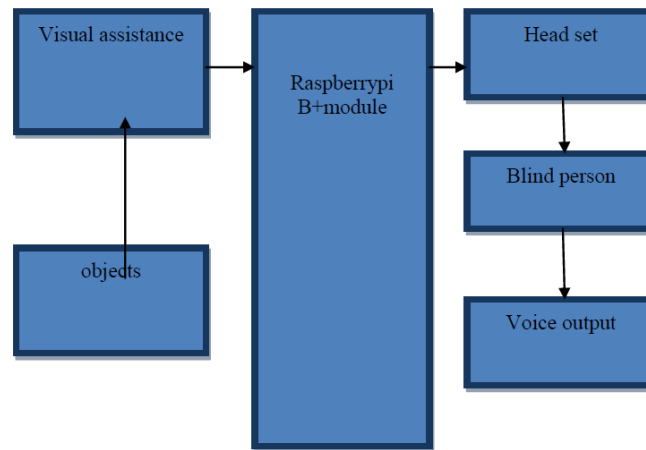


Fig 2: Structure of the proposed system's receiver

It is a perfect for remote control applications where minimal effort and long range is required. It works from 1.5-12V flexibly, making it perfect for battery-fueled applications. This utilizes a SAW-balanced out oscillator, guaranteeing exact recurrence control for best range execution. It is a perfect for short-go remote control applications where cost is an essential concern. The beneficiary module requires no outside RF segments with the exception of the receiving wire. It produces for all intents and purposes no discharges. The super-regenerative structure displays uncommon affectability requiring little to no effort.

One of the key highlights of GSM is the Subscriber Identity Module, generally known as a SIM card. The SIM is a separable savvy card containing the client's membership data and telephone directory. This permits the client to hold their data in the wake of exchanging handsets. On the other hand, the client can likewise change administrators while holding the handset basically by changing the SIM. GSM Service Security - GSM was structured with a moderate degree of administration security. The framework was intended to confirm the endorser utilizing a pre-shared key and challenge-reaction. Correspondence between the endorser and the base station can be scrambled. GSM just confirms the client to the system and not the other way around. The security model offers secrecy and verification, however restricted approval abilities, and no non-denial.

An encoder is a gadget used to change a sign, (for example, a piece stream) or information into a code. The code serves any of various purposes, for example, packing data for transmission or capacity, encoding or adding redundancies to the info code, or making an interpretation of starting with one code then onto the next. This is typically done by methods for a modified calculation. A decoder is a gadget which does the opposite of an encoder, fixing the encoding with the goal that the first data can be recovered. A similar strategy used to encode is typically simply switched so as to unravel. In computerized hardware this would imply that a decoder is a numerous info, various yield rationale circuit that changes over coded contributions to coded yields. Empower inputs must be on for the decoder to work, in any case its yields accept a solitary "impaired" yield code word. Deciphering is fundamental in applications, for example, information multiplexing

Speakers are one of the most widely recognized yield gadgets utilized with PC frameworks or any kind of sound framework. The reason for speakers is to deliver sound yield that can be heard by the audience. Speakers are transducers that convert electromagnetic waves into sound waves. The speakers get sound contribution from a gadget, for example, a PC or a sound collector. This information might be either in simple or computerized structure. Simple speakers just enhance the simple electromagnetic waves into sound waves. Since sound waves are created in simple structure, advanced speakers should initially change over the computerized contribution to a simple sign, at that point produce the sound waves. The sound created by speakers is characterized by recurrence and adequacy. The recurrence decides how high or low the pitch of the sound

IV. Simulation Results

The significant capacity acted in this undertaking is the preparing of pictures and signals gained from camera and keypad. Among the data sources, visual pictures are viewed as generally significant. The picture caught utilizing camera is handled in the PC. The (main) picture got from camera is accepted as Input 1 (I1) and is being spared at first in the memory (EEPROM), indicated as 'M', the succeeding contribution of I1, the subsequent picture acquired is named as I2. The second picture is likewise spared in memory. The camera is used to capture the objects in front of it; the captured image is then processed in the PC. The captured image is compared with the images that are already fed to the system and object is identified. On identification it informs the user about object using predefined voice output through speaker.

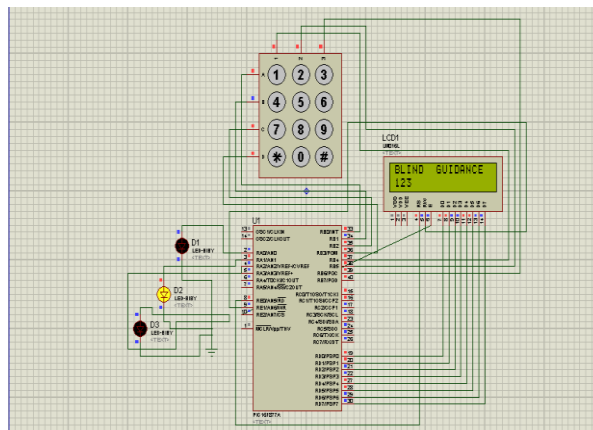


Fig 4: Simulation block

In all the above previous system we had found some errors which affect the efficiency of the system and its code. So, we had done very efficient coding in python script which makes the coding side as simple as possible, we also used jessay OS & open cv lib file to make thing more easy. The main purpose of this model is to help blind persons by guiding them using this system design. It recognizes the face, signs, obstacles, humans such as known and unknown persons will be identified using face and text recognition features. It gives the scanned and recognized images in the form of audio output to help and guide the blind person. It is specially designed to blind navigation purpose.

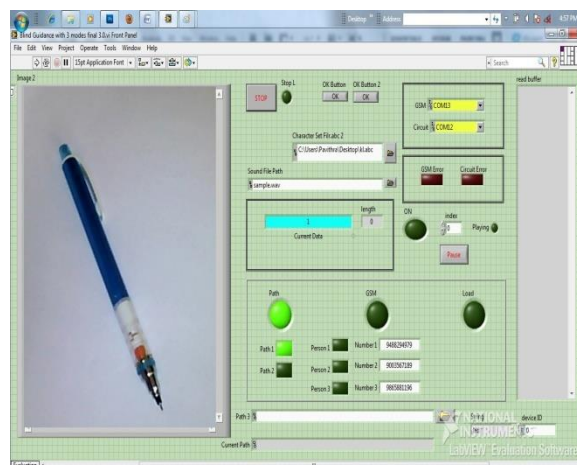


Fig 5: obstacle detection and path finding

By the efficient programming in the module it recognizes the feeder obstacles, faces, signs and gave it as a required audio output through the earphone. The main purpose of this model is to help blind persons by guiding them using this system design. It recognizes the face, signs, obstacles, humans such as known and unknown persons will be identified using face and text recognition features. It gives the scanned and recognized images in the form of audio output to help and guide the blind person. It is specially designed to blind navigation purpose.



Fig 6: Proposed hardware setup

The second part is a navigator system based on keypad and voice output system. The keypad is connected to the system using a microcontroller. The buttons in the keypad are programmed to store names of the different rooms. When a button is pressed a voice based announcement is obtained as output informing about the room selected, for confirmation the person needs to repress the same. The destination can be reached using camera and speaker by object identification method. The third part of the system deals with controlling loads. The keypad also contains buttons for controlling loads through wireless communication. When a key is pressed, the data from microcontroller is encoded and transmitted using an antenna. The received data is decoded and given to driver by microcontroller which is used to drive a load selected using a relay. The simulated output of the load controlling process has been obtained by using PIC microcontroller programming. The program is simulated using MP-LAB IDE software. The input is given using keypad switches and each load is specified in the switches. The change of load can be made by pressing different switches.

V. Conclusion

The output for the obstacle detection, path finding, load controlling and emergency calling process has been obtained by using PIC microcontroller programming. The mode switch is used for selecting a particular mode. The input is given using keypad switches and webcam. The path in the indoor area is found by pressing different switches. Similarly, the switching ON the load, switching OFF the load and calling different persons is also made using the keys. Thus, this paper can still be improved with nano technology. And that blind can carry the objects easily using nano technology. We have proposed a design on face and text recognition based on raspberry pi which is mainly designed for the purpose of blind navigation. Our future work will focus on detecting the emotions of the persons and recognizing more types of indoor objects and icons on signage in addition to text for indoor way finding aid to assist blind people travel independently. We will also study the significant human interface issues including auditory output and spatial updating of object location, orientation, and distance. With real-time updates, blind users will be able to better use spatial memory to understand the surrounding environment, obstacles and signs.

References

- [1] J. Li, L. Yu, J. Wang and M. Yan, "Obstacle information detection based on fusion of 3D LADAR and camera," 2017 36th Chinese Control Conference (CCC), Dalian, 2017, pp. 5242-5246, doi: 10.23919/ChiCC.2017.8028184.
- [2] Design of a FPGA based virtual eye for the blind, c.melki anderson, velammal, 2011 2nd international conference on environmental science and technology ipcbee vol.6 (2011) IACSIT press, singapore.
- [3] Virkes, D.; Nenadic, K.; Virkes, D.Z., Positioning systems for mobility of the blind, overview and analysis, Proceedings, 46th International Symposium Electronics in Marine 2004.
- [4] Daviault, J.; Study on the Benefits of GPS Based Orientation Tools for the Mobility and Orientation of the Blind, Center on Disabilities Technology and Persons with Disabilities Conference, 2005.
- [5] Serge Resnikoff, a Donatella Pascolini, a Silvio P Mariottia & Gopal P Pokharela "Global magnitude of visual impairment caused by uncorrected refractive errors in 2004" Bulletin of the World Health Organization 2008;86:63–7
- [6] Jinglei Tang Xu Jing Dongjian He Shangsong Liang Coll. of Mech. & Electron. Eng., Northwest A & F Univ., Yangling, China. Blind-Road Location and Recognition in Natural Scene, Computer Science and Information Engineering, 2009 WRI World Congress on.
- [7] Camera based analysis of text and documents by Jian Liang, David Doermann. In Proceedings of the IEEE International Conference on Robotics and Automation, 2004.
- [8] Y. Zhou and Z. Dong, "A vision-based autonomous detection scheme for obstacles on the runway," 2017 Chinese Automation Congress (CAC), Jinan, 2017, pp. 832-838, doi: 10.1109/CAC.2017.8242881.
- [9] D. Ghorpade, A. D. Thakare and S. Doiphode, "Obstacle Detection and Avoidance Algorithm for Autonomous Mobile Robot using 2D LiDAR," 2017 International Conference on Computing, Communication, Control and Automation (ICCUBEA), Pune, 2017, pp. 1-6, doi: 10.1109/ICCUBEA.2017.8463846.
- [10] G. Prabhakar, B. Kailath, S. Natarajan and R. Kumar, "Obstacle detection and classification using deep learning for tracking in high-speed autonomous driving," 2017 IEEE Region 10 Symposium (TENSYP), Cochin, 2017, pp. 1-6, doi: 10.1109/TENCONSpring.2017.8069972.