ISSN 2319-2720
Volume 7, No.2, April – June 2018
International Journal of Computing, Communications and Networking
Available Online at http://www.warse.org/ijccn/static/pdf/file/ijccn26722018.pdf
https://doi.org/10.30534/ijccn/2018/26722018

IOT POWERED MULTISENSOR STRATEGIES TO SUPPORT BLIND PEOPLE WITH GPS NAVIGATION SYSTEM

Prof. Vinod HN[1], Farooque MD[2], Meenakshi Murali[3], Bindu L[4], Pavithra KS[5]
[1]Assistant professor EWIT, India, vinodhn@ewit.edu
[2]Student, EWIT, India, farooque.farooque.khan92@gmail.com
[3]Student, EWIT, India, meenakshimurali1996@gmail.com
[4]Student, EWIT, India,Binduln02@gmail.com
[5]Student, EWIT, India, pavithraksreddy1997@gmail.com

ABSTRACT

The Blindness is freuently used to describe severe visual impairments with or without residual vision. The application of ultrasonic ranging scheme for producing electronic walking stick for the blind is a technological advancement. There is a great dependency for any type of movement or walking within area or out of the particular area, they use only their natural senses such as touch or sound for identification or walking .To overcome all these problems of blind people, need to develop a project by using simple available technologies. This walking stick for blind people which have multiple sensors, with the help of sensors it has possible to enhance more features to the walking stick. The features are to detect the obstacle for collision avoidance, it detects the object in directions up, down and front. The other sensor placed near bottom tip of the walking cane to find the pits on the ground. Integrate these sensors to the voice record and play chip. The detector is based on a multi-sensor strategy and adopts smart signal processing to provide the user with suitable information about the position of object. In this project, sensors plays key role to detect the objects in all directions to make free to walk for the blind people.

Keywords: Smart Walking stick; Raspberry Pi; infrared sensor; Accelerometer.

I. INTRODUCTION

Blindness is a state of lacking the visual perception due to physiological or neurological factors. The partial blindness represents the lack of integration in the growth of the optic nerve or visual centre of the eye, and total blindness is the full absence of the visual light perception. In this work, a simple, cheap, friendly user, smart blind guidance system is designed and implemented to improve the mobility of both blind and visually impaired people in a specific area. The proposed work includes a wearable equipment consists of light weight blind stick and sensor based obstacle detection circuit is developed to help the blind. Around blind by emitting-reflecting waves. The reflected signals received from the barrier objects are used as inputs to microcontroller. The microcontroller is then used to determine the direction and distance of the objects around the blind.

The main objective of this project is to design a walking stick which is very much useful for those people who are visually impaired and are often need help from others. It allows the user to walk freely and independently by detecting the obstacles. The obstacle can be detected by using various techniques. The image will be captured using camera and camera is connected to Raspberry Pi. If any obstacle comes in front of the blind person, he will get the information about the obstacle by hearing the sound which was generated by the head phone connected to his ear.

The smart walking stick for blind is a simple and purely mechanical device to detect the obstacles on the ground. This device is light in weight and portable. But its range is limited due to its own size. It provides the best travel aid for the blind. The blind can move from one place to another independently without the other help. The main aim of the system is to provide a efficient navigation aid for the blind persons which gives a sense of vision by providing the information about their surroundings and objects around them. Various technologies can be used to reduce different barriers that a blind person has to face these kinds of technologies are commonly referred to as assistive technology.

II. RELATED WORK

Paper [1] Title: Smart Stick for the Blind a complete solution to reach the destination. This system uses IR sensor, Ultrasound sensor and water sensor to detect the obstacle. However, this system just gives an alert if any one of the sensor is triggered, it uses a buzzer to alert the blind person. This system does not use any location identifier or location indicator. Paper [2] Title: Pothole detection for visually impaired which uses a camera that captures image 15 frame per second and based on the concept of image processing the pothole is detected. Problem with this system is use of camera makes it expensive, and also a lot of images captured per second increases overhead and storage requirement. Paper [3] Title: Smart Walking Stick for Blind describes about a Stick

which use Raspberry Pi [10] and an ultrasonic sensor to detect objects and intruder, the system also has a camera embedded with it, and based on the images captured the objects are detected. The objects are analyzed based on the set of image datasets that are already stored. This system however, becomes costly due to the use of high-end camera and also because of storage constraints as large volume of datasets are needed to be stored. This system sometimes might also be inaccurate because the obstacles are detected based on dataset (large set of images) as different objects vary in their shape and size. Paper [4]Title: Smart Belt for Blind uses a belt embedded with ultrasound sensor which detects the obstacle. The belt also has a buzzer which vibrates when obstacle is detected. The entire system is developed in such a way that the distance calculated is sent as an audio message for the blind person, where in which he hears the distance calculated using a speaker. Paper [5] Title: A wearable ultrasonic obstacle sensor for visually impaired. This system uses a couple of ultrasound sensor on either side over the strap of the goggles. This project can detect the intruder in front of the blind person who is wearing the goggles. This system is not robust as the sensor embedded with the goggles makes it heavier and also it cannot detect complex objects such as water, vehicle etc.

III. METHODOLOGY

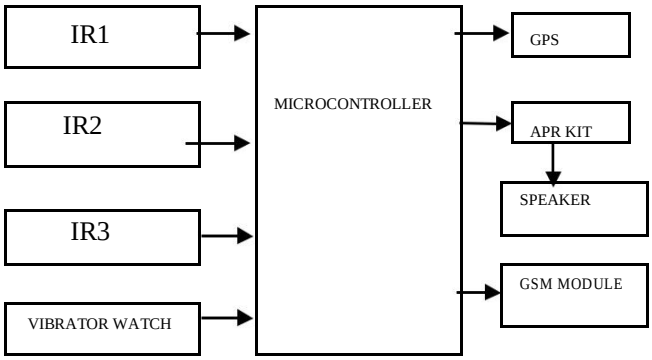
The Wi-Fi hotspot transmitter will be located on the bus and the receiver will be with the blind person.
When the bus reaches the bus stop it will automatically generates the signal and sends to the blind person.
The generated signal will be including bus number origin and destination information about the bus.
Blind person having Wi-Fi hotspot receiver receives the message.
The voice synthesizer converts the message information to voice and blind person hears the voice with the help of the headset.
The additional button facility may be provided on the module if the blind person wants to hear the information again.
The GPS navigation system is used to locate the position of the blind person.
If the blind person does not respond to his mentor's call after three attempts, then the software is designed to send the current location information of the blind person to the mentor.

IV. PROPOSED SYSTEM

In this project of "**multisensory strategies to support Blind people: A clear-path indicator**". We propose a system which can detect the obstacles. In this new system we increase the range of the operating device to about 40 to 240cm which is possible only through obstacle sensors. Here we are using infrared sensor for detecting the obstacle. Two sensors are placed in the right and left side of the stick. For any obstacle detected we warn the person through voice board warning for left and right side.The objective of this project is to guide blind people with voice navigated GPS using an ARM 11 phone.

The stick is embedded with Raspberry Pi, GSM module, GPS module, vibrator, switches and sensors. If any sensor is invoked, the vibrator which is placed over the handle vibrates. If the visually impaired person wants to know their current location they can press the switch assigned for that purpose, an audio regarding the current location is heard by the blind person with the help of a Bluetooth audio device. Different kinds of sensors like water sensor, ultrasonic sensor [11], and Infrared sensor [12] are placed at various parts of the stick making it robust. If the visually impaired person also wants some help during some emergency, a call or a message is sent to a set of mobile numbers stored in a micro controller. Developing the product at minimal cost becomes the key agenda of the project. If the person wants to know the directions to get to the right location, he/she can actually press a button associated for the purpose, the direction based audio message is heard by them using the Bluetooth based audio device. Infrared which is present at the bottom of the stick can detect presence of holes and steps.

A. BLOCK DIAGRAM



B.HARDWARE DESCRIPTION

INFRARED SENSORS:

This sensor senses the obstacles within few meters of range. There is a pair of eyes, Transmitter and Receiver, Transmitter transmits pulse signals with velocity v and Receiver receives the transmitted signals after time t (this is called Time of Flight). So, the distance will be (v*t)/2. An IR sensor [12] senses **i**ts surrounding by emitting or detecting infrared radiation, infrared sensors can also detect the heat emitted by the object and also can detect motion.

GPS AND GSM MODULE:

GPS module is used to know the current location where the blind person is present, he can also hear the audio message regarding the direction that is to be followed by the blind person. GSM module is used by the blind person to contact to mobile numbers stored in the microcontroller in case of any emergency

LCD:

A liquid crystal display is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs does not emit light directly. In liquid crystal displays (LCDs) of liquid crystal technology is the most common applications. An advanced VGA computer screen from the pervasive wrist watch and pocket calculator, this type of display has evolved into an important and ambidextrous interface.Consist of a liquid crystal display, an array of tiny segments (called pixels) and to present the information that can be manipulated. This basic common idea is to all displays, alienate from simple calculators to a full color LCD television.

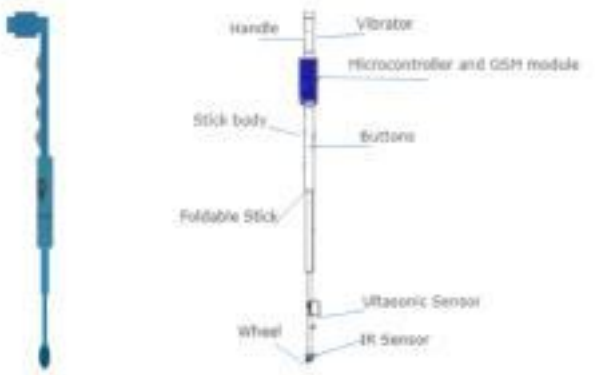
RASPBERRY PI

The Raspberry pi with low power consumption is used for implementing the smart walking stick. It is a full-fledged and having a credit card sized computer, and have a full Linux based operating system and has hardware support for SPI, I2C and Serial and this have an ability to run different programs. Hence the entire System is implemented using Raspberry Pi and the python language.

Figure 1 Raspberry pi

MODEL:

SMART WALKING STICK



IV.CONCLUSION

The Smart Waking Stick for blind is an embedded system which is to be implemented with an aim to reduce the complexities of the blind people. With this system , the blind people will be able to move from one place to another place Without the help from others. It will act as a basic platform for the generation of more such devices for visually impaired and it will be real boon for the blind. The developed system gives good results in detecting obstacles in front of the user. In this System the sensors play an important key role to detect the objects in front of the blind to make free to walk for the blind people .Due to these features it is best equipment for the blind and visually impaired people for walking on the road. Hence the system can solve the problems faced by the blind in their daily life. The system also takes measures to ensure their safety.

REFERENCES

[1] G.Prasanthi, P.Tejaswitha " *Sensor assisted stick for the blind people*" Transactions on Engineering and Sciences

[2] A.Sangami, M.Kavithra, K.Rubina, S.Sivaprakasam "*Obstacle Detection and Location Finding For Blind People*

[3] Ankita R.Pawar, M.M.Mahajan "*Multitasking Stick for Indicating Safe Path to Visually Disable People*".

[4] Ms. S hruti Dambhare Prof. A.Sakhare "*Smart stick for Blind: Obstacle Detection, Artificial vision and Real-time assistance via GPS* "

[5] Jismi Johnson, Nikhil Rajan P, Nivya M Thomas, Rakendh C S, Sijo TcVarghese "Smart Stick for Blind" International Journal of Engineering Science Invention Research & Development; Vol. III, Issue IX, March 2017. Department of Computer Science, Jyothi Engineering College, Kerala, India.

[6] Amy Nordrum, Title: Pothole detection for blind, IEEE, 30 May,2016 https://spectrum.ieee.org/the-human-os/biomedical/devices/p othole-detection-for-the-visually-impaired

[7] G. Prashanthi, PTejaswitha "Sensor assisted Stick for Blind People" Transactions on Engineering and Sciences, Vol 3, Issue January 2016.

[8] Ayush Wattal, Ashuthosh Ojha, Manoj Kumar "Obstacle Detection Belt for Visually Impaired Using Raspberry Pi and Ultrasonic Sensors" Department of Information Technology JSSATE, Noida, India. National Conference on Product Design (NCPD 2016), July 2016

[9] V. Diana Earshia, S.M Kalaivanan, K.Bala Subramanian "A Wearable Ultrasonic Obstacle Sensor for Aiding Visually Impaired and Blind Individuals."International Journal of Computer Applications, National Conference on Growth of Technologies in Electronics January 2016

[10] Ezra Ali Hassan, Tong Boon Tang, Smart Glasses for Visually Impaired, ICCHP 2016: Computers Helping People with Special Needs pp 579-582

[11] Sonda Ammar Bouhamed, Imene Khanfir Kallel, Dorra Sellami, Title: New electronic white cane for stair case detection and recognition using ultrasonic sensor, (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 4, No. 6, 2013 http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.310.4332&rep=rep1&type=pdf

[12] The Amazon way on IoT by John Ross man, volume 2, 20th July,2016

[13] Designing the Internet of Things' by Adrian McEwen, Wiley Publication, Edition 1 2013.

[14] Programming in python' by Cody Jackson, 3rd Edition, 2011

[15] https://en.wikipedia.org/wiki/Raspberry_Pi

[16]education.rec.ri.cmu.edu/content/electronics/boe/ultrasonic_sensor/1.html

[17] https://www.azosensors.com/article.aspx?ArticleID=339

[18] Smart Blind Stick, Gangan Deep Singh, 2013 https://www.slideshare.net/gagandeepsingh942/sensor-based-blind-stick-65362526

[19] Passenger BUS Alert System for Easy Navigation of Blind G.Lavanya ME., Assistant Professor, Department of Biomedical Engineering, Sri Ramakrishna Engineering College, Coimbatore Preethy. W*, Shameem.A *, Sushmitha.R* IV year, Biomedical Engineering, Sri Ramakrishna Engineering College, Coimbatore 2013 International Conference on Circuits, Power and Computing Technologies

[20]Indoor Navigational Aid Using Active RFID and QR-Code For sighted and Blind People Saleh Alghamdi #1, Ron van Schyndel #2, Ahmed Alahmadi 3 # School of Computer Science and IT,RMIT University Melbourne, Australia Department of Computer Science an Computer Engineering, La Trobe University Melbourne, Australia