ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Assistive Wireless Technology Based Smart Cane for Blind People

Ms. Varsha Subudhi
Department of Electronics & Telecommunication Engineering, Chh. Shahu College of Engineering, Aurangabad, Maharashtra-431136, India.

Dr.U.B.Shinde
Department of Electronics & Telecommunication Engineering, Chh. Shahu College of Engineering, Aurangabad, Maharashtra-431136, India.

Prof. Sumera Ali
Department of Electronics & Telecommunication Engineering, Chh. Shahu College of Engineering, Aurangabad, Maharashtra-431136, India.

ABSTRACT

A Smart stick system concept is devised to provide a smart electronic aid for blind people. Blind and visually impaired people find difficulties in detecting obstacles during walking in the street. The system is intended to provide artificial vision and object detection, real time assistance via GPS by making use of Raspberry Pi. The system consists of Ultrasonic sensors, Vibration Sensor, GPS module, GSM Module. Ultrasonic sensors are used for obstacle detection through the ultrasonic waves produced by it. Vibration sensors are used to forward and alarm when the blind person is in difficulty or he feels that he is lost. GPS module is used in this to get the current location information of the person, which location will be sent via Short Message Service (SMS) to the registered numbers using a GSM module, on pressing of a switch whenever he feels he is lost. The aim of the overall system is to provide a low cost and efficient navigation and obstacle detection aid for blind which gives a sense of artificial vision by providing information about the environmental scenario of object around them, so that they can walk independently.

INTRODUCTION

There are several numbers of people around us which are visually impaired, and among them millions of people are blind and there are thousands of people those who are irreversibly blind [1]. For visually impaired people, performing daily activities is a difficult task since vision plays a central role in almost every activity of ours. The visually impaired people have to rely on their memory to find their belongings and may become irritated if someone replaced the object or it falls down occasionally. It is not possible to search an object in an unknown place or surroundings without having the eye sight. There can be found different technologies such as SONAR based, RFID based, and vision based technologies which was useful for the blind persons.

Smart Walking Stick helps the blind people in moving and allowing them to perform their work easily and comfortably [2]. In normal cane or stick, the detection of the obstacle is done by using the sensor. But it is not efficient in the case of a blind person Because the blind person can't able to know what type of things or objects come in front of him and what is the size of that object and how much far is he from that obstacle [3]. So it is difficult for a blind person to move from one place to another. But in the smart walking stick for blind, the output produces in the form of sound. The Stick measures the distance between the objects and Smart Walking Stick by using an Ultrasonic sensor. 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.

Recently, much research effort have been focused on the design of Electronic Travel Aids (ETA) to aid the successful and free navigation of the blind. Also, high-

Cite this article as: Ms. Varsha Subudhi & Dr.U.B.Shinde, "Assistive Wireless Technology Based Smart Cane for Blind People", International Journal & Magazine of Engineering, Technology, Management and Research, Volume 6 Issue 7, 2019, Page 101-105.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

end technological solutions have been introduced recently to help blind persons navigate independently. Another reason why ultrasonic is prevalent is that the technology is reasonably cheap. Moreover, ultrasound emitters and detectors are portable components that can be carried without the need for complex circuit [4]. RF module will help the person to find the stick wherever it is placed. Whenever the user wants to locate it, such a person will press a button on remote control and buzzer will ring, then the person can get the idea of where the stick is placed. The conventional and oldest mobility aids for persons with visual impairments are characterized with many limitations. Some inventions also require a separate power supply or navigator which makes the user carry it in a bag every time they travel outdoor. These bulky designs will definitely make the user to be exhausted. The objectives of this research work include: to design an assistive technology for visually impaired people that can detect obstacles and provides alternative routes for the blind; to alarm the user through vibration to determine the obstacles direction sources; and to help the user find his stick when he cannot remember where is was kept.

LITERATURE REVIEW

Several attempts have been made to design guard or obstacle avoidance devices for the blind using components with limited number of applications. This section will discuss some of these attempts and their shortcomings. For instance; [5] proposed a Smart Walking Stick for Visually Impaired. The proposed method is a simple walking stick equipped with sensors to give information about the environment. Reference [6] designed and implemented a Smart Stick for Obstacle Detection and Navigation. Their proposed system utilized infrared, ultrasonic and water sensors. It also used GPS and GSM module. GPS to give positioning and navigation to the stick. GSM module helps to give notifications when the blind person is faced with threats.

In [7] the Voice Enabled Smart Walking Stick for Visually Impaired persons was proposed. Their proposed system consists of a simple walking stick equipped with ultrasonic sensors to give information about the environment such as object detection, pit sensing and water sensing. GPS technology is integrated with preprogrammed locations to determine the optimal route that the blind should navigate. Also, a voice enabled equipment switching is provided to help the blind person in private domain. In [8] an Intelligent Walking Stick for the Blind was proposed. The proposed navigation device for the visually impaired is focused on providing voice output for obstacle navigation using infrared sensors, RFID technology, and android devices.

OBJECTIVE

The main objective is to design and implement the smart walking stick for blind people.

- To detect and warn the blind people that there is an obstacle on their way.
- To arm the blind person with a panic tool with the help of which the blind person is able to convey his location in the form of latitude and longitude to the registered mobile number.

The main advantage of the system is that it helps the blind people in both indoor and outdoor, care-free navigation. The devices placed in the stick makes it comfortable and easy to handle. The smart stick helps in detecting obstacles placed at a distance in front of the user. The system is suitable for both indoor and outdoor environment. The system is a moderate budget mobile navigational aid for the visually impaired.

PROPOSED SYSTEM

In the proposed system, the ultrasonic sensor is used to sense the obstacle distance from the user. This reference distance can be used to decide whether the user can move or not. The ultrasonic sensors work on the basis of sound. The sound waves are transmitted ahead from the sensors towards the obstacle which can sense the distance up to a distance of 12 feet with a resolution of 0.3cm. The system consists of a walking stick including a GPS Receiver, GSM module, Rain sensor, Ultrasonic sensor, Raspberry pi and a head phone attached to it. The raspberry pi is the central controller of the system. The

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

raspberry pi allows the ultrasonic sensor to continuously measure the distance of the obstacles appearing across it.

The Ultrasonic sensor calculates the distance by using the time taken for ultrasonic waves to reach and reflect from the obstacle. If the obstacle is within 50 meter range, then the ultrasonic sensor sends signal to the raspberry pi.

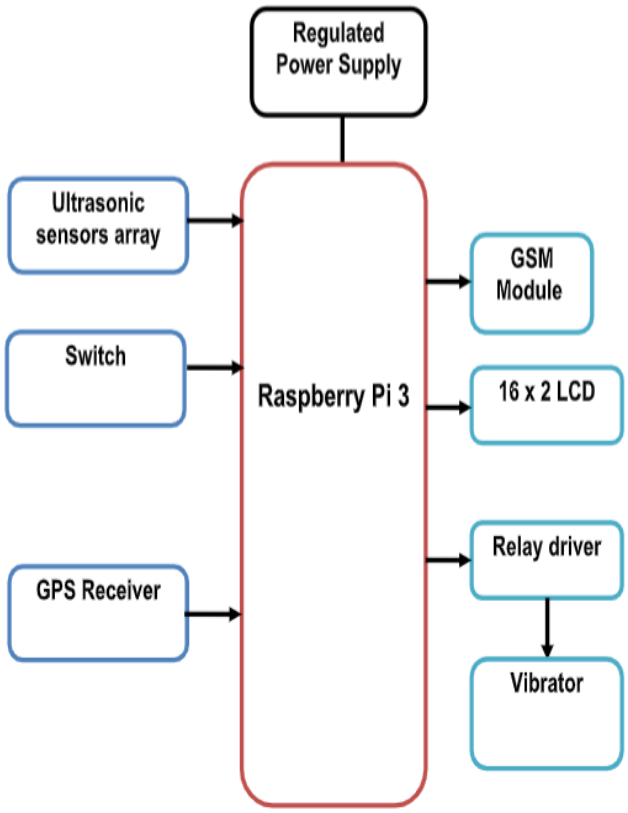

Fig.1 Proposed block diagram

WORKING METHODOLOGY

There will be 6 ultrasonic sensors which are placed at the top, middle and bottom of the stick. These sensors will read the distance continuously and send to raspberry pi. If any sensor reads less distance say 50 cm then vibrator should be ON and get the voice

Message through head phones as “take left” or Take right”. A push button switch is connected to the system which when pressed, send the SMS along with the location as URL to the concerned person like “I am here: Location”.

RESULTS

The experimental hardware setup is designed to implement Smart assistive wireless technology based smart cane for blind people as shown in below fig.

Fig.2 Typical Hardware setup

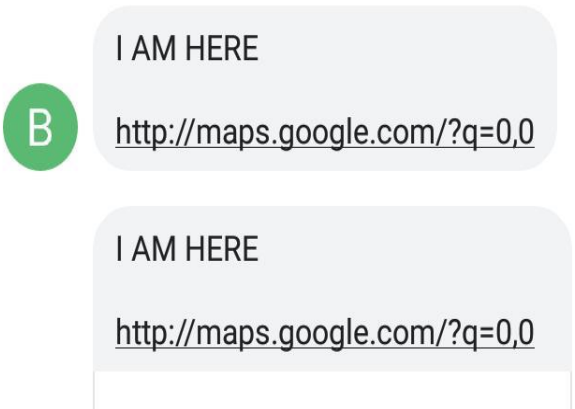

Fig.3: Getting information on mobile (SMS)

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

The above figure shows the information about location is tracked through GPS Receiver and sent through the particular mobile number as an SMS.

ADVANTAGES

- The system can be used both indoor and outdoor navigation.
- Detects obstacles and alerts the blind person through vibration alert and speech output.

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. This system is inexpensive, scalable, and highly efficient and it also provides fast response. As it uses a low powered Raspberry Pi board and efficient low powered sensors, it helps to atomize the industry in less cost and less energy which decreases overall cost of the atomization.

REFERENCES

[1]. R. Radhika, P.G. Pai, S. Rakshitha and R. Srinath "Implementation of Smart Stick for Obstacle Detection and Navigation." International Journal of Latest Research in Engineering and Technology, vol. 2, number 5, pp. 45-50, 2016.

[2]. M.H. Mahmud, R. Saha and S. Islam "Smart Walking Stick – An Electronic Approach to Assist Visually Disabled Persons." International Journal of Scientific and Engineering Research, vol. 4, number 10, pp. 111-114, 2013.

[3]. A. Jose, G. George, M.R. Nair, M. J. Shilpa and M. B. Mathai "Voice Enabled Smart Walking Stick for Visually Impaired." International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, vol. 5, pp. 80-85, 2016.

[4]. R. Sheth, S. Rajandekar, S. Laddha and R. Chaudhari "Smart White Cane – An Elegant and Economic Walking Aid." American Journal of Engineering Research. Vol. 3, number 10, pp. 84-89, 2014.

[5]. C.S. Kher, Y.A. Dabhade, S.K Kadam., S.D. Dhamdhere and A.V. Deshpande "An Intelligent Walking Stick for the Blind." International Journal of Engineering Research and General Science, vol. 3, number 1, pp. 1057-1062, 2015.

[6]. G. Balakrishnan, G. Sainarayanan, R. Nagarajan and S. Yaacob, Wearable RealTime Stereo Vision for the VisuallyImpaired, Engineering Letters, vol. 14, no. 2, 2007.

[7]. R. L. A. Kuranov and V. Pisarevsky, An empirical analysis of boosting algorithms for rapid objects with an extended set of Haarlike features, Intel Technical Report MRLTR-July 02-01, 2002.

[8]. R. Lienhart and J. Maydt, An extended set of Haar-like features for rapid object detection, presented at the IEEE International Conference on Image Processing, 2002.

Author Details

Ms. Varsha Subudhi
M.Tech
Department of Electronics & Telecommunication Engineering
Chh. Shahu College of Engineering,
Aurangabad, Maharashtra-431136, India.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Dr.U.B.Shinde
Principal
Chh. Shahu College of Engineering,
Aurangabad, Maharashtra-431136, India.

Prof. Sumera Ali
Professor
Chh. Shahu College of Engineering,
Aurangabad, Maharashtra-431136, India.