International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2020 IJSRCSEIT | Volume 6 | Issue 1 | ISSN : 2456-3307
DOI : 10.32628/CSEIT206116

A Review on Navigation System for Visually Impaired Using Smart Shoes

[1]Mayur K. Regundwar, [1]Mayur B. Burde, [1]Anurag G. Barde, [1]Anurag M. Rathod, [1]Saurabh Singh,
[2]Nitesh A. Ghodichor

[1]BE Scholar, Department of Computer Technology, Priyadarshini College of Engineering, Nagpur, Maharashtra, India

[2]Assistant Professor, Department of Computer Technology, Priyadarshini College of Engineering, Nagpur, Maharashtra, India

ABSTRACT

Blindness, low vision, visual debilitation, and vision misfortune impact affect people encountering such handicaps. These convey with them physiologically, mental, social, and financial results, subsequently affecting the personal satisfaction and denying such people from performing a considerable lot of the Activities of Daily Living, the most vital of which is route and versatility. 285 million individuals are assessed to be outwardly disabled around the world, out of which 39 million individuals are blind and 246 have low vision. Here we have overviewed the current arrangements implied for independent portability for the outwardly debilitated individuals. In this paper, we have proposed a novel plan, Smart Shoes with sensors installed in them to direct an outwardly impeded individual smoothly and to caution him/her of the obstructions that lay in front of him in his way. The structure is expected to build up a simple to utilize Android application to take into account the extraordinary needs, used to direct the individual coextending the highlights of the Smart Shoes.

Keywords : Visually impaired, Sensors, Embedded System, Navigation, Android, Smart Shoes

I. INTRODUCTION

Blindness is a subjective term that depicts the clinical condition whereby people have no light discernment because of complete vision misfortune. Blindness additionally alludes to the individuals who have so little vision that they need to depend overwhelmingly on different faculties as vision substitution abilities. Then again, visual weakness is a subjective term utilized when the state of vision misfortune is portrayed by lost visual capacities at the organ level, for example, the loss of visual sharpness or the loss of visual field.

Artificial Vision is the most significant piece of human physiology as 83% of data person gets from the earth is through sight. The insights by the World Health Organization (WHO) in 2014 appraisals that there are 285 billion individuals in the world with visual debilitation, 39 billion individuals who are blind and 246 with low vision. The most established and customary versatility helps for people with visual impedances are the strolling stick (additionally called white stick or stick) and guide hounds. The downsides of these guides are the scope of movement and almost no information passed on. With the quick advances of current innovation, both in equipment and programming front can possibly give wise route capacities. As of late, there has been a ton of Electronic Travel Aids (ETA) planned and formulated to assist the blind individuals with navigating securely and autonomously. Likewise, top of the line mechanical

arrangements have been acquainted as of late with assistance blind people explore freely.

The IR sensor and ringer will not give precise outcome to the blind individuals; this is the primary downside of past venture. In past undertaking IR sensor are the item-identifying sensor, the issue related with these reasons and less effectiveness and misfortune the exactness to recognize article and one more issue is it will not give clean data to blind individuals.

With the fast advances of current innovation, both in equipment and programming front can possibly give insightful route abilities. As of late, there has been a great deal of Electronic Travel Aids (ETA) planned and conceived to assist the blind individuals with navigating securely and freely. Additionally, top of the line mechanical arrangements have been acquainted as of late with assistance blind people explore autonomously. In this undertaking, an exertion has been made to improve the nature of the framework to be progressively useful for blind individuals. In this undertaking, the framework is has been made as a piece of the blind individual's shoe. Furthermore, in this venture, we are utilizing ultrasonic sensors and speaker, which give more precision of article recognition and given clean data to blind individuals separately.

II. LITERATURE REVIEW

S.Gangwar [1] designed a smart stick for blind that can give early warning of an obstacle using Infrared (IR) sensors. After identifying the obstacles, the stick alerts the visually impaired people using vibration signals. However, the smart stick focused only for obstacle detection but it is not assisting for emergency purposes needed by the blind. In addition, the IR sensors are not efficient enough because it can detect only the nearest obstacle in short distance.

S.Chew [2] proposed the smart white cane, called Blind spot that combines GPS technology, social networking and ultra- sonic sensors to help visually impaired people to navigate public spaces. The GPS detects the location of the obstacle and alerts the blind to avoid them hitting the obstacle using ultra-sonic sensors. However, GPS did not show the efficiency in tracing the location of the obstacles since ultra-sonic tells the distance of the obstacle.

Benjamin etal [3] had developed a smart stick using laser sensors to detect the obstacles and down curbs. A high pitch “BEEP” using a microphone signalized obstacle detection. The design of the laser cane is very simple and intuitive. The stick can only detect obstacle, but cannot provide cognitive and psychological support. There exists only beep sound that triggers any obstacle and there is no any assistance to direct them.

Central Michigan University [4] developed an electronic cane for blind people that would provide contextual information on the environment around the user. They used RFID chips which are implanted into street signs, store fronts, similar locations, and the cane reads those and feeds the information back to the user . The device also features an ultrasound sensor to help to detect objects ahead of the cane tip. The Smart Cane, which has an ultrasonic sensor mounted on it, is paired with a messenger- style bag that is worn across the shoulder. A speaker located on the bag strap voice alerts when an obstacle is detected and directs the user to move in different direction.

Mohd Helmyabd Wahab and Amirul A. Talibetal [5] developed a cane could communicate with users through voice alert and vibration signal). Ultrasonic sensors are used to detect obstacle in front, since ultrasonic sensors are good in detecting obstacle in few meters range and this information will be sent in the form of voice signal. This voice signal is send via speaker to the user. Here blind people might find it

difficult in travelling without any emergency alert rather than having only ultrasonic sensors.

Alejandro R. Garcia Ramirez and Renato Fonseca Livramento da Silvaetal [6] designed an assistive technology device called the electronic long cane to serve as a mobility aid for blind and visually impaired people .The author implements the cane with an ergonomic design and an embedded electronic system, which fits inside the handle of a traditional long cane. The system was designed using haptic sensors to detect obstacles above the waistline. It works in such a way when an obstacle is detected; the cane vibrates or makes a sound. However, this system only detects obstacle above the waistline.

Joao José, Miguel Farrajota, Joao M.F. Rodrigues [7] designed a smart stick prototype. It was small in size, cheap and easily wearable navigation aid. This blind stick functions by addressing the global navigation for guiding the user to some destiny and local navigation for negotiating paths, sidewalks and corridors, even with avoidance of static as well as moving obstacles . Rather than that, they invented a stereo camera worn at chest height, a portable computer in a shoulder-strapped pouch or pocket and only one earphone or small speaker. The system is inconspicuous, and with no hindrance while walking with the cane. In addition, it does not block normal sound in the surroundings.
Shruti Dambhare and A.Sakhare [8] designed an artificial vision and object detection with real-time assistance via GPS to provide a low cost and efficient navigation aid for blind which gives a sense of artificial vision by providing information about the environmental scenario of static and dynamic objects around them.

III. PROPOSED SYSTEM

This project is intended to be developed as tool or aid that will help blind people in moving or travelling. The dependency on others is reduced and these people can become more self-reliant. The project is built around ARDUINO UNO controller. The project has features to detect obstacles using ultrasonic module and IR module in conjunction. These sensors are mounted on the shoes of the blind person. The person is alerted and will information on the surroundings. The project mainly consists of many important electronic components, and has the Arduino Microcontroller. The circuit consists of the following:

- Microcontroller ARDUINO UNO.
- Vibration unit.
- Ultrasonic distance measurement module.
- Gyroscope interface.
- Power supply.

Figure 1 shows the block diagram of the proposed System.

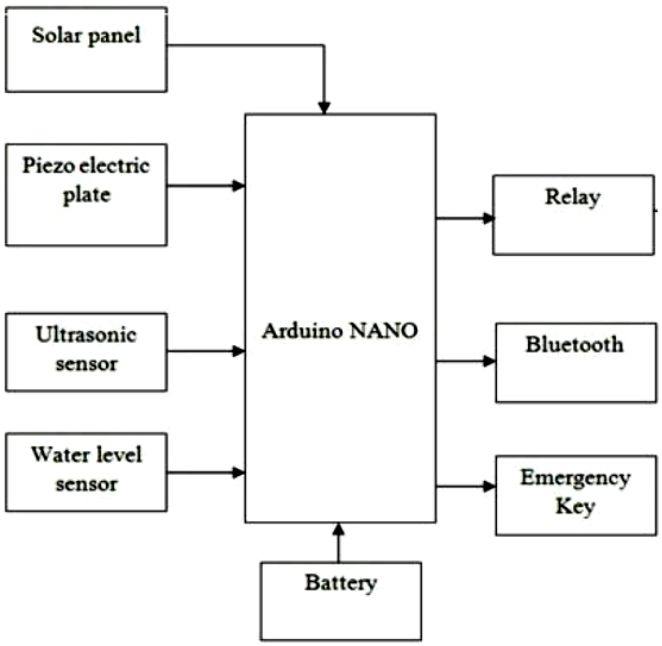

Figure 1. Block Diagram

IV. CONCLUSION

This paper proposes a model-driven procedure that consequently changes time-sharing Java applications to realtime applications in RTSJ. This approach facilitates the improvement of real-time systems by

permitting programming architects to build real-time Java applications without essential information on the RTSJ programming particular. What's more, the proposed technique is good to those associations with a need to re-build up their items to have real-time highlights. The proposed philosophy gives a real-time framework improvement arrangement that diminishes programming advancement cost, builds profitability and wipes out human-related blunders. In this paper, a total standard Java to RTSJ change automation engineering is given required activities during every change stage portrayed in detail. What's more, change rules are exhibited for producing major RTSJ offices and the RTSJ run-time condition dependent on the JamaicaVM with the given data sources.

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Cite this article as :
Mayur K. Regundwar, Mayur B. Burde, Anurag G. Barde, Anurag M. Rathod, Saurabh Singh, Nitesh A. Ghodichor, "A Review on Navigation System for Visually Impaired Using Smart Shoes", International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), ISSN : 2456-3307, Volume 6 Issue 1, pp. 87-90, January-February 2020.
Journal URL : http://ijsrcseit.com/CSEIT206116