ULTRASONIC BLIND WALKING STICK THROUGH IOT

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Abstract: Blind stick is an innovative stick designed for visually disabled people for improved navigation. We here propose an advanced blind stick that allows visually challenged people to navigate with ease using advanced technology.

Our proposed system mainly focused on Detection of Obstacles, Finding the forgotten blind stick within the limited distance using Bluetooth, manhole detection. We use ultrasonic sensors to detect obstacles around the blind person. if the obstacle finds, then the buzzer will make a sound so that the blind person can easily understands there is an obstacle. The system has one more advanced feature integrated to help the blind to find their stick if they forget where they kept it. Bluetooth module is used for this purpose. If there is any manhole near by the person then the stick will give a sound.

Key words: Ultrasonic sensors, visually impaired person, Node mcu.

I. Introduction:

Visually impaired people are the people who find it difficult to recognize the smallest things near to them. Those who have the visual acuteness of 6/60 or the horizontal range of the visual field with both eyes open have less than or equal to 20 degrees. These people are regarded as blind. The main problem of blind is how to navigate their way to wherever they want to go. So, for ease navigation they use white cane and guide dogs. The below pie chart 1.1.1 shows visually disabled people across the world according to WHO. Blind stick is an innovative stick designed for visually disabled people for improved navigation. We here propose an advanced blind stick that allows visually challenged people to navigate with ease using advanced technology. The blind stick is integrated with 3 ultrasonic sensors, NODEMCU, 2 buzzers, Bluetooth. ultrasonic sensors to detect obstacles ahead within the range 2cm-450cm using ultrasonic waves. On sensing obstacles, the sensor passes this data to the NODEMCU. The NODEMCU then processes this data and calculates if the obstacle distance is close enough. If the obstacle is not that close the circuit does nothing. If the obstacle is close the NODEMCU then it sends a signal to the blind person. And one buzzer is for detecting the obstacle which is left side of the person and another buzzer is for detecting obstacle which is right side of the person.

Recently, much research effort has been focused on the design of Electronic Travel Aids (ETA) to aid the successful and free navigation of the blind. Also, high-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. Bluetooth module will help the person to find the stick wherever it is placed. Whenever person wants to find it, by using Bluetooth terminal app he connects to the Bluetooth module, by clicking any button in the app the buzzer gives signal to the blind person. Thus, person can find misplaced stick.

A Smart Walking Stick which is an Electronic Approach to Assist Visually Disabled Persons. Their device is a Node Mcu based automated hardware that can assist a blind to detect obstacles in front of him/her promptly. This hardware consists of Node Mcu Esp-32 pin with ultrasonic sensor for obstacle detection. The simplicity of the proposed design makes it easy to use by any person and at the same time the cost of manufacturing such sticks is kept low. The power consumption of the proposed stick is low and can be operated easily. It is also very cheap compared to the conventional ones. Obstacle and hole can be determined easily by sensor readings. Also, it can be code-protected so that its security cannot be overridden except by the user or vendor. The proposed system used four Ultrasonic detectors which are for object detection, man hole detection, finding the misplaced stick by using Bluetooth. When the person connected to the Bluetooth then it paired and gives the vibration on stick by clicking the buttons. Thus, Person can find that misplaced stick.

II. EARLY HISTORY

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors and network connectivity, which enables these objects to collect and exchange data. IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct interactions between the physical world and computer-based systems and resulting in improved efficiency, accuracy and economic benefits.

"Things", in IoT, can refer a wide variety of devices such as heart monitoring implants, bio chip transponders on farm animals, electric clams in coastal waters, automobiles built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring or field operation that assists fire-fighters in search and rescue operations. These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices.

Internet of Things is not the result of a single novel technology, instead, several complementary technical developments provide capabilities that taken together help to bridge the gap between the virtual and physical world.

III. APPLICATIONS

Some of the Applications of Internet of Things are:

a. Smart Home has become the revolutionary ladder of success in the residential spaces and it is predicted Smart homes will become as common as smart phones.

b. Wearable devices are installed with sensors and software's which collect data and information about the users.

c. Smart city is another powerful application of IoT generating curiosity among world's population. Smart surveillance, automated transportation, smarter energy management systems, water distribution, urban security and environmental monitoring all are examples of internet of things applications for smart cities.

d. Connected healthcare yet remains the sleeping giant of the Internet of Things applications.

e. Livestock monitoring is about animal husbandry and cost saving. Using IoT applications to gather data about the health and well-being of the cattle, ranchers knowing early about the sick animal can pull out and help prevent large number of sick cattle.

IV. EXISTING SYSTEM

Existing System:

In existing system blind people used white cane and dogs became a well-known attribute to blind person's navigation. Blind people have big problem when they walk on the street or stairs using white cane. later efforts have been made to improve the cane by adding remote sensor**.**

White cane:The most popular mobility hand held aid. It is usually foldable and adjustable to the height of the user. A blind person using swing-like movements, "scan" the path in front in approx.

Guidance of Dog:A specially trained dog assisting the blind in obstacle avoidance, but usually not aiding in way finding (unless travelling a familiar path), e.g. the dog is trained to stop before obstacles, reacts to commands on walking directions.

V.PROBLEMS WITH EXISTING SYSTEM

1. The system developed here is a moderate budget navigational aid for visually impaired people.
2. Minimisation in cost leads to compensation in performance

VI. PROPOSED SYSTEM

Our proposed system uses ultrasonic sensors to detect obstacles around using ultrasonic waves. On sensing obstacles, the sensor passes this data to the Node Mcu. The Node Mcu then processes this data and calculates if the obstacle is close enough. If the obstacle is not that close the circuit does nothing. If the obstacle is close the Node Mcu sends a signal to sound a buzzer. This system has one more advanced feature integrated to help the blind find their stick if they forget where they kept it, with the help of bluetooth blind people will find the stick. Pressing the button in the smart phone sounds a buzzer on the stick which helps the blind person to find their stick. And also, while detecting the manholes it vibrates. Thus, this system allows for obstacle detection as well as finding stick if misplaced by visually disabled people.

VII. WORK FLOW FOR PROPOSED SYSTEM

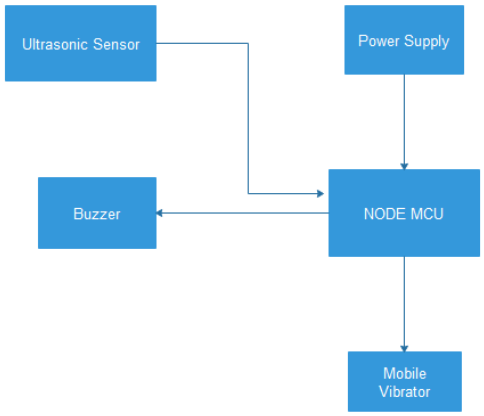

Fig: 7.1 Flow chart for working of the Proposed System.

The above Figure 7.1 shows the work flow operations of all the sensors, Arduino board, light and Buzzer.

Steps

Ultrasonic sensors to detect obstacles around using ultrasonic waves. On sensing obstacles, the sensor passes this data to the Node Mcu. The Node Mcu then processes this data and calculates if the obstacle is close enough. If the obstacle is not that close the circuit does nothing. If the obstacle is close the Node Mcu sends a signal to sound a buzzer. This system has one more advanced feature integrated to help the blind find their stick if they forget where they kept it,with the help of bluetooth blind people will find the stick. Pressing the button in the smart phone sounds a buzzer on the stick which helps the blind person to find their stick. And also, while detecting the manholes it vibrates. Thus, this system allows for obstacle detection as well as finding stick if misplaced by visually disabled people.

VIII. NEED FOR PROPOSED SYSTEM

1. The system can be used both indoor and outdoor navigation.
2. Blind person's location can be tracked whenever needed which will ensure additional safety.
3. Detects obstacles and alerts the blind person through vibration alert and speech output.

IX. CONCLUSIONS AND FUTURE SCOPE

It is worth mentioning at this point that the aim of this study which is the design and implementation of a smart walking stick for the blind has been fully achieved. The Smart Stick acts as a basic platform for the coming generation of more aiding devices to help the visually impaired to navigate safely both indoor and outdoor. It is effective and affordable. It leads to good results in detecting the obstacles on the path of the user in a range of three meters. This system offers a low-cost, reliable, portable, low power consumption and robust solution for navigation with obvious short response time. Though the system is hard-wired with sensors and other components, it's light in weight. Further aspects of this system can be improved via wireless connectivity between the system components, thus, increasing the range of the ultrasonic sensor and implementing a technology for determining the speed of approaching obstacles. While developing such an empowering solution, blind people in all developing countries were on top of our priorities. The device constructed in this work is capable of detecting obstacles, finding misplaced blind stick and manhole detection.

For future enhancements, more powerful sensors can be integrated in the project to provide the detection of obstacles in a wider range.Project could be enhanced by using other techniques such as RFID for indoor navigation Camera to make it easier for the blind to recognize objects faced him.The project could be developed by design a mobile application that identify blind his location and guide him to right way with help of headphones and google mapping.

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