BLIND STICK USING ULTRA SONIC SENSOR WITH VOICE ANNOUNCEMENT

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ABSTRACT

This project present to design and implementation of Blind Stick using ultrasonic sensor with voice announcement. In this world visually challenged people are facing so many problems in their everyday life. Often, have a difficult time to navigate outside environment.

The main aim of this project is to assist the blind persons without the need of another person. It is well known that the blind people carry a hand stick with them whenever they need a support. Sometimes even when they use this stick, there is no guarantee that the blind persons are safe and secured in reaching their destinations. There may be an obstacle in their path but is not encountered by the person with the help of the stick. Thus, the people may be injured if the obstacle is big enough or dangerous. Thus, a design has been developed to assist the blind and provide them a clear path.

Now a day's so many useful technologies are coming out to make our lifestyle more comfort, luxurious and secure. In this project we use

ultrasonic module to detect the object and APR9600 micro controller to play distance through voice alert.

This system not only detects the obstacle, but it also tells the object distance from user so that the user can have a clear idea of turning in his walk. By using this Ultra sonic distance module, we can find obstacle distance within 3 meters range. The information about obstacle distance can be played through speaker or through headphone for more convenience.

To play the voice messages we do not need any separate voice module because we can play that voice from APR9600 microcontroller directly by saving prerecorded voice message in micro controller's memory in the form of binary.

1. INTRODUCTION

The visually impaired are at a considerable disadvantage because they often lack the information for avoiding obstacles and hazards in their path. They have very little information on self- velocity, objects, direction which is essential for travel. The system designed will detect an object or obstacle using ultrasonic sensors and gives audio instructions for guidance. An obstacle as close to minimum distance can be detected by this module. A resolution of obstacle distance has been designed and achieved. It is very important to maintain efficient information while traveling to the blind people. This system has been aimed at design and development of a smart and intelligent blind stick which helps in navigation for the visually impaired people.

The navigator system designed will detect an object or obstacle using ultrasonic sensors and gives audio instructions for guidance. The algorithm developed gives a suitable audio instruction depending on the duration of ultrasound travel. We developed this system to detect the obstacle while travelling and give voice notification to visually impaired people. In this paper, a solution is proposed to move safely and detect obstacle in their path. Solution was composed of a foldable stick with a pair of IR sensor mounted on it. Connected to an earphone to alert the blind with speech warning message about the detected obstacle. The most common tool that the blind currently use to navigate is the standard white cane. We decided to modify and enhance the walking cane, since blind are only able to detect objects by touch or by cane.[1] In the past different systems are designed with limitations without a solid understanding of the non-visual perception.

Some of the systems are only for indoor navigations, and has no hurdle detection and determining location feature in outdoor environment. Researchers have spent the decades to develop an intelligent and smart stick to assist and alert visually impaired persons from obstacles and give information about their location The user sweeps the cane back and forth in front of them. When the cane hits an object or falls off of the edge of a stair, the user then becomes aware of the obstacle – sometimes too late. We accomplished this goal by adding ultrasonic sensors at specific positions to the cane that provided information about the environment to the user through audio feedback. Total blindness is the complete lack of form and visual light perception and is clinically recorded as NLP, an abbreviation as "no light perception". Blindness is frequently used to describe severe visual impairment with residual vision.

Those described as having only light perception have no more sight than the ability to tell light from dark and the general direction of a light source. The system has been developed using both the hardware and software implementations. The main component of this system is the Radio-Frequency module which is used to find the stick if it is misplaced around. By examining and analyzing earlier systems, we were able to design a new system that would be able to address the shortcomings of the older ones. Therefore, we offer a better solution to the mentioned problem by utilizing the technologies that are now in use. There are great deals of

blind persons in society who struggle to do even the most basic tasks, which puts lives in danger when traveling.

These days, it is essential to give blind individuals security and safety. To yet, not many tools have been created to assist the blind. In addition to light and water sensors, the blind stick has an embedded Ultrasonic sensor First, our suggested project makes use of an ultrasonic sensor to find obstructions without touching it using ultrasonic waves. The sensor transmits this data/8 to the microcontroller upon detecting obstructions. After processing this data, the microcontroller determines whether the obstruction is sufficiently close. When an impediment is far away, the circuit accomplishes nothing. However, a buzzer is activated by the microcontroller if an obstruction is in near proximity. Additionally, it detects water, and when it does, the buzzer will sound differently to inform the blind person. An additional feature is that it enables the blind individual to discern whether the room is dark or light.

An additional sophisticated component of the system is added to assist the blind person in finding their stick in the event that they misplace it. To locate the misplaced stick, an RF-based wireless remote is utilized.by pressing the remote button sounds a buzzer on the stick. Aids with the blind person's stick finding. Therefore, this approach enables visually impaired individuals to detect obstacles and locate a stick if it is Misplaced. A blind person can identify any barrier in front of them using an ultrasonic sensor. Its detection range is 2 to 450 cm, so if there's an obstruction within that range, it will notify the blind user.

2. LITERATURE SURVEY

Mobility and independence are essential for individuals with visual impairments. Traditional white canes have limitations in detecting obstacles above waist level and identifying the nature of the obstacle. Ultrasonic sensors have been widely explored to augment the functionality of white canes, providing additional information about the environment.

Existing Approaches:

A smart stick has been built for the visually impaired people that helps to detect obstacles with the use of infrared, ultrasonic and water sensors. Obstacles within the distance of about 3m can be detected with the help of these sensors. Also, we make use of GPS module to give positioning and navigation to the stick. Using GPS module assists the blind person to reach his destination. While the blind person navigates, the GPS receiver gets the location of the person updated and the co-ordinates of that location can be used to keep track of the blind person for safety concerns. The blind person can also send emergency message or make an emergency call at times of risk, to his guardian, using GSM module. In this way, the GSM module will be used to give notifications when the blind person has threats.

Numerous attempts have been made in the society to help the blind. "Project Prakash" is a humanitarian mission to help the blind children especially by training them to utilize their brains to learn a set of objects around them. In, the stick has a ping sonar sensor to sense the distant objects. It also has a wet detector to detect the water. The microcontroller used is PIC microcontroller. The microcontroller circuit is on the outside of the stick but is protected with a code so its security cannot be breached. The only feedback given to the user is through the vibration motor. In three sensors are used viz. ultrasonic, pit sensor and the water sensor. Even this is a PIC based system. The feedback given is through the vibration as well as the speaker/headphones. There is a GPS system where-in the user must feed his location. In, the author has made a detachable unit consisting of an ultrasonic sensor and a vibration motor. It can be fit on any stick. It detects obstacles up to 3m. The vibration feedback varies in the intensity as the obstacle comes nearer. Many different approaches have been taken with the

primary purpose of creating a technology to aid the visually impaired. The priorities set by different authors are different leaving a scope of improvement in every application. Smart Cane has been designed by students from Central Michigan University where this invention uses Radio Frequency Identification (RFID). RFID is used to detect objects or obstacles in front of the user and detects the RFID tag that has been placed in several areas to navigate the users. This invention is just like a normal stick but is equipped with a bag, worn by the user. The bag supplies electricity power to the invention and informs the user through speakers inside the bag. For users who do not have the ability to hear, there are special gloves that will vibrate at every finger, in which different vibrations in each finger have different meaning.

The application of engineering practices in medicine has immensely contributed to the recent findings in biomedical research areas. One of the products of this application is the development of sophisticated aids for physically challenged people. In this paper, visually impaired walking aid is designed and implemented using a network of ultrasonic sensors, thereby capable of detecting the direction and position of obstacle(s). The performance and functionality are also improved by the addition of alert light, and voice guidance signal which is relayed to a miniature headset. The recorded voice alerts the user of the presence and direction of the obstacle(s). The prototype of the multidimensional walking aid was able to detect obstacles within the range of 0m to 1m at the left, right and front of the stick with an appropriate voice alert. The test results of the prototype showed that the stick can effectively guide its user.

The aim of this paper is 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. The paper presents a theoretical model and a system concept to provide a smart electronic aid for blind people. The system is intended to provide overall measures – Artificial vision, object detection and emergency messaging facility the use ultrasonic sensors to calculate distance of the obstacles around the blind person to guide the user towards the available path. Output is in the form of beeps which the blind person can hear. GPS and GSM are used to acquire the exact location of the blind person at times of emergency and send the co-ordinates to his relatives or caretaker. The hardware consists of Arduino mega board, ultrasonic sensors, infrared sensor, GPS, GSM and two speakers.

Today technology is growing to a bigger extent, but there's no price effective device for visually impaired folks. For a visually impaired person it becomes not possible to try to his/her day-to-day activities, so sensible Blind stick will facilitate visually impaired folks in moving and permitting them to perform their work simply. The sensible stick can have sensors embedded with it, thereby it senses the objects/intruder, once associate objects or obstacles are available in vary of a supersonic device then the person is alerted with a fast reaction time employing a vibrator. The general system conjointly encompasses a GPS module, so the person with incapacity will recognize this location with the assistance of an electro-acoustic transducer and a speaker. this technique conjointly has a feature wherever within which the person with incapacity will contact to a particular person whose range is keep in an exceedingly microcontroller just in case of any emergency obstacle detection. coming up with a price effective and economical blind stick is that the main aim of the project.

The design of intelligent stick for blind and deaf that will not only detect any kind of obstacle including water but will also contain vibratory mechanism to aware the person holding stick. Results: The white cane is the most widely used travel aid for blind persons, but it is not suitable for detecting potentially dangerous obstacles. The deaf persons can see the obstacles, but they

cannot hear the sounds such as car horns, which can be really dangerous. Moreover, intelligent GPS/GPRS based system has been included in the design that will send the exact location of the person if some mishap occurs. Conclusion: The proposed solution for blind persons is tested and it works effectively

3. PROPOSED SYSTEM

3.1 Block diagram

The general block diagram of the overall system is shown below. The system consists of an Arduino Uno, RFID cards, RFID readers, a door sensor, a buzzer, a GSM module, and an ESP32 camera.

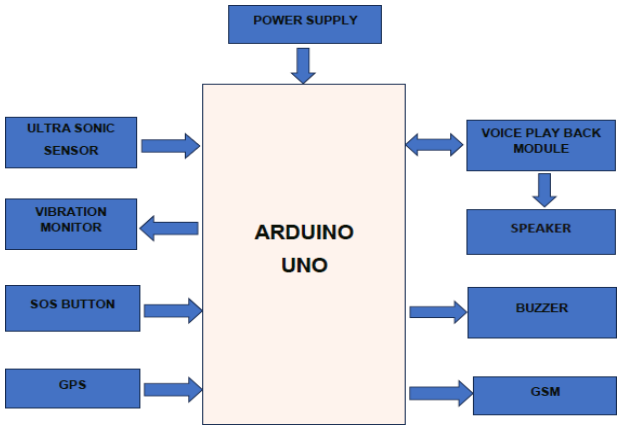

Fig 3.1 System Block diagram

3.2. Designed System

This stick is used to assist the blind persons without the need of another person. It is well known that the blind people carry a hand stick with them whenever they need a support. Sometimes even when they use this stick, there is no guarantee that the blind persons are safe and secured in reaching their destinations. There may be an obstacle in their path but is not encountered by the person with the help of the stick. Thus, the people may be injured if the obstacle is big enough or dangerous. Thus, a design has been developed to assist the blind and provide them a clear path.

This system structure consists of ultrasonic sensor (HC-SR04) with arduino uno, vibration motor, GPS,GSM module along with voice module. This stick works to assists blind person to given the instruction to blind person.

Ultrasonic Sensor: An ultrasonic sensor is mounted on the blind stick. This sensor emits ultrasonic waves (sound waves with a frequency higher than the audible range for humans) and then listens for the waves to bounce back after hitting an object.

Distance Calculation: By measuring the time it takes for the ultrasonic waves to bounce back, the sensor can calculate the distance to the object in front of it. This distance measurement helps in detecting obstacles in the user's path.

Obstacle Detection: If the sensor detects an obstacle within a certain range (which can be set based on the user's preference), it sends a signal to a feedback mechanism, such as a vibration motor or an audible alert, to notify the user.

User Feedback: The feedback mechanism provides the user with information about the presence of obstacles, helping them navigate safely.

Adjustable Sensitivity: The sensitivity of the sensor can often be adjusted to detect obstacles at different distances, depending on the user's needs and environment.

4. RESULTS

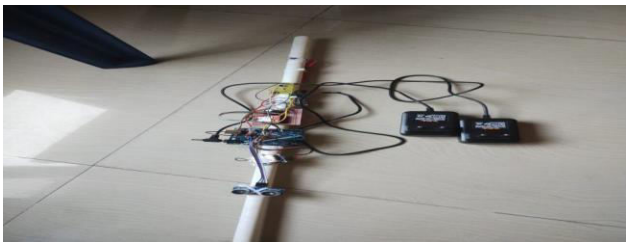

Fig 4.1: Structure of Blind Stick

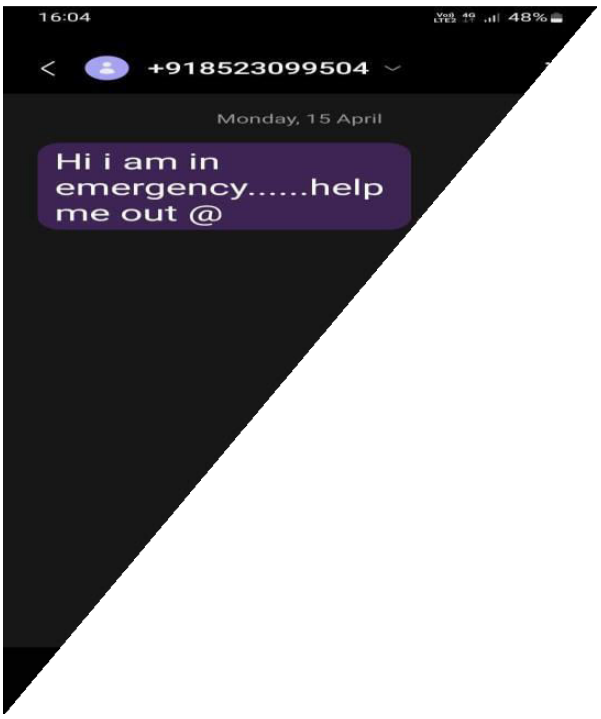

Fig 4.2 Emergency Message

5. CONCLUSION AND FUTURE SCOPE

CONCLUSION

In the conclusion, this project comprises of some hardware parts like GSM module, ultrasonic sensor, Arduino UNO, and vibrator. Programming used in Arduino is visual basic. We can alsouse c/c++ as the programming in Arduino UNO. There are two primary objectives of the project first one is to enhance the mobile capability and second one is to inform the known person through the message if the person is in danger zone. To increase the mobile capacity of the impaired person, vibrator and ultrasonic sensor are used. If any object is exist in front of the blind person then he will recognize the obstacle before getting touch. It is suitable to travel in the unknown environment for the blind person and enhance the safety. By implementing this an impaired person can move to an unfamiliar environment without any human guidance. The blind people can move more positively and independently.

It sends the message to a registered mobile number if the blind person is in a danger.

The hardware and software of the project had been successfully integrated and worked to meet the requirements. The prototype of a smart cane is built and the function meets the objectives of this project.

The equipment and programming of the venture had been effectively coordinated and attempted to meet the necessities. The model of the smart stick is built and the functionality capacity meets the main motive of the project.

FUTURE SCOPE

There is some future scope to fulfill the requirement by the smart stick. Obstacle detection capability of this project can be increased by introducing the ultrasonic sensor which has better accuracy and precision angle width. We can introduced GPS system to find the exact location of the person. By implementing voice recognition system we can improve the accuracy of the project.

It can be further by using VLSI technology ti design the PCB unit. This makes the system further more compact.Also, use of RFID tags will transmit the location information automatically to the PCB unit, when the intelligent stick is in its range. The global position of the user is obtained using the global positioning system,and their current position and guidance to their destination will be given to the user by voice.

REFERENCES

[1] Nowak, Michal, et al. "Characteristics of refractive errors in a population of adults in the central region of Poland." International journal of environmental research and public health 15.1 (2018): 90.

[2] 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.

[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] O. O. Olakanmi, "A Multidimensional Walking Aid for Visually Impaired Using Ultrasonic Sensors Network with Voice Guidance", International Journal of Intelligent Systems and Applications (IJISA), vol. 6, number 8, pp. 53-59, 2014. DOI: 10.5815/ijisa.2014.08.06

[5] B.G. Roopashree, B.S. Patil and B.R. Shruthi "Smart Electronic Stick for Visually Impaired." International Journal of Innovative Research in Science, Engineering and Technology, vol. 4, number 7, pp. 6389-6395, 2015.

[6] 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.

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

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

[9] 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 2016V.