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Smart Blind Stick

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Abstract: *Visually impaired people find difficulties detecting obstacles in front of them, during walking in the street, which makes it dangerous. The smart stick comes as a proposed solution to enable them to identify the world around. We propose a solution, represented in a smart stick with ultrasonic sensor to detect any other obstacles in front of the user, within a range of few meters. Moreover, another sensor is placed at the bottom of the stick for the sake of avoiding puddles. GSM messages (warning message), vibration motor & accelerometer are activated when any obstacle is detected. This proposed system uses the Arduino UNO, vibration motor, GSM messages (warning message), vibration motor & GPS etc. The stick is capable of detecting all obstacles in the range few meter during 39 m/s and gives a suitable respect message empowering blind to move twice his normal speed because she/he feels safe. The smart stick is of low cost, fast response, low power consumption, light weight and ability to fold.*

Keywords: Blind stick

I. INTRODUCTION

The survey of WHO carried out in 2011 tells us that in world about 1% of the human population is Visually impaired and amongst them about 10% is fully blind. People find difficulties detecting obstacles in front of them, during walking in the street, which makes it dangerous. The smart stick comes as a proposed solution to enable them to identify the world around. The main problem with blind people is mobility. This project proposes a tool for visually impaired people that will provide them navigation.

We propose a solution, represented in a smart stick with ultrasonic sensor to detect any other obstacles in front of the user, within a range of few meters. Moreover, another sensor is placed at the bottom of the stick for the sake of avoiding puddles. GSM messages (warning message), vibration motor & accelerometer are activated when any obstacle is detected. This proposed system uses the Arduino UNO, vibration motor, GSM messages (warning message), vibration motor & accelerometer. Long white cane is a traditional mobility tool used to detect obstacles in the path of a blind person we are modifying this cane with some electronic components and sensors so that cane can become smart cane. The stick is capable of detecting all obstacles in the range few meter during 39 m/s and gives a suitable respect message.

II. LITERATURE SURVEY

Sylvain Cardin, Daniel Thalmann and Frederic Vexo[1] used stereoscopic architecture to develop new obstacle sensing abilities. First they determine from which direction the obstacles are coming from. There are vibrators on left and right shoulder of user. With these vibrators he can detect the position of the obstacle. Then user in this system will be able to position himself.

Osama Bader AL-Barrm, JeenVinouth [2] proposed that detects the obstacles in the path of the blind using ultrasonic sensors. It consists of these sensors to scan three different directions, a microcontroller, buzzer and DC vibration motor. The buzzer and vibration motor is activated when any obstacle is detected. In addition, the stick is equipped with GPS and SMS message system.

B.Mohan Sitaramaiah, M.Naganaik [3] this system has ability of overcoming the drawbacks with the existed technologies like guide cane and talking signs that they are only giving a support while they are walking, but not avoiding the accidents due to some vehicles and man holes. The existed systems are also failed in information sending in case of emergencies. This system enhances blind system assistance with ultrasonic sensors. The system consists of two ultrasonic sensors modules, voice playback module, and a vibration motor. The ultrasonic sensors will monitor the objects in front of them. The sensor placed in front direction to the system will detects if any obstacles are present in front of the blind person path. Another sensor placed in back direction of the system will measure the distance from the objects to the blind person.

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The voice module will play the corresponding voice for intimating the blind person about the danger happening. The vibration motor is useful in case of person is in traffic and if the voice output is not audible in busy areas. In an addition, there is a GSM module connected to the system, for providing the information exchanging from the blind people.

F. van der Heijden, P.P.L. Regtien [4] this paper describes the system architecture for a navigation tool for visually impaired persons. The major parts are: a multi-sensory system comprising stereo vision, acoustic range finding and movement sensors, a mapper, a warning system and a tactile human-machine interface. There are three main sensors in this project stereovision, optical flow, and sonar.

Srirama Divya, B. Navya, P. Suma manasa, S. Chitra [5] 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 and object detection. The aim of the overall system 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. Ultrasonic sensors are used to calculate distance of the obstacles around the blind person to guide the user towards the available path. Output is in the form of voice which the blind person can hear e.g., right, left etc. The hardware consists of Arduino Uno board, ultrasonic sensors and speaker.

Ankit Agarwal, Deepak Kumar, Abhishek Bhardwaj [6] this paper proposes an economical ultrasonic stick for visually challenged people, so as to gain a personal Independence and free from the external help. A portable user friendly device is developed that can identify the obstacles in the path using ultrasonic sensors and Camera. Ultrasonic sensors can scan three different directions (at 180o). Camera can be used as an alternative tool in the places that surrounds with the low signal coverage, a microcontroller, buzzer and vibrating motor. The buzzer and vibration motor is activated when any obstacle is detected. GPS system provides the information regarding to his current location.

III. PROBLEM STATEMENT

Blind people can't easily recognize obstacles or stairs while using normal blind stick. No safety features on the normal blind stick Can't locate the locations of the normal blind stick user when they are having an emergency problem or lost in public area.

IV. PROPOSED SYSTEM

In this proposed system an ultrasonic sensor is ar\ranged to detect the obstacles. RF transmitter and receiver are there in this project. The transmitter will be with the person if the caretaker presses the switch in RF transmitter, then the buzzer will ON to locate the Stick. When obstacle is near then buzzer alert will be given. The main microcontroller here is Arduino Nano.

IV. METHODOLOGY

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 ultrasonic sensor along with light and water sensing. Our proposed project first uses ultrasonic sensors to detect obstacles ahead using ultrasonic waves. On sensing obstacles, the sensor passes this data to the Arduino Uno. The Arduino uno 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 Arduino Uno sends a warning in the form of voice. It also detects and sounds a different buzzer if it detects water and alerts the blind. The stick also includes the vibrator. If the obstacle is close the Arduino uno sends a warning through vibration. Water detection is done by water sensor. One more feature is that it allows the blind to detect if there is light or darkness in the room. The system has one more advanced feature integrated to help the blind find their stick if they forget where they kept it. A wireless RF based remote is used for this purpose. Pressing the remote button sounds a buzzer on the stick which helps the blind person to find their stick.

V. DESIGN OF PROPOSED SYSTEM

During the evaluation of this method, opinions on individuals with visual impairments were formed through discussions and interviews with users to identify resources designed for blind people with disabilities. The Design of a Stick Prototype for People with Visual Impairment Using Ultrasonic Esp8266 is discussed below. The views of blind people are one of

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the subjects addressed to receive feedback/appraisal from users. Three users were given the task of rating the prototype, as well as trying it out and responding to the statements made. Based on the findings, it can be inferred that ultrasonic sensor sticks have proven to be extremely beneficial to blind people. This prototype has reduced the risk of blind people getting into accidents in difficult road structures with many obstacles, as well as when crossing the street. Since a large gap between the stick and the sensor can result in constant censorship of objects recognized around the stick, the design of the blind stick is made more flexible on the stick section, which is something to consider. The stick works by creating an Android-based mobile application that links the stick to the phone and performs a variety of tasks, including making phone calls to pre-determined numbers and determining the location. The stick is distinguished by its low price and simple nature. When the wireless sensor detects an object or obstacle in its environment, it serves as an input or input to the esp8266 processor. The audio jack connected to the headphone then emits sound. The lack of essential skills and preparation, as well as the limited range of motion and knowledge transmitted, are among the most serious shortcomings of these aids. Electronic assistive devices are intended to solve issues like these, and we used some electronics modules and sensors to adjust the cane. A buzzer, ultrasonic sensors, and a water sensor are all included. The blind person walking with an electronic stick. Two ultrasonic sensors are mounted on the stick having a set.

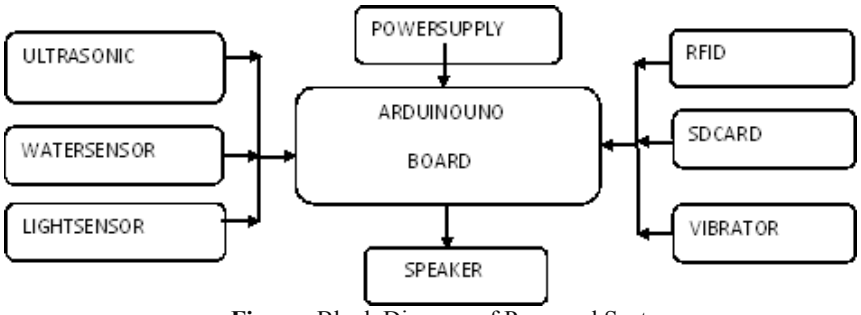

Figure: Block Diagram of Proposed System

VI. CONCLUSION

The project proposed the design and architecture of a new concept of smart electronic guiding stick for blind people. the advantage of system lies in the fact that it can prove to be very low cost solution to millions of blind person world wide. The proposed combination of various working units makes a real time system that monitors position of the user And provides dual feedback making navigation more safe and secure. It can be further improved to have more decision taking capabilities by employing various types of sensors and thus could be used for different applications. It aims to solve the problems faced by the blind people in their daily life. The system also takes measures ensure their safety.

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