

SMART BLIND WALKER STICK

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ABSTRACT

The main purpose of this project is to provide a talkative assistance to visually impaired people in order to improve their mobility so that they can live better and independent life. We here propose a smart stick that allows visually challenged people to navigate with ease using advanced technology. We are going to develop an intelligent system that works efficiently in both indoor and outdoor environment. This project focuses on obstacle detection, finding location in order to reduce navigation difficulties for visually impaired people so that they can move independently and confidently without any external support.

Keywords:- Ultrasonic Sensor, Obstacle, GPS, GSM

INTRODUCTION

The main aim of this project is to provide an aid for visually impaired person at cheaper rate which will help them in their mobility. There are many fundamental challenges faced by visually impaired people in mobility, education, employment and an independent living, which ultimately encounter their involvement and integration into the society. It is an assisting tool for the visually impaired that provides safe and independent mobility which eases their integration into the society. In everyday life, they endure problem of navigation to reach from one place to another safely. They often depend on external aid which can be provided by humans or trained dog as support system for decision making. Keeping in mind all the problems faced by blind people in their mobility and in order to help them to some extent, we are developing a technological aids for them which can help them in navigation and give a sense of virtual vision by providing information about the environmental scenario of static and dynamic objects around them. The stick will have following features:

- It helps the person to move easily, indoor and outdoor by detecting obstacles in front of the blind person.
- Solve the problem of moving from one place to another i.e. navigation.
- Helps users to avoid collisions with over-hanging and extending objects, such as tree branches, and thus helps in preventing unwanted contact.
- It is also useful in finding the stick for the visually impaired person. Produces voice alert and vibration when obstacle is being detected.

LITERATURE SURVEY

Numerous attempts have been made in the society to help the blind. One of them is a “Project Prakash”[1], launched in 2005, by Prof. Pawan Sinha. This project helps the blind children by training them to utilize their brain to learn a set of objects around them. But this can't help them properly to move independently wherever they want. They may lack confidence while walking to some new place. Voice operated outdoor navigation system for visually impaired persons developed by Somnath and Ravi (2012)[3] uses a cane embedded with ultra-sonic sensors, GPS and audio output system. The GPS module consist of a memory card which will store different locations where the visually impaired person generally goes. The user can set the location by voice and the GPS will guide the person to his/her destination. This system will also cater the remaining distance to reach the destination. When any obstacle will be detected by ultra-sonic sensors, then it will directly activate the voice system and a voice alert sound will be produced. They also referred this system as a cost-effective system. IIT Delhi has developed a smart cane [4] to help the visually impaired. This project was started in 2005. The cane has numerous features which includes detection of object within a distance of three-meter around the person. The cane is a smart and technical variant of the normal cane which is used by visually impaired people to navigate. The cane is embedded with different vibration pattern for different obstacle disclosure. It also uses ultrasonic technology used in the radars to detect the objects and obstacles above knee height around the person. The cost of smart cane is economically cheaper and is currently being used by many visually impaired persons.

COMPARISION TABLE

S.No.	NAME	MICROCONTROLLER	SENSOR	RANGE
1	An Electronic Walking Stick for Blinds[2]	ATmega328	Ultrasonic and IR	20-350cm
2	Voice Operated Outdoor Navigation System For Visually Impaired Persons[3]	LPC2148	Ultrasonic	2cm
3	Smart Cane: Assistive Cane for Visually-impaired People[5]	PIC microcontroller	Ultrasonic	1m
4	Ultrasonic Blind Walking Stick[6]	ATmega328	Ultrasonic	-
5	An Intelligent Walking Stick for the Blind[7]	89c51 microcontroller	IR sensor	-
6	Sound and Touch based Smart Cane: Better Walking Experience for Visually Challenged[8]	-	Ultrasonic	50-100cm
7	Ultrasonic Stick for Blind[9]	PIC Microcontroller	Ultrasonic	50-100cm

8	Smart White Cane – An Elegant and Economic Walking Aid[10]	ATmega328	Ultrasonic	2-4cm
9	Smart Walking Stick for Visually Impaired People Using Ultrasonic Sensors and Arduino[11]	ATmega328	Ultrasonic and water	2m
10	Ultrasonic Blind Walking Stick With Voice Playback[12]	PIC Microcontroller	Ultrasonic and IR	2-4cm
11	Smart Blind Walker Stick	Raspberry pi	Ultrasonic	50-100cm

COMPONENTS USED

a) Ultrasonic Sensor: It is used to detect the obstacle in front of the visually impaired person at a particular distance and pit and send signal to raspberry pi so that it can alert the person about the obstacle.

b) Buzzer: It will alert the visually impaired person by producing a sound when obstacle is detected by ultrasonic sensor.

c) Push Button: The visually impaired person will press the push button when any emergency situation occurred.

d) GPS Module: The gps module will help in tracking the current location of visually impaired person and the destination location where he wants to go so that it could help him in navigation.

e) GSM Module: GSM module will help to send message to the number saved in raspberry pi when the push button will be pressed.

f) Vibratory motor: The motor will start rotating when an obstacle is detected in front of the visually impaired person and vibration will be produced in the stick in order to alert the person about the obstacle.

g) Water sensor: It is used to detect the presence of water and provide an alert in time for path change so as to avoid slipping.

h) Raspberry pi: It acts as a controller and controls all the devices or components that are being used in the stick.

METHODS USED

1. Coded script is installed in raspberry pi
2. Tx and Rx pins of ultrasonic sensor connected to GPIO pins
3. Buzzer is connected to raspberry pi
4. Emergency button is connected to raspberry pi for navigation
5. Location of blind person is shared when button is pressed
6. Tx & Rx pins of water sensor are connected to raspberry pi
7. USB modem is connected with raspberry pi

8. Power is given to raspberry pi by using power bank

FLOW CHART

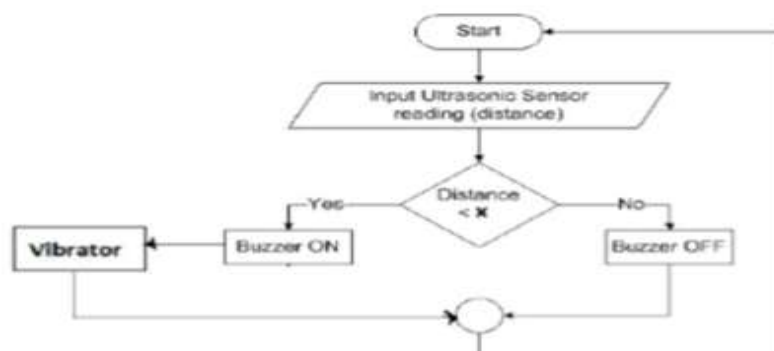


Fig 1-Flow chart for obstacle detection

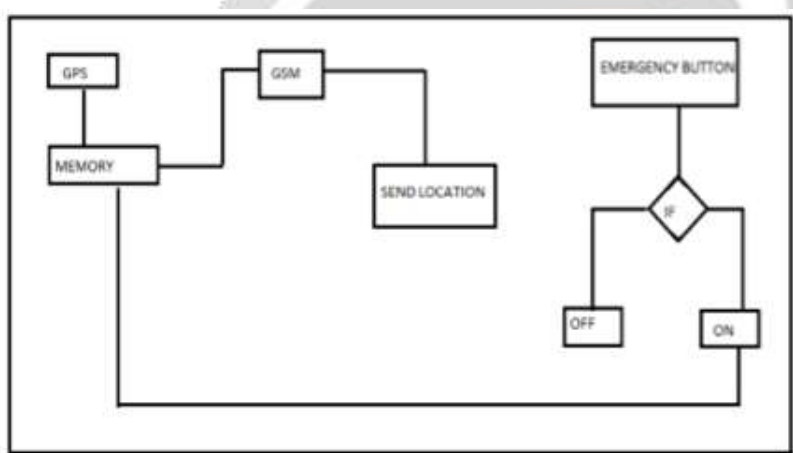


Fig 2- Flow chart of gps and gsm module

CONCLUSION

The above proposed idea of integrating the modules will become an assistive technology for future. Thus, providing the visually impaired- a reliable partner that would never leave in the situations of need. The system will alert the user about the nearby obstacles and surroundings thus, avoiding the collision and accidents of blind persons. This paper proposed the design and architecture of a new concept of Smart Stick for blind people. The advantage of the system lies in the fact that it can prove to be a very low cost solution to millions of blind person worldwide. The system has been used to receive the data from the sensing devices. We have integrated the ultrasonic sensor in order to detect obstacles, gps module in order to help the visually impaired person in navigation , gsm module in order to help the visually impaired person send message when any emergency takes place and to obtain more detailed regarding the blind's environment. Thus, allowing blind people to move independently, safely and quickly among obstacles and hazardous places. This system does not require a huge device to be hold for a long distance and it also does not require any special training. Overall, the Smart Cane's use of technology and ergonomic design has greatly improved upon the traditional white cane, and has taken a great leap towards improving the lives of the visually impaired.

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