Smart Assistive Device for Visually Impaired People

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Abstract: Moving safely and confidently in a metropolitan area without any human assistance is a difficult for vision loss people. In my project a walking stick for blind people that helps them to find their way in this world. This stick will be detect obstacles comes in blind path and it will give vibration and voice feedback to blind person. This whole system is control by raspberry PI which will operated through battery . Moisture sensor used to detect water comes in blind person's path. This system provide current location of blind person through GPS whenever blind person feels unsafe . It will send current location of blind person to blind person's family member through SMS with the help of GSM .This system navigate blind person from unknown place to blind person's home through GPS.

Keywords— Raspberry Pi; moisture sensor; Ultrasonic sensor; GPS; GSM; Real Time;

I. INTRODUCTION

Blind people or say visually impaired people find difficulty in mobility in unknown environments. Mobility means the feasibility of moving around unfamiliar environments without any supplementary assistance[1]. Visually impaired people face many hardships in mobility. Guiding visually impaired people by use of some sound technology that help them to find their way with the help of some mobile systems is referred as Navigation Assistance for Visually Impaired (NAVI)[3]. There are many researches that are being conducted to help people suffering from vision loss and partially sighted. Mostly these technologies have enormous limitations and have a great impact on the performance and efficiency of the system developed to guide them. People who suffer from vision loss usually use dogs or walking stick to help them to detect obstacles[4]. The stick cannot scan the platform as such and it just serve as a device to help people from danger in case of situation like traffic and in road crossing. Secured feeling and confidence could be enormously increased using such devices that give a signal and warning to find the direction of an object less or obstacle less way in an changing environments .

Electronic Travel Aids (ETAs) is a device that warns the user with help of some signals either the sound waves or by physical interaction with people such as vibratory patterns. This system provides an important measure to reduce accidents among blind people in common traffic areas and give away warning to them by creating a great

tendency to detect objects and obstacles as blind death has become common due to their inability to see and manage situations in heavy traffic[7]. The proposed system helps the visually impaired.people to reach their destination by commanding them through voice recognition system via Earphone. The headset and walking stick are connected by Bluetooth. As soon as the data is received from the receiver in the Bluetooth headset, it is converted to text using voice recognizer[6]. Then, sent to the walking stick where GPS device is located. The GPS identifies the current location and find the way to their destination. This is conveyed to them through voice recognition system available in navigator. In addition to that, suggest the mode of transportation, and measures the distance and time taken to reach their destination. Based on these parameters, the visually impaired people will select their mode of transportation.

From the survey of World Health Organization, in the year of among 7 billion human populations 285 million people are blind and which 19 million are children who are below 15 years. India's human crowd has measured up to 120 Cr. And among those 8.90 Cr. Humans suffer from vision loss. Moreover 30,000 blind people die every year due to trouble with navigation.[2] Moving safely and confidently in a metropolitan area without any human assistance is a tedious work for vision loss people .Blind people or say visually impaired people find difficulty in mobility in unknown environments. [1] People who suffer from vision loss usually use dogs or walking stick to help them to detect obstacles.

II EASE OF USE

Hardware Description

The aim of this project is to investigate and development of a navigation aid for blind people .The proposed system detects the nearest obstacle via ultrasonic sensor and send back vibrative and verbal feedback to inform the blind .Moisture sensor detect water on floor. This system will navigate blind person from unknown place to blind person's home. In this system ultrasonic sensor is used to detect obstacle comes in blind person path .System will give audio feedback using earphone .System will give vibrative feedback using motor . moisture sensor is use to avoid accident due to water on the floor .following figure number 1 shows block diagram of the system.
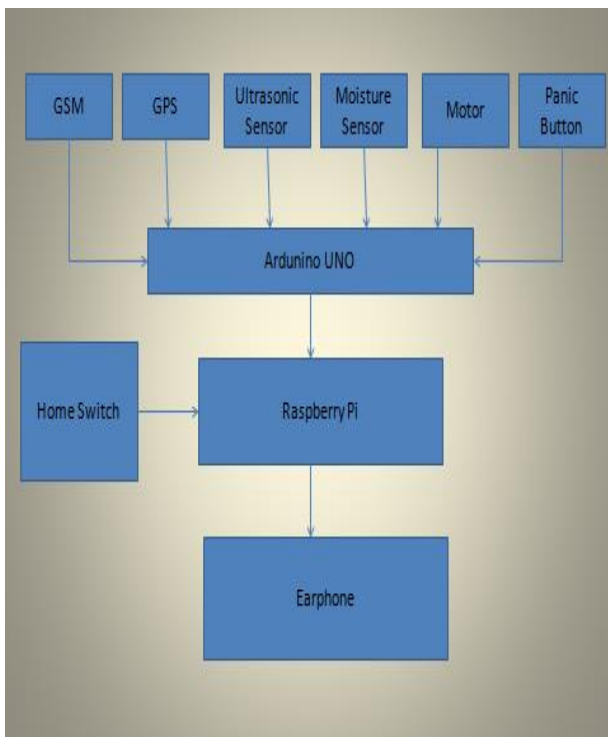

Fig. 1 Block diagram of system

III DESIGN METHODOLOGY

As shown in figure number 2 moisture sensor is placed on the bottom of the system .whenever panic button is pressed by blind person ,then current location of the blind person is send to blind person's family by using GSM module . home switch is use to guide blind person towards his home using GPS module.
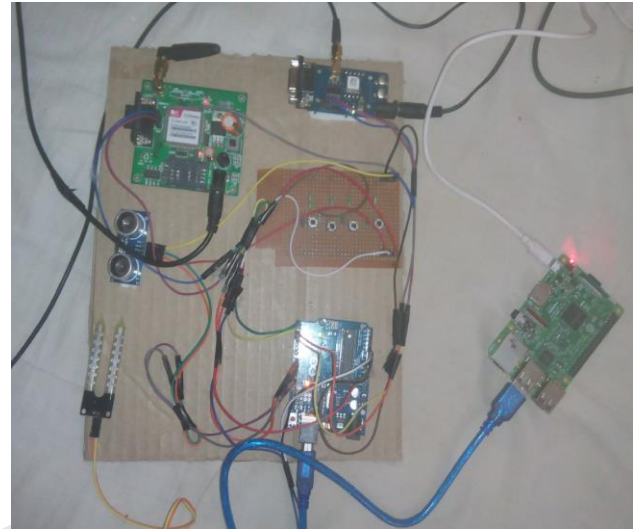

Fig. 2 Hardware

RASPBERRY PI 3

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor and uses a standard keyboard and mouse. The Raspberry Pi Model B+ has dual core ARM11 processor with 512MB SDRAM and powers through Micro USB socket of 5V [16].
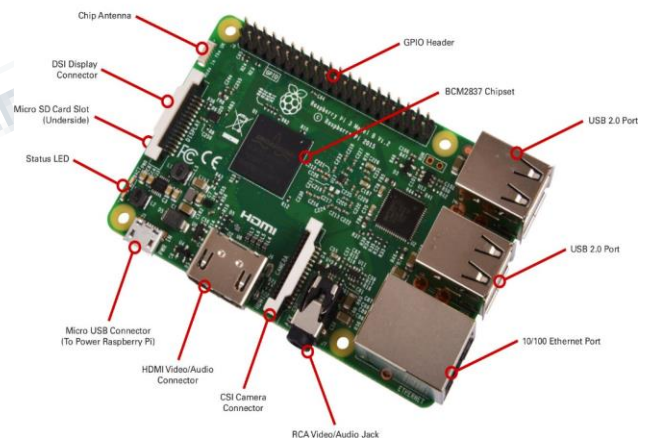

Fig. 3 Raspberry pi model B

Ultrasonic sensor

The principle by which ultrasonic sensors yield measurements is that of evaluating the time taken for the wave to travel between transmission and reception. Ultrasonic sensor has 4pins   As shown in figure number 4

ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 5, Issue 4, April 2018

Fig. 4 Ultrasonic sensor

Moisture Sensor

Moisture sensor measures conductivity or resistivity. less moisture results in high resistance . More moisture(water) results in less resistance .Low power consumption and high sensitivity. Operates on low voltage of 5V.Operates on low current <20mA. As shown in figure number 5
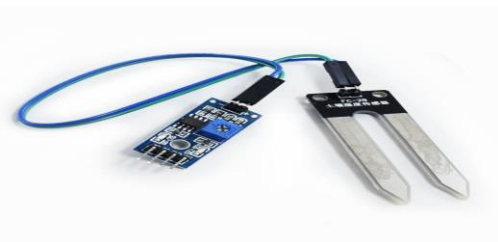

Fig. 5 Moisture sensor

RESULT

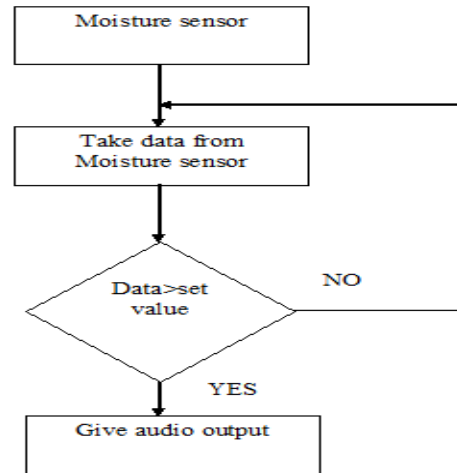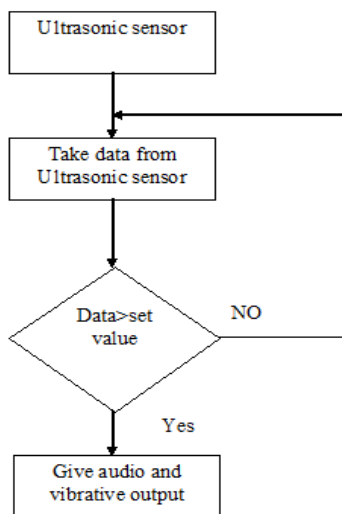*Flow chart of Ultrasonic sensor*

Fig. 6 Flowchart of Ultrasonic Sensor

Ultrasonic sensor is use to detect obstacle comes in blind person path .By using this sensor blind person easily avoid obstacle comes in path As shown in figure 6 flow chart shows use of ultrasonic sensor.
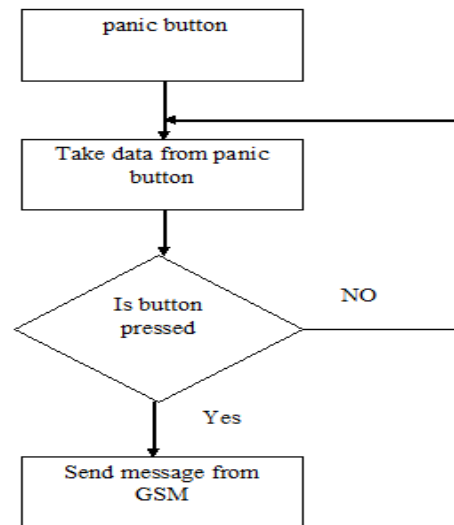
Flow chart of Moisture sensor

Fig. 7 Flowchart of Moisture Sensor

Moisture sensor is use to detect water on floor ,By using Moisture sensor we can avoid accident happed due to water on floor ,As shown in figure 7 shows use of moisture sensor .
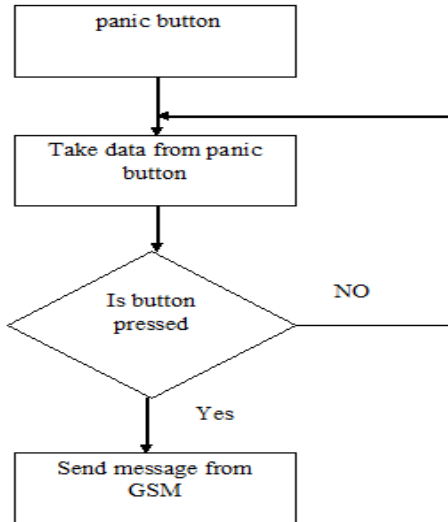
Flow chart of Panic button

Fig. 8 Flowchart of Panic button

Panic button is use ,whenever blind person feel unsafe ,when panic button pressed by blind person ,then current location of blind person will be send by message to blind person's family through GSM, figure number 8 show flow chart of panic button
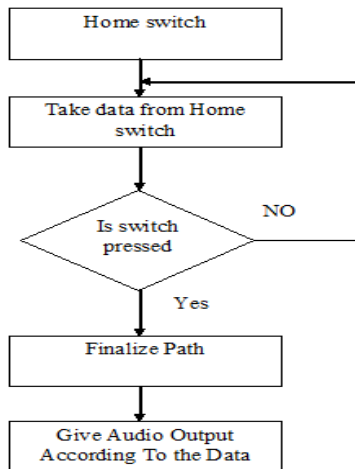
Flow chart of Home Switch

Fig. 9 Flowchart of Home Switch

Home switch is use by blind person ,whenever blind person wants to go to his home from unknown place to

home ,home switch navigate blind person through GPS. below figure number 9 show flow chart of home switch.
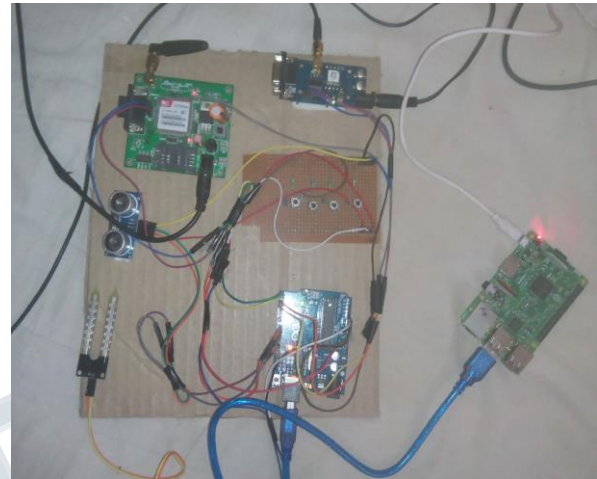
HARDWARE

Fig. 10 Hardware of Smart Assistive Device

As shown in figure number 10 the heart of the system is Raspberry pi ,Ultrasonic sensor is use to detect the obstacle comes in blind person path ,Moisture sensor used to detect the water on the floor, GSM used to send text message when Panic button is pressed.GPS is used to find current location of blind person. GPS, GSM, Ultrasonic sensor ,Moisture sensor are interface with raspberry pi using arduino.
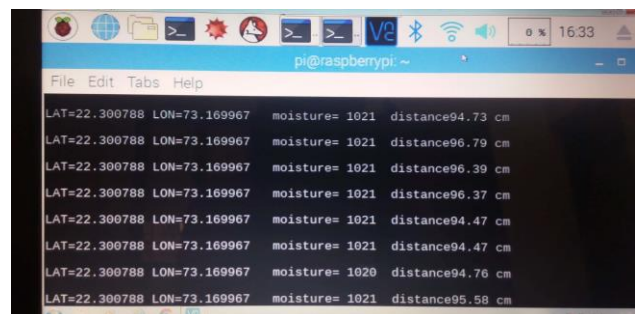
SOFTWARE

Fig. 11 Results of hardware

As shown in figure number 11 show latitude and longitude of current position of blind person .moisture sensor indicate water is present on floor or not .ultrasonic sensor give distance of the obstacle .

CONCLUSION

Some time before the visually impaired people did not believe in the electronic aids that have been in the market. They preferred dogs and white canes to electronic aids. Mostly because of reliability issues and its high cost. So we tried have tried to develop a more reliable and relatively low cost electronic cane for visually impaired people in order to replace most of the hardships faced by them. The proposed model can be easily used at any place without any difficulty.

FUTURE SCOPE

Currently GPS ,GSM ,ultrasonic sensor ,moisture sensor are interface to raspberry .in future navigation part of the project will be implement .

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