RASPBERRY PI BASED AN INTEELIGENT MULTI DIMENTIONAL WALKING AID FOR BLIND PEOPLE USING GPS AND GSM

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Abstract: Smart stick system concept is devised to provide a smart electronic aid for blind people. Blind and visually impaired people find difficulties in detecting obstacles during walking in the street. The system is intended to provide artificial vision and object detection, real time assistance via GPS by making use of Raspberry Pi. The system consists of ultrasonic sensors, GPS module, and the feedback is receive through audio, voice output works through TTS (text to speech). The proposed system detects an object around them and sends feedback in the form of speech, warning messages via earphone and also provides navigation to specific location through GPS. The aim of the overall system is to provide a low cost and efficient navigation and obstacle detection aid for blind which gives a sense of artificial vision by providing information about the environmental scenario of static and dynamic object around them, so that they can walk independently.

Index Terms – **Raspberry Pi, Vibration Motor, Ultrasonic sensor, Moisture sensor etc.**

1. INTRODUCTION

Blindness or visual impairment is a condition that affects many people around the world. This case leads to the loss of the valuable sensitivity of perception. Visually impaired people suffer inconveniences in their daily and social life. Eyesight plays a major role in collecting most of the information from the real world and that information will be processed by the brain. Across the world, there are millions of people who are visually impaired, out of which many are blind. The compulsion for beneficial devices was and will be interminable. There is a immense range of navigation systems and device existing for visually impaired individuals. India's population is currently at a whopping 133 crores, out of which, about 1.5 crore people are visually impaired, and 2.7 crore people are physically disabled.

The ingenious device for blinds is an contraption which helps the blinds people to navigate with speed and confidence by detecting the nearby objects and obstacles using the help of pi camera, ultrasonic waves and notify them with buzzer sound along with voice alert. The current technical knowledge is improving daily in different aspects in order to provide flexible and safe movement for the people. Currently the most widespread and used mean by the visually impaired people are the white stick, however it has limitations. With the latest technology, it is possible to extend the support give to people with visual impairment during their mobility, this project proposes an economical object detection based third eye for visually challenged people, so as to gain a personal independence and free from the external help. A portative user friendly device is flourished that can identify the obstacles in the path using ultrasonic sensors. If the obstacle is close then raspberry pi sends a signal to sound a buzzer and also sends the voice command through the earphones.

2. OBJECTIVE

The main objective is that, our proposed device with advanced embedded technology which will give the blind person an imaginary vision rather than being dependent on others. This project is designed keeping the view of visually impaired people, with this tool they can travel to their destination without the need of others.

Now days, there are several people in the world who are deprived of vision. There are a number of severe disabilities, of which blindness is one of them, in which a person needs to face many problems despite a number technological advancement. Astigmatism is a state of condition where the individual is unable to see and has no light perception. The astigmatism also refers to those who have so little vision that they use other senses as vision substitution skills. Thus, the astigmatism considers the person who has total vision loss or partial vision loss. The device will help them to go out independently.

3. LITERATURE SURVEY

Ayat A. Nada [1], was proposed, Stick solution use different technologies like infrared, ultrasonic sensor and laser but they still have drawbacks. In the present study we introduce, light pressure, low-cost, adaptable, fast response and low power utilization. Smart stick based infrared technology. A combination of infrared sensors can reveal stair-cases and other obstacle presence in the user path, within a range of two meters. The tentative results carry out good accuracy and the stick is able to identify all of disincentives.

S. Innet, N.Ritnoom [2] was proposed that blind people use a white stick as a tool for directing them when they move or walk. In spite of, the white stick is helpful, it cannot give a high assurance that it can assure blind people away from all level of hurdles. Several researchers have

been obsessed in establishing electronic devices to protect blind people away from obstacles with a higher guarantee. This study introduces an hurdles restraint alternative by using an electronic stick that serves as a tool for blind people in walking. It exploits an infrared sensor for detecting hurdles along the roadway. With all level of hurdles, the infrared stick facilitates to identify all type of earthly available in the course such as concrete, wood, metal, glass, and human being. The outcome also shows that the stick detects obstacles in range of 80 cm which is the same as the length of white stick. The twig is designed to be small and light, so that blind people can carry it comfortably.

Ross Girshick [3], we propose a Fast Region-based Convolutional Network method (Fast R-CNN) for object detection. Fast R-CNN frames on previous work to accurately distribute object proposals using deep convolutional networks. Correlated to previous work, Fast R-CNN uses several innovations to improve training and testing speed while also increasing detection accuracy. Fast R-CNN tracks the very deep VGG16 network 9x faster than R-CNN, is 213x faster at test-time, and achieves a higher mAP on PASCAL VOC 2012. Compared to SPP net, Fast R-CNN trains VGG16 3x faster, tests 10x faster, and is more accurate. Fast R-CNN is implemented in Python and C++.

4. METHODOLOGY

A. *Existing System*

Significant composing materials as indicated by a point we have been given. For cautious progression of the device Smart Stick for Blind Using Raspberry Pi, we need to encounter each and every specific viewpoint related to it. This part gives an introduction to the area of investigation. A Brief Study and Survey has been Carried out to fathom various issues related to the endeavor which incorporates giving a sharp electronic manual for shock people to give counterfeit vision and thing area, persistent assistance through GPS module by using Raspberry Pi .An audit is made among the Blind public finding difficulties in distinctive obstacles during walking around the street .Our errand in a general sense bases on the ostensibly upset people who can't walk unreservedly in new atmosphere .The standard purpose of our endeavor is to develop a structure that energizes the outwardly weakened people to move independently. Splendid Stick for Blind systems when in doubt involve three segments to help people with going with a more conspicuous degree of mental comfort and opportunity: recognizing the brief atmosphere for obstacles and dangers, giving information and motor will vibrate

B. *Proposed System*

In our proposed scheme Shrewd stick for daze utilizing Raspberry Pi framework is straightforward and keep up. This framework utilizes Raspberry pi, it is a little preparing gadget which functions as PC at generally minimal effort. Daze and outwardly disabled individuals discover troubles in identifying deterrents, fire and water during strolling in the road. The framework is proposed to give counterfeit

vision and article discovery, constant help by means of GPS by utilizing Raspberry Pi. The framework comprises of ultrasonic sensors, fire sensor. Soil dampness sensor, GPS module, GSM module and the input is gotten through vibration engine with speaker. The proposed framework recognizes an item, fire and water around them and sends input as vibration that is cautioning messages by means of headphone and furthermore gives route to explicit area through GPS. The point of the general framework is to give an ease, proficient route and obstruction location help for dazzle which gives a feeling of counterfeit vision by giving data about the natural situation of static and dynamic article around them, with the goal that they can walk autonomously.
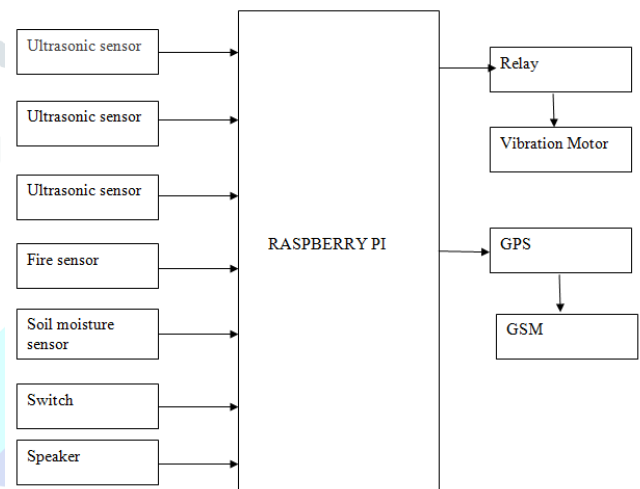
5. IMPLEMENTATION

Fig.1 Proposed Block diagram

The framework comprises of ultrasonic sensors, fire sensor. Soil dampness sensor, GPS module, GSM module and the criticism is gotten through vibration engine with speaker. The proposed framework recognizes an article, fire and water around them and sends criticism as vibration that is cautioning messages by means of headphone and furthermore gives route to explicit area through GPS. The point of the general framework is to give a minimal effort, effective route and deterrent recognition help for daze which gives a feeling of fake vision by giving data about the natural situation of static and dynamic article around them, with the goal that they can walk autonomously.

A. *Ultrasonic Sensor*

Ultrasonic sensors expend short, high-frequency sound pulses at proper intervals. These propagate in the air at the velocity of sound. If they force an object, then they are catched back as echo signals to the sensor, which itself computes the distance to the target based on the time-span between emitting the signal and receiving the echo. Just as the distance to an object is obstinate by measuring the time of flight and not by the intensity of the sound, ultrasonic sensors are excellent at suppressing background interference. Essentially all materials which emulate sound can be noticed, regardless of their colour. Plane translucent

components or thin foils represent no problem for an ultrasonic sensor.

Fig.2 Ultrasonic Sensor

B. Moisture Sensor

The Moisture sensor is known to measure the water content (moisture) of soil. Although the soil is having water shortage, the module output is at high level, else the output is at low level. The present sensor reminds the user to water their plants and also monitors the moisture content of soil. The Moisture Sensor needs capacitance to measure dielectric permittivity of the enclosing medium. The sensor generates a voltage proportional to the dielectric permittivity, and therefore the water content of the soil. The sensor tolerable the water content over the entire length of the sensor.
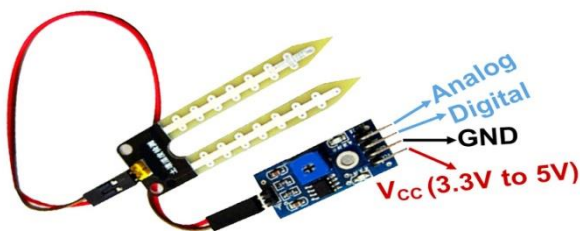

Fig.3Moisture Sensor

C.GPS Module

This module deals with the navigation of blind person from particular source to destination. This phase starts by Obstacle Detection. First the ultrasonic sensor gives voice command about the distance measurement between the obstacle and the blind person, based on that the navigation route instruction will be provided to blind by GPS Module via voice command. The navigation route is provided based on the latitude and longitude values. The latitude and longitude values will be stored so that when that value is matched the blind person gets the voice command to move left or right.

Fig.4 GPS Module
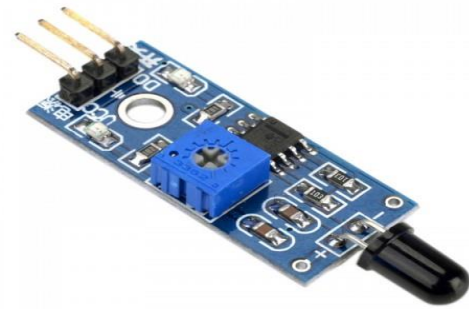
D. Fire Sensor

Fig.5 Fire Sensor

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system. When used in applications such as industrial furnaces, their role is to provide confirmation that the furnace is working properly; it can be used to turn off the ignition system though in many cases they take no direct action beyond notifying the operator or control system. A flame detector can often respond faster and more accurately than a smoke or heat detector due to the mechanisms it uses to detect the flame

E.Raspberry Pi

The Raspberry pi is a low priced credit –card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a skillful little device that facilitates people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It is adapted of doing everything you had expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spread-sheets, word-processing and playing games.

The Raspberry Pi obtain a Broadcom BCM2836 system on a chip (SOC), which encompasses an ARM1176JZF-S 700 MHz processor (The firmware includes a number of "Turbo" modes so that the user can attempt overclocking, up to 1 GHz, without affecting the warranty), Video Core IV GPU and it originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It accomplish not append a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage. The Raspberry Pi Foundation prepares Debian and Arch Linux ARM distributions for download. Python as the essential programming language with support for C and Perl. In view of this project Raspberry Pi Model B is used and all codes will be written in C/Python. There are currently four Raspberry pi models. They are the Model A, the Model B, the Compute module. All models use the same CPU, the BCM2836, but other hardware features differ. The Model B+ released in 2014, the Model B+ is a revision of the Model B. It increases the number of USB ports to 4 and number of pins on the GPIO header to 40. In addition, it has improved power circuit, which allows high power USB

devices to be attached and now hot plugged. The full sized composite video connector has been removed and the functionality moved to the 3.5mm audio/video jack. The full size SD card slot has also been replaced with a much more robust micro SD slot.

Fig.6 Raspberry Pi Controller

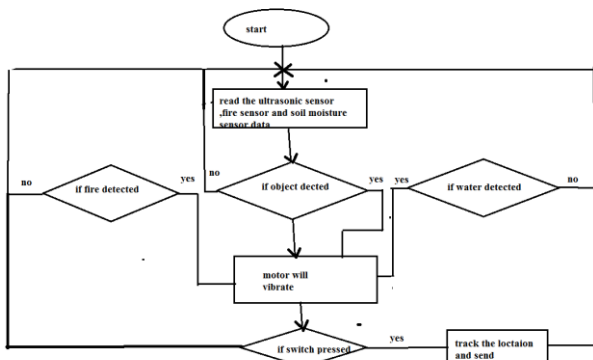*F. Proposed System Flow Chart*

Fig.7 Proposed Flow Chart

The framework comprises of ultrasonic sensors, fire sensor. Soil dampness sensor, GPS module, GSM module and the criticism is gotten through vibration engine with speaker. The proposed framework identifies an item, fire and water around them and sends input as vibration that is cautioning messages by means of headphone and furthermore gives route to explicit area through GPS. The point of the general framework is to give an ease, productive route and deterrent identification help for dazzle which gives a feeling of counterfeit vision by giving data about the natural situation of static and dynamic article around them, so they can walk freely.

F.Design
Input:
In this project we are using inputs as sensors
Ultra sonic sensor: Ultrasonic sensor is the input of the raspberry pi it will detect the object.
Fire sensor: Fire sensor is the input of the raspberry pi it will detect the flame.
Soil moisture sensor: Soil moisture sensor is the input of the raspberry pi it will detect water.

Output:
GPS: It will track the current position longitude and latitude
GSM: GSM will send the SMS
Vibration motor: Vibration motor will vibrate when alert came
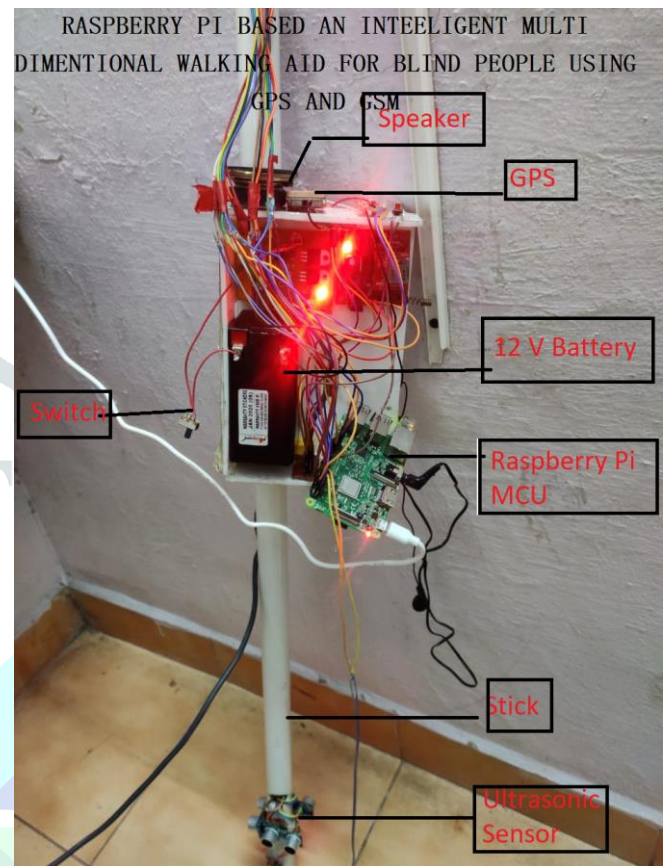
6. EXPERIMENTAL RESULTS

Fig.8 Experimental Setup

7. CONCLUSION

The endeavor Keen Stick for Blind Using Raspberry Pi is proposed to make a structure using Ultrasonic sensors, fire, soil suddenness, GPS module and giving vibration through headphone to the outwardly hindered people. It would empower an ostensibly prevented individual to investigate through a public spot openly. The proposed system endeavors to discard the weaknesses in the past structure. It intends to handle the issues looked by the outwardly weakened people in their consistently life. The structure in like manner takes measures to ensure their security. The arrangement Smart Stick for Blind using ultrasonic sensors and GPS with voice yield is of phenomenal preferred position to stun people concerning free adaptability. The advantage of the structure lies in the manner that it can wind up being negligible exertion answer for a considerable number of outwardly hindered individual around the globe. The proposed mix of Ultrasonic Sensor, fire sensor, soil sogginess sensor and GPS makes a steady system that screens position of the customer and gives input making course more liberated from all mischief. We are using speaker increate the vibration of motor as yield. The model of Smart Stick for Blind can recognize hindrances, fire and water before the customer

REFERENCES

[1] Ayat A. Nada Department of Computers and Systems Electronics Research Institute, Giza, Egypt , "Assistive Infrared Sensor Based Smart Stick for Blind People" ayat@eri.sci.eg

[2] Arnesh Sen Kaustav Sen Jayoti Das Jadavpur University: Dept. of Physics, "Ultrasonic Blind Stick For Completely Blind People To Avoid Any Kind Of Obstacles", Kolkata, India senarnesh.elec@gmail.com.

[3] "An Application of Infrared Sensors for Electronic White Stick" S. Innet 1, N. Ritnoom 21Department of Computer and Multimedia Engineering 2Department of Electrical Engineering University of the Thai Chamber of Commerce

[4] "Smart Assistance Navigational System for Visually Impaired Individuals " Mrs. S. Divya, Assistant Professor, Department of Electrical and Electronics Engineering, Kalasalingam Academy of Research and Education, Virudhunagar.

[5] Shrewd strolling stick - an electronic way to deal with help outwardly debilitated people, Mohammad Hazzaz Mahmud, RanaSaha, Sayemul Islam.

[6] A Multidimensional Walking Aid for Visually Impaired Using Ultrasonic Sensors Network with Voice Guidance, Olakanmi O. Oladayo Electrical and Electronic Engineering, Technology Drive, Office 6, New Faculty of Engineering Building, University of Ibadan, Ibadan, Nigeria.

[7] Ultrasonic savvy stick showing a protected free way to dazzle individuals, arun G. Gaikwad 1, H. K. Waghmare2 1ME Embedded framework Design, MIT Aurangabad ,2 Assistant Professor Department of E&TC, MIT Aurangabad.

[8] Savvy stick for Blind: Obstacle Detection, Artificial vision and Realtime help by means of GPS ", ShrutiDambhare M.E third SEM (ESC) G.H.R.C.E. Nagpur, Prof. A.SakhareM.Tech (ESC) G.H.R.C.E. Nagpur.

[9] "Sensor helped stick for the visually impaired individuals", G.Prasanthi1 P.Tejaswitha 2 Professor, Dept. of Mechanical Engineering, JNTUA College of Engineering, Ananthapuramu, A. P.PG Research Scholar, Product Design, Dept. of Mechanical Engineering, JNTUA College ofEngineering, Ananthapuramu, A. P.