Review on Smart Stick

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Abstract: *There are many visually impaired person in our society. If you notice them you can very well know about it they can't walk without the help of other. One has to ask guidance to reach their destination. They have to face more struggles in their daily life. Today technology is growing to a greater extent, however there is no cost effective device for visually impaired people. For a visually impaired person it becomes impossible to do his/her day to day activities, therefore Smart Blind stick can help people in moving and allowing them to perform their work easily they find difficulties detecting obstacles on the way of user, during walking in the street, which makes it very dangerous. The stick is a best way to identify the surrounding in this stick we are using in a smart stick with infrared sensor to detect stair cases and pair of ultrasonic sensor to detect any other obstacles in front of the user, within a range of four meters. And water sensor is also used which detects the water on the way of the user. All the detected obstacles are informed to the user through voice module as voice instructions. And GPS is also used which tells the user about his current location.*

Keywords: Arduino, stick, voice module, ultrasonic sensor, IR sensor, water sensor, GPS, LDR sensor

1. Introduction

Visually impaired persons have difficulty to interact and feel their environment. They have little contact with surrounding. As vision is the most important part of human physiology as 83% of information human being gets from the environment is via sight. The 2011 statistics by the World Health Organization (WHO) estimated that there are 70 million people in the world living with visual impairment, 7 million of which are blind and 63 million with low vision. Physical movement is a challenge for visually impaired persons, because it can become tricky to distinguish where he is, and how to get where he wants to go from one place to another. To navigate unknown places he will bring a sighted family member or his friend for support. Over half of the legally blind people in the world are unemployed. Because limited on the types of jobs they can do. They have a less percentage of employment. They are relying on their families for mobility and financial support.

Stick
Stick is the main architecture of our project because all of the concept is based on the smarting the stick .all the components required will be assembled on the stick which will be make with PVC pipe.

Arduino
Arduino (UNO R3) is an open-source hardware and software company, project and user community that designs and manufacturessingle-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control both physically and digitally. Which can be programed to design any system with additional sensors.

Ultrasonic Sensor
Ultrasonic transducers or ultrasonic sensor (HC-SR04) are a type of acoustic sensor divided into three broad categories: transmitters, receivers and transceivers.

Transmitters convert electrical signals into ultrasound, receivers convert ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound .which can be use to sense the obstacles in our project.

IR Sensor
An infrared sensor (A215/450) is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor.

Voice Module
This Voice Recognition Module (ISD1820) is a compact and easy-control speaking recognition board .This product is a speaker-dependent voice recognition module. It supports up to 80 voice commands in all. Maximum seven voice commands could work at the same time. Any sound could be trained as command.

GPS Module
A GPS navigation device (EM-411), GPS receiver, or simply GPS is a device that is capable of receiving information from GPS satellites and then to calculate the device's geographical position. Using suitable software, the device may display the position on a map, and it may offer directions.

Water Sensor
A water sensor (LE 25.00) is the sensor that is designed to detect the presence of water and provide an alert on time for prevention.

LDR Sensor
Light Dependent Resistor (UNI4), changes its resistances due to change of the light intensity. During night, LDR will have high resistance and no current pass through it but through a LED connected parallel to it which illuminates and acts as a Flashlight, which can be easily noticed by others. It alerts people about the presence of blind person to let him to pass the way.

Power Supply Unit
One power supply unit (+5V) is designed in order to supply power to the Arduino and other unit. These all components are assembled and programed in order to make proper

functioning stick. For guiding the visually impaired person and assisting them to reach their destination in a digital way.

2. Literature Survey

[1] M Narendran, SarmisthaPadhi, Aashita Tiwari, "the third eye for the blind using Arduino and ultrasonic sensor". Department of Computer Science & Engineering, SRM Institute of Science & Technology Ramapuram, Chennai, Tamil Nadu, India ,National Journal of Multidisciplinary Research and Development ISSN: 2455-9040 Volume 3; Issue 1; January 2018; Page No. 752-756 .

This was a wearable technology for the blinds. One of the main feature of this device is that it will be affordable. The Arduino Pro Mini 328- 15/16 MHz board is worn like a device. This was equipped with ultrasonic sensors, consisting of module. Using the sensor, visually impaired can detect the objects around them and can travel easily. When the sensor detects any object it will notify the user by beep or vibration. Arduino, wearable band, buzzer, blind, people, ultrasonic.

[2] Sathya, S.Nithyaroopa, P.Betty, G.Santhoshni, S.Sabharinath, M.J.Ahanaa"smart walking stick for blind person". Department of Computer Science and Engineering, Kumara guru College of Technology Coimbatore. Coimbatore International Journal of Pure and Applied Mathematics Volume 118 No. 20 2018, 4531-4536.

The proposed system contains the ultrasonic sensor, water sensor, voice play back board, raspberry pi and speaker. The proposed system detects the obstacle images which are present in outdoor and indoor with the help of a camera. The Stick measures the distance between the objects and smart walking stick by using an ultrasonic sensor. To provide vision to the user so we need to consider and process the image ahead as well. The image is detected using image sensors (camera walking stick including a USB camera, RF module, Rain sensor, Ultrasonic sensor, Raspberry pi and a head phone attached to it. The raspberry pi is the central controller of the system. The images which were sent from the camera are compared with the images stored in the dataset using the image processing. For image processing, morphology segmentation is used.

[3] Jayakumar, S.Magesh ,K.Prasanth, P.Umamaheswari, R.Senthilkumar,"smart walking stick for visually impaired people". Dept.of EEE, Erode Sengunthar Engineering College. International Journal of Advanced Research in Basic Engineering Sciences and Technology (IJARBEST) Vol.3, Special Issue.24, March 2017.

The different sensors like object sensors (ultrasonic sensors), humidity sensor, temperature sensor and light sensor are used. Speaker and volume control is used in the form the status to the blind people. GPS is used to track the blind people path and emergency conditions are transmitted to the neighbour through GSM based alarm system. This project is implemented by using the DSPIC30F2010 controller ,ARM Processor,DISPIC3OF 2010.

[4] Dada Emmanuel,Gbenga, Arhyel, Ibrahim Shani , Adebimpe Lateef, Adekunle . "Smart walking stick for visually impaired people using ultrasonic sensor and Arduino".Department Of Computer Engineering, University Of Maiduguri, Borno State, Nigeria . International journal of innovative research in electrical, electronics, instrumentation and control engineering vol. 4, issue 3, March 2016.

This paper presents the smart walking stick based on ultrasonic sensors and Arduino for visually impaired people the system was designed, programmed using c language and tested for accuracy and checked by the visually impaired person. Our device can detect obstacles within the distance of about 2m from the user. Ultrasonic sensor, Arduino atmega328 microcontroller, mobility aid, visually impaired person, alarm.

[5] D.Sekar, S.Sivakumar, P.Thiyagarajan, R..Premkumar, Vivekkumar," Ultrasonic and voice based smart stick". SriEshwar College of Engineering .International Journal Of Innovative Research In Electrical, Electronics, Instrumentation And Control Engineering Vol. 4, Issue 3, March 2016. In this paper GPS technology is integrated with pre-programmed locations to determine the optimal route to be taken.

The user can choose the location from the set of destinations stored in the memory and will lead in the correct direction of the stick. In this system, ultrasonic sensor, temperature sensor, humidity sensor, GPS receiver, vibrator, voice synthesizer, speaker or headphone, PIC controller and battery are used In this system, ultrasonic sensor, temperature sensor, humidity sensor, GPS receiver, vibrator, voice synthesizer, speaker or headphone, PIC controller and battery are used.

3. Inferences Drawn

Table 4.1: Inferences drawn table from literature survey

Sl. No.	Title of the paper	Description	Author	Limitation
1	Third eye for the blind people using Arduino and ultrasonic sensor	In this paper they have design a smart wrist band for blind people which was a wearable wrist band which is impacted with ultrasonic sensor for detecting the obstacles on the way of user.	M.Narendran Sarmistha Padhi Aashita Tiwari. Dept of Computer Science And Technology SRM Tamil Nadu	In this paper the gadget was made to wear in Hand because of which it does not detect the object nearer to the earth surface.
2	Smart walking stick for blind people.	In this paper they have design a smart stick for blind people in which they used raspberry PI as the main architecture with the different sensors and buzzer for alerting	Sathya S.Nithyaroopa P.Betty G.Santhoshni S.Sabharinath. Computer science and engeneering, Kumara guru collage of technology	In this paper they have use buzzer which is not so much listenable.

		the user.		
3	Smart walking stick for visually impaired people.	In this paper they have design a smart stick for blind people in which they have use different sensors like temperature sensor and humidity sensors.	Jayakumar, S.Magesh ,K.Prasanth, P.Umamaheswari, R.Senthilkumar Dept.of EEE, ErodeSengunthar Engineering College.	In this paper there is no mechanism to locate the stick if it is misplaced.
4	Smart walking stick For visually impaired person.	In this paper they have design a stick forthe blind people using Arduino Atmega 328 which was impacted with ultrasonic sensor for detecting the obstacles.	Dada Emmanuel GbengaArhyel Ibrahim Shani Adebimpe Lateef Adekunle . Department of computer science University of malaya	In this paper there is no mechanism for sensing the water in the way of the user.
5	Smart stick for blind people	In this paper they have Design a smart stick for blind people using microcontroller and impacted with different sensors and GPS for the user convinence.	D.Sekar,S.SivakumarP.Thiyagarajan, R. Premkumar, M. Vivekkumar UG Student, Eshwar College of Engineering .	In this paper there is no mechanism for walking in night to indicate the other people about the blind person.

4. Proposed Methodology

We have design a block diagram to show the methodology of our project as shown in fig 8.1 diagram different units areconnected to the Arduino.
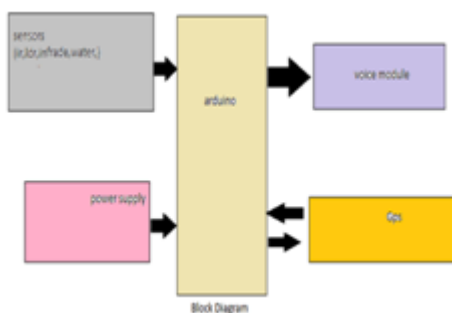

Figure 8.1

In fig 8.1 we can see that Arduino is the main architecture of our stick in which all the units are connected. Sensor unit is the unit in which all the sensors are attached and it sense the surrounding and send the data to the Arduino. After that Arduino reads the data and gives output to the user as a voice instruction. Power supply unit supplies power to the Arduino. GPS is also connected which reads the location of the user and tells the user through voice module.

We have prepare some procedure to design our stick which are as follows.
Step 1: One stick is made with the help of PVC pipe which is the main architecture of our project.
Step 2: Circuit is connected as per the requirement with different sensors and power supply.
Step 3: Arduino is programmed and make functional.
Step 4: The whole circuit will be assembled in the stick in a comfortable fashion in a box.
Step 5: Then one switch is placed for switching on/off.

5. Conclusion

This will be designed so that, the visually impaired person shall be able to move from one place to another without anyone help, which will increase the rate of mobility for the visually impaired person. This smart stick will be integrated with multiple sensors, which will help in navigating the way while walking and keep alerting the person if any sign of danger is detected.

This will gives good results in detecting obstacles on the way of the user it and will be real help for the blind. At the same time Global Positioning System (GPS) is linked with the voice stick, so that person can know his current position which will be informed to users through voice instructions**.**

References

[1] M Narendran, SarmisthaPadhi, Aashita Tiwari, "the third eye for the blind using Arduino and ultrasonic sensor". Department of Computer Science & Engineering, SRM Institute of Science & Technology Ramapuram, Chennai, Tamil Nadu, India ,National Journal of Multidisciplinary Research and Development ISSN: 2455-9040 Impact Factor: Volume 3; Issue 1; January 2018; Page No. 752-756 .

[2] Sathya, S.Nithyaroopa, P.Betty, G.Santhoshni, S.Sabharinath, M.J.Ahanaa"smart walking stick for blind person". Department of Computer Science and Engineering, Kumara guru College of Technology Coimbatore. Coimbatore International Journal of Pure and Applied Mathematics Volume 118 No. 20 2018, 4531-4536.

[3] Jayakumar, S.Magesh ,K.Prasanth, P.Umamaheswari, R.Senthilkumar,"smart walking stick for visually impaired people". Dept.ofEEE,ErodeSengunthar Engineering College.International.Journal of Advanced Research in Basic Engineering Sciences and Technology (IJARBEST) Vol.3, Special Issue.24, March 2017.

[4] Dada Emmanuel, Gbenga, Arhyel,Ibrahim Shani , Adebimpe Lateef, Adekunle . "Smart walking stick for visually impaired people using ultrasonic sensor and Arduino". Department Of Computer Engineering, University Of Maiduguri, Borno State, Nigeria . International journal of innovative research in electrical, electronics, instrumentation and control engineering vol. 4, issue 3, March 2016.

[5] D. Sekar, S.Sivakumar, P.Thiyagarajan, R..Premkumar, Vivekkumar," Ultrasonic and voice based smart stick".SriEshwar College of Engineering .International Journal Of Innovative Research In Electrical, Electronics, Instrumentation And Control Engineering Vol. 4, Issue 3, March 2016.