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SMART DEVICES FOR BLIND

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Abstract: The sense of vision is an important aspect of human being life. But, unfortunately some people lack the ability of visualizing things. Visually impaired people find difficulties and has to face many challenges in their daily lives . The normal stick used , do not provide any ways to detect obstacles in ahead of them and also it is not efficient for those kinds of people.

The smart stick comes as a proposed solution to enable them to identify the world around them probably in better ways. In this project we propose a solution for visually disabled people for improved navigation . This system helps in providing the artificial vision and detecting the obstacles or objects in prior.
The main aim of the proposed system is to provide low cost and efficient navigation tool for the visually impaired persons who can feel or sense and gain information about the environmental scenario of stable and unstable objects around them. The Ultrasonic sensors, which calculates the distance of the obstacles around the blind person to guide them to available path in form of sequence of beep sound which the blind person can hear . The use GSM and GPS sensors helps in case of emergency and track down the location information the blind person through the smart phones. The smart stick is of low cost and highly efficient.

INTRODUCTION

Our eyes are the key to the surroundings and also the one of the sensor attached to the Brain. Unfortunately, approximately 285 million people are estimated to be visually impaired worldwide, of which 39 million are blind ,according to the report published by the World Health Organization(WHO). Moreover, 90% of visually impaired people belong almost to the developing countries. The Earliest form of navigation tool for the blind for has been in the form of a normal walking stick. But the drawbacks of using it are the lack of necessary skills ,cost and training period , and also visually impaired are more prone to accidents ,and cannot walk independently . The user have to sweep the cane back and forth in front of the object, when cane or stick touches some object or when object falls off then the user becomes aware of the obstacle.
The Internet of Things(IoT) refers to system of interrelated and connected devices or things over the internet which are able to collect, sense and transfer data over a wireless network without human intervention or with less interaction.The same working of IoT is used in designing the smart ,it is possible to design and develop technological solutions that can help a visually impaired persons to interact and feel the environment. In smart Blind stick or shoe designed and implemented using IoT , the object is detected prior and also measures the distance between the objects using the ultrasonic sensor.

The main objective of this is to detect obstacles in various directions and alerts the user through sound or vibration in response of detecting obstacles. And also, one can be able to track their location information and location address in case of some emergency.

LITERATURE SURVEY

S.Gangwar (2011) designed a smart stick for blind which can give early warning of an obstacle using Ultrasonic sensors. After identifying the obstacles, the stick alerts the visually impaired people using sound wave signals. However the smart stick focused only for obstacle detection but it is not assisting for emergency purposes needed by the blind. And also the Ultrasonic sensors are not really efficient enough because it can detect only the nearest obstacle

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in short distance.

S.Chew (2012) proposed the smart white cane, called Blindspot that combines GPS technology, social networking and ultrasonic sensors to help visually impaired people to navigate public spaces. The GPS detects the location of the blind and it also alerts the blind to avoid them hitting the obstacle using ultra-sonic sensors.

Benjamin etal (2011) had developed a smart stick using Ultrasonic sensors to detect the obstacles and down curbs . Obstacle detection was signalized by a high pitch "BEEP" using a microphone. The design of the smart cane is very simple and intuitive. The stick can only detects obstacle, but can not provide cognitive and psychological support. There exists only beep sound that triggers any obstacle and there is no any assistance to direct them.

Central Michigan University (2009) developed an electronic cane for blind people that would provide contextual information on the environment around the user. The device also features an ultrasound sensor to help to detect objects ahead of the cane tip. The Smart Cane, which has an ultrasonic sensor mounted on it, is paired with a GPS .A buzzer located on the cane strap beep alerts when an obstacle is detected and also directs the user to move in different direction.
Mohd Helmyabd Wahab and Amirul A. Talibetal (2011) developed a cane could communicate with users through sound alert and vibration signal. Ultrasonic sensors are used to detect obstacle in front, since ultrasonic sensors are good in detecting obstacle in few meters range and this information will be sent in the form of voice signal. This sound signal is send via buzzer to the user. Here blind people might find it difficult in travelling without any emergency alert rather than having only ultrasonic sensors.

Alejandro R. Garcia Ramirez and Renato Fonseca Livramento da Silvaetal (2012) designed an assistive technology device called the electronic long cane to serve as a mobility aid for blind and visually impaired people .The author implements the cane with an ergonomic design and an embedded electronic system, which fits inside the handle of a traditional long cane. The system was designed using haptic sensors to detect obstacles above the waistline. It works in such a way when an obstacle is detected; the cane vibrates or makes a sound. However this system only detects obstacle above the waistline.

Joao José, Miguel Farrajota, Joao M.F. Rodrigues (2011) designed a smart stick prototype. It was small in size, cheap and easily wearable navigation aid.The system is inconspicuous, and with no hindrance while walking with the cane. Also it does not block normal sound in the surroundings.

Shruti Dambhare and A.Sakhare (2011) designed an artificial vision and object detection with real-time assistance via GPS 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.

TECHNICAL SPECIFICATIONS

- **Arduino UNO:**

The Arduino Uno is a standard leading group of Arduino. The word here "UNO" signifies 'one' in Italian language. It was named as uno to stamp the underlying arrival of Arduino Software. It was the main USB board delivered by Arduino.It is considered as the amazing board utilized in assortment of activities. The Arduino UNO was created by Arduinoo.cc. Arduino UNO is based on ATmega328P microcontroller. Contrasted with different sheets, for example, Arduino Mega board ,and so on ArduinoUNO is not difficult to utilize. The board is given arrangements of advanced and simple info/yield (I/O) pins which can be interfaced to various development sheets (safeguards) and different circuits. The board has 14 computerized I/O pins (six equipped for PWM yield), 6 simple I/O sticks, and is

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programmable with the Arduino IDE (Integrated Development Environment), the IDE is normal to normal to any or all sheets of Arduino.

- **Ultrasonic sensor:**

As the name says, ultrasonic sensors measure the distance by using ultrasonic waves, and converts the reflected sound into electrical signal. Ultrasonic waves travel faster than the speed of the sound that humans can hear i.e high frequency sound waves are produced. This sensors use sound waves above the range of 40KHz to detect the objects in before or in prior ,it is similar as how bats use echolocation to detect the objects without colliding into obstacles or objects.
Ultrasonic sensors have two main components:

- Transmitter- which emits the sound and used to convert electrical signals into ultrasound.
- Receiver - which meets the sound after it has travelled to and from the target and used to convert ultrasound into electrical signals.

To measure the specific distance by ultrasonic sensor, this formula can be used for calculation.

Distance = ½ T x C

Where,

T = Time , C =The speed of sound

- **GSM module:**

GSM stands for Global System for Mobile communication , is a digital mobile network which was developed by the European Telecommunication Standards Institute (ETSI) . GSM is used for digitization and for compressing the data ,then it is sent through channel along with two other streams of user data , everything in its own time slot. For identification and verification of sensors , this technology provide devices SIM cards that ensures to provide control of our own assets.
It was basically created to describe the protocols for second-generation i.e 2G digital cell phone networks. But now, it has become default standard for mobile phones communication-with nearly 90% market share and also operating in 219 countries and territories.
In GSM, geographical area is divided into hexagonal cells whose side depends upon power of transmitter and number of end user. At the center of cell there will be base station consisting of transmitter, receiver and an antenna.

- **GPS module:**

GPS stands for Global Positioning System (GPS) ,is a satellite based navigation system that provides location and time information. It is capable of receiving information from satellite and then calculates the devices geographical location. GPS module contains tiny processors and Antennas that directly data sent by satellites through dedicated RF frequencies.GPS came to existence since 1978 and it become globally recognized and available since 1994. The latest GPS receivers provide geolocation with an accuracy of 30 centimeters. The GPS system is owned by the United States government and is maintained and controlled by the United States Space Force. It is a network of 30+ Medium Earth Orbit (MEO) satellites. These satellites continuously send signals over dedicated RF frequencies that a GPS receiver can listen to.

CONCLUSION:

The proposed system **"Smart Devices For Blind"** deals with a innovative way to help visually disabled people. This system keeps aware of the obstacles in front of them by passing the signal in form of sound or vibration. And in case of emergency one can easily get location address of the user as it provides the accurate information. This system mainly helps blind people or people who often needs help from others , It acts as artificial vision . Using this system visually disabled people can interact well with the environment, walk independently and mainly they will be less prone to accidents. User friendliness , low cost and high efficient are the unique features of this system .It is also interactive and flexible for the future enhancement.

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