A Survey on Intelligent Walking Stick For Visually Challenged People

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ABSTRACT: There are approximately 39 million people across the globe who is visually impaired people according to the World Health Organization. This paper presents the intelligent walking stick based on Ultrasonic sensors and Arduino Uno for visually impaired people. The ultrasonic sensor used to detect the obstacles in the distance between 2cm to 400cm.It is the method to find the obstacle in front of the blind people and send the audio signal such as 'obstruct 'to the required person using headphones It proposed low cost and light weight system designed .The results in real configurations such as parked cars, trees, and dustbins are presented too. Finally, it explain how the device can be used in real life by visually impaired people in coincidence with the typical white cane

KEYWORDS: Arduino, HC-SR04 Ultrasonic Sensor,   HC-05Bluetooth,Voice Module, Head Phones, Mobile Application.

I. INTRODUCTION

Visually impaired people are the people who find it difficult to be aware of the smallest detail with vigorous eyes. Those who have the visual depth of 6/60 or the horizontal range of the visual field with both eyes open have less than or equal to 20 degrees. It mainly designed to help the blind people to wrestle from one place to another place. It is a tool to identify the obstacle in front of the blind people and provide information about the blockage through audio signal. Our approach modified this cane with some electronics components and sensors, the electronic aiding devices are designed to solve such issues. The ultrasonic sensor, voice signal and RF transmitter/Receiver are used to record the information about the presence of obstacles on the road. The ultrasonic sensor has the capacity to detect any obstacle within the distance range of 2cm-450cm. Therefore whenever   there is an obstacle in this range it will alert the user. Most blind guidance systems use ultrasound because of its protection to the environmental blast.

II. EXISTING SYSTEM

 Visually impaired people generally use either the typical white cane or the guide dog to travel by automatically. Although the white stick gives the caution about 1m before the obstacle, for a normal walking speeds of 1.2m/s, the time to react is very short. The stick scans the floor and consequently cannot detect certain obstacles. Safety and assurance could be increased using devices that give a signal to find the direction of an obstacle –free path in odd or shifting environments. Electronic travel aids are devices that give off a warning by acoustic or /and physical signals when an obstacle is in the way of the visually impaired people and allow the user to elude it. Several devices have been

developed to improve the mobility of visually impaired people. An active optical pathfinder using a LED and a photodiode is implemented as an electronic travel aid to improve the mobility of the persons who is blind. The improved version of LED and Photodiode is Electronic Travel Aids-smart guiding device in the shape of pair of eyeglasses for giving these people guidance inventively and safely. Different from existing, a novel multi-sensor fusion based obstacle avoiding algorithm is proposed, which utilizes both the depth sensor and ultrasonic sensor to solve the problems of detecting small obstacle, and translucent obstacles.

III. PROPOSED SYSTEM

In order to help the visually impaired people, obstacles are detected and then the information of the obstacles will be sent to the visually impaired people by using different modalities such as voice. This idea is by adding ultrasonic sensors and Arduino Uno at specific positions to the walking stick that provided information about the environment to the user by activating the Bluetooth. The obstacle position can be determined based on information enclosed in reflected sound signals. An echolocation system can resolve these quantities by measuring time interval between sending a sounding pulse and receiving its echo, and by establishing the direction ($\Theta H, \Theta V$) from which the reflected signal was received using phase beam forming principles. This method is based on a spatiotemporal filter (beam former) that uses the output of an array of sensors(microphones) to take out signals received from a particular direction ($\Theta H, \Theta V$), at the same time rejecting background noise and directional interferences .
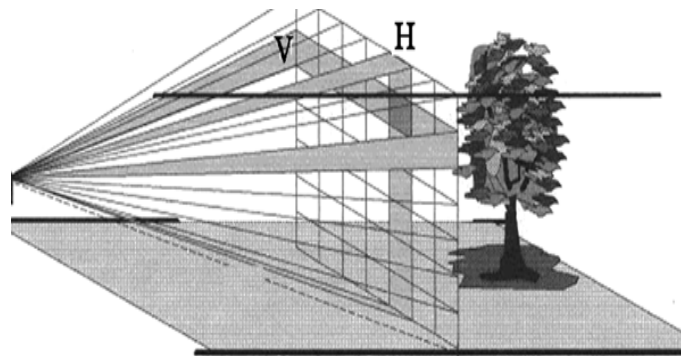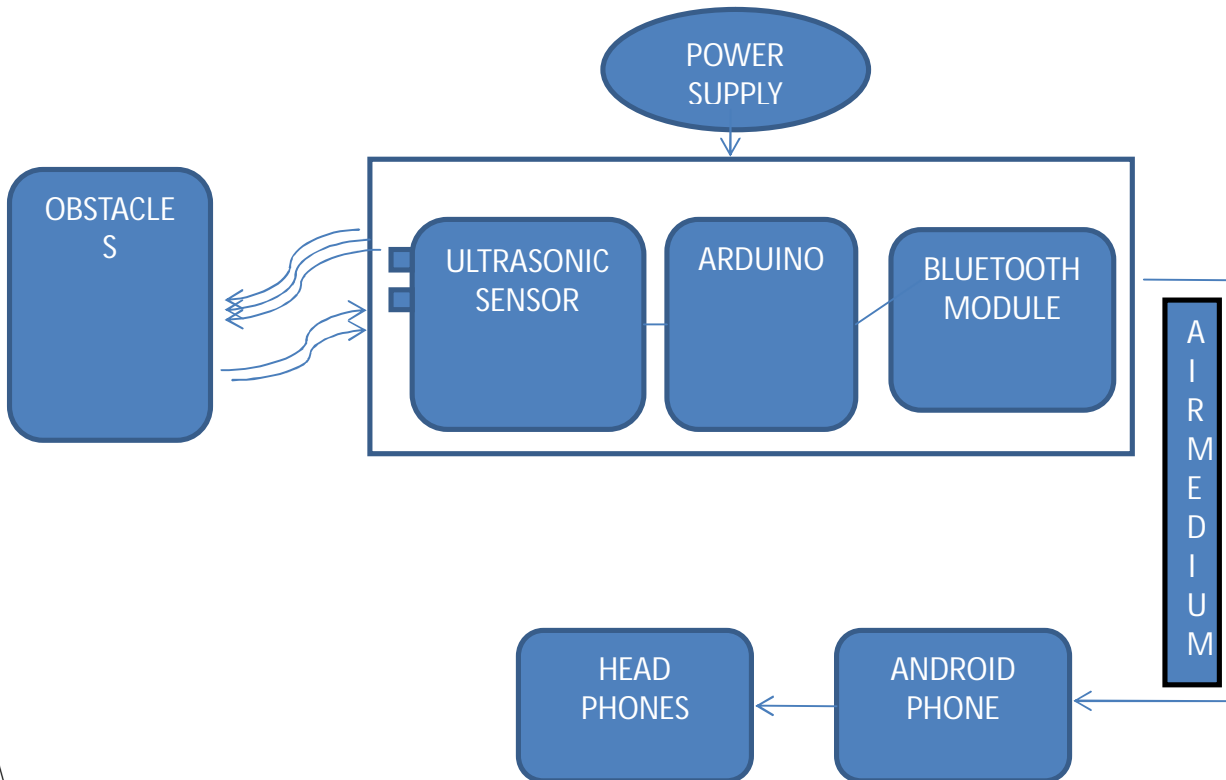

Horizontal and vertical receiver beams.

MATERIALS AND METHODS
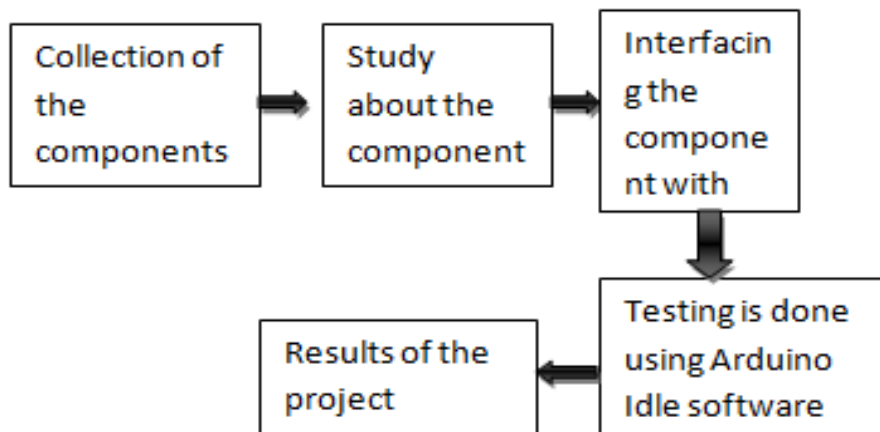
BLOCK DIAGRAM OF INTELLIGENT WALKING STICK

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IV. HARDWARE AND SOFTWARE REQUIREMENTS

A. ULTRASONIC SENSOR

❖ It works on the principle of echo. It used for detect the obstacles and distance measurement. Ultrasonic sensor contains transmitter circuits, receiver circuits and control circuit .It will detect the obstacles in range of 2cm to 400cm.
❖ It offers excellent non-contact range detection, high accuracy and stable reading in an easy to use package.
❖ Features of Ultrasonic Sensor:
  ➢ Power Supply :+5V DC
  ➢ Quiescent Current : <2mA
  ➢ Working Current: 15mA
  ➢ Effectual Angle: <15°
  ➢ Ranging Distance : 2cm – 400 cm/1″ – 13ft
  ➢ Resolution : 0.3 cm
  ➢ Measuring Angle: 30 degree
  ➢ Trigger Input Pulse width: 10u
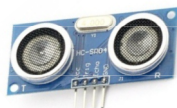 ➢ Dimension: 45mm x 20mm x 15mm

B. ARDUINO UNO

It is open source computer hardware and software company, project and user commune that designs and manufactures microcontroller- based kits for structure digital devices and interactive that can sense and control objects in the physical world.The systems afford sets of digital and Analog I/O pins that can interfaced to various expansions boards and other circuits. The board feature serial communications interfaces, including USB on some models, for loading programs from personal computer. The Arduino projects provides an Integrated Development Environment (IDE) based on the dealing out project, which includes support the C and C++ programming languages.

C. BLUETOOTH

HC-05 module is an easy to utilize Bluetooth serial port protocol module, designed for see-through wireless serial connection setup. It acts as master/slave. Bluetooth modules commune in the range of 10 meters that is 32 feet.
Connecting HC-05 Bluetooth module with Arduino:

- To connect VCC with 3.3v of Arduino
- To connect Bluetooth GND with any GND of Arduino
- To connect Rx pin with TX of Arduino.
- To connect TX pin with RX of Arduino

V. RESULT

The power supply is connected to Arudino board and the sensor namely Ultrasonic sensor are connected to it. An Ultrasonic Sensor detects the Obstacles and send the distance to an Arduino module. Then Arduino sends the correct distance to the mobile application through Bluetooth module . The Application user can hear the information about the obstacles in form of Audio signal like 'Obstacle' in their Head phone.
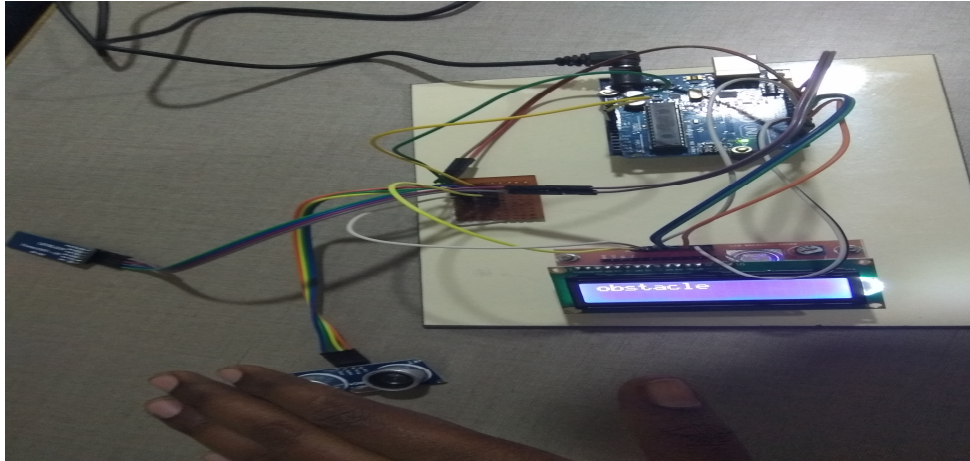
VI. CONCLUSION

Hence intelligent walking stick is very helpful for visually impaired people to move from one place to another place because of sending voice alert about in front of obstacle through Bluetooth module to the visually impaired people. This is low cost and user friendly also.

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