THINK INDIA JOURNAL

ISSN: 0971-1260
Vol-22-Issue-16-August-2019

An Assistive walking Stick For Blinds

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Abstract-Life of visually impaired people is too harsh and they have to depend on others for movement. This sense of dependency takes away their self-confidence and affect them emotionally as well as psychologically. Solution to this problem is to provide them with a tool that can help them to navigate the place without hitting any object in the path. This is very much important for their moral boost. So, they can be independent and live with self-confidence.

***Keywords—walking stick;*ATmega328P*,ultrasonic*.**

INTRODUCTION

According to World Health Organization (WHO)Visual Disabilities in world account to approximately 285 million persons out of which around completely blind are 39 million are and it will reach double by 2020. To assist them there are many guidance system generally known as ETA (Electronic Travel Aids)[1][2][3], the ETA will assist visual impaired persons to recognize obstacles and helps them in navigating safely.

SYSTEMDESCRIPTION

Electronic walking stick is a great electronic tool and is a boom for visually impaired people. It uses Ultrasonic sensors[4] for detection of obstacles and hurdles in the path of blind and warns him/her about it. This model uses 3 Ultrasonic sensors there are threeultrasonicsensors are mounted each havingrangefrom30-350cms and ear phone is connected to help disabled person to navigate from proper path. Based on individualistic response from each ultrasonic sensor our algorithm will indicate Left, Right, and Forward directions on the display and indicate directions through audio output. This type of ETA would also help visually impaired person to map himself and reduce his/her chances of falling.

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ISSN: 0971-1260
Vol-22-Issue-16-August-2019

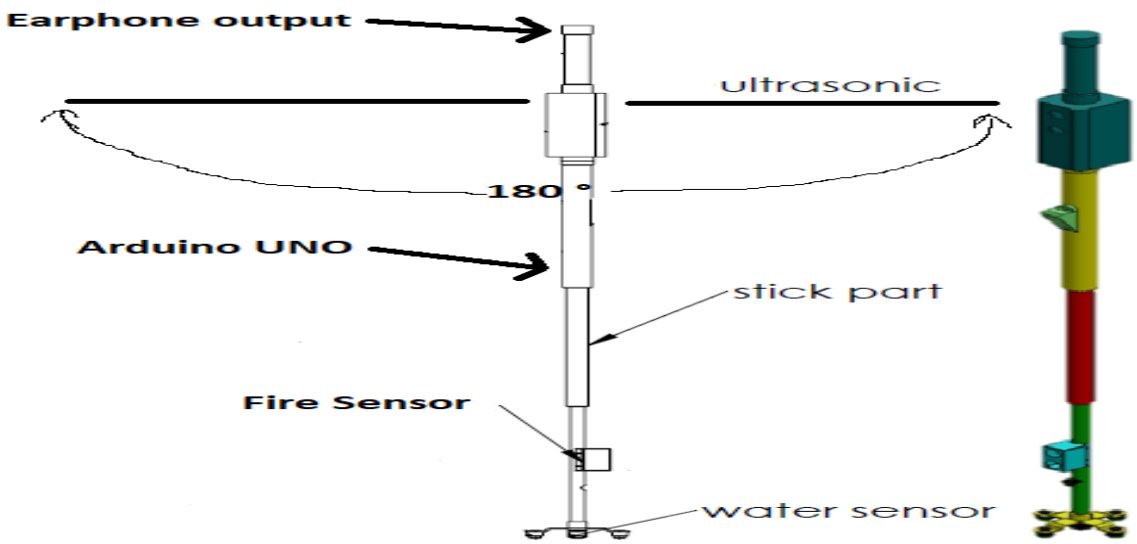

Fig. 1 showsa smart blind man electronicstick

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The model consist of the following components**:**

A) Object detection using ultrasonic sensor

The object detection is possible through ultrasonic sensor (HCSR04). It operates by detecting the ultrasonic waves from the target ranging between 2-350cms noncontact measurement [6]. It has accuracy of 3mm.

The basic principal of working is:

1) IO trigger for more than 10us.
2) The transmitter than sends eight 40 kHz and detects reflected pulse back.
3) IF the pulse reflected, time of high output is measured.

INTERFACING OF THE ULTRASONIC SENSOR

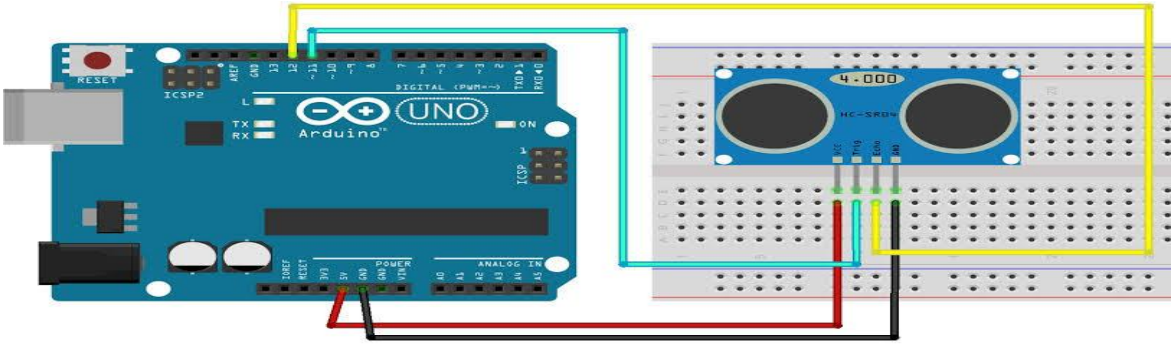

Fig.2 Schematic diagram

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Vol-22-Issue-16-August-2019

SPECIFICATIONS OF SENSOR:

Working Voltage	**DC 5 V**
Working Current	**15mA**
Working Frequency	**40Hz**
Max Range	**4m**
Min Range	**2cm**
MeasuringAngle	**15 degree**
Trigger Input Signal	**10uS TTL pulse**
Echo Output Signal	**Input TTL lever signal and the range in proportion**
Dimension	**45*20*15mm**

Fig.3 Specification of ultrasonic sensor

TIMIING DIAGRAM:

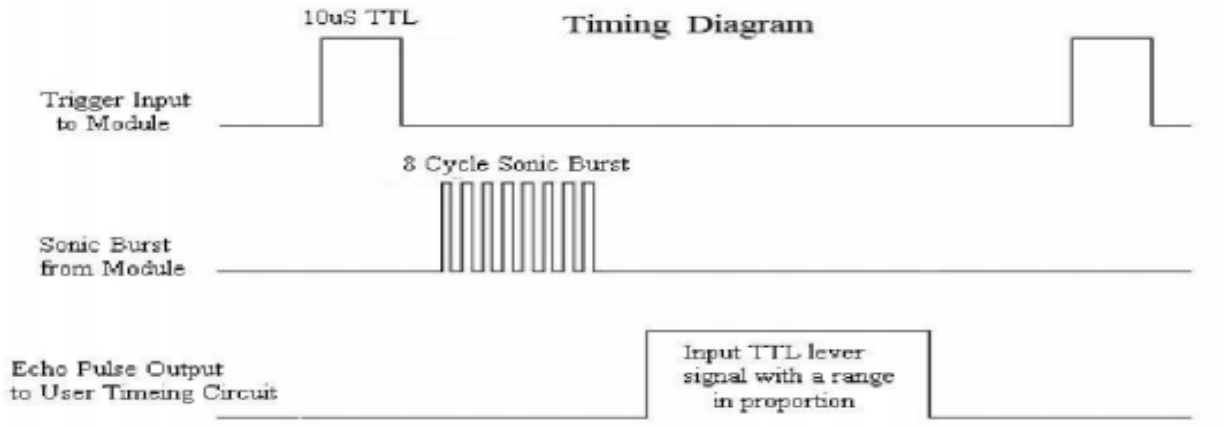

Fig.4 Timing diagram of sensor

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ISSN: 0971-1260
Vol-22-Issue-16-August-2019

A) Controller

Microcontroller	ATmega328P – 8 bit AVR family microcontroller
Operating Voltage	5V
Recommended Input Voltage	7-12V
Input Voltage Limits	6-20V
Analog Input Pins	6 (A0 – A5)
Digital I/O Pins	14 (Out of which 6 provide PWM output)
DC Current on I/O Pins	40 mA
DC Current on 3.3V Pin	50 mA
Flash Memory	32 KB (0.5 KB is used for Bootloader)
SRAM	2 KB
EEPROM	1 KB
Frequency (Clock Speed)	16 MHz

Fig.5 Arduino Controller Fig.6 Arduino specifications

The Arduino Unois a microcontroller based board based contain ATmega328. It has 6 analog inputs, 14 digital input/output pins (out of which 6 are PWM outputs), a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It can connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery [5].

Algorithm:

The algorithm works as below:

***** if distance>75 cm then logic considered is 0 and if distance <75 cm then logic considered is 1, hence following cases arises:

Considering D1 for Left, D2 for Forward & D3 for Right direction.

D1	D2	D3	Conclusion
0	0	0	Path available
0	0	1	Can’t move right
0	1	0	Can’t move forward
1	0	0	Can’t move left
1	0	1	Forward path available only
1	1	0	Left path available only

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1 1 1	No path available

Fig 9. Configuration Table

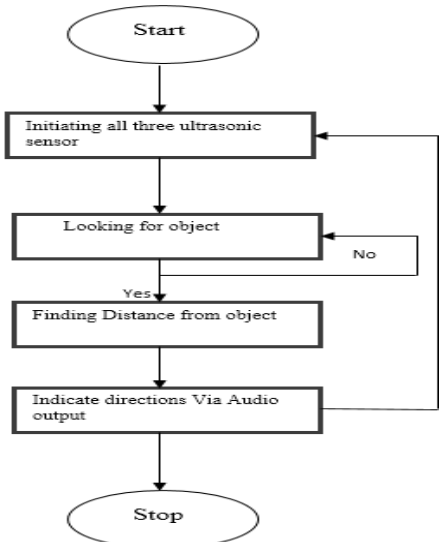

Fig.10 Blindman electronicstick

CONCLUSION

The System give best results for shorter distances which is in the range of 350cms and has a drawback that it cannot find longer distances and also could not able to differentiate between humans and the objects, it could be improved by adding camera as one of the sensor to recognise paths which would help disabled in better way. Secondly currently the data is not accumulated and trained for intensive use to increase the speed of the user.

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