

SMART BLIND STICK USING ARDUINO

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Abstract - This paper describes ultrasonic blind walking stick with the use of arduino. According to WHO, 30 million peoples are permanently blind and 285 billion peoples with vision impairment . If u 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 life daily life. Using this blind stick , a person can walk more confidently. This stick detects the object in front of the person and give response to the user either by vibrating or through command. So, the person can walk without any fear. This device will be best solution to overcome their difficulties .

Key Words: Arduino, Ultrasonic sensor, Walking Stick.

1.INTRODUCTION

This walking stick is an alternative to the traditional walking stick. Here, Arduino UNO , ultrasonic sensor, IR sensor, voice playback module , LCD display and voltage regulator are used. Arduino is a microcontroller which can do all the calculations very fastly and quickly with great accuracy. Ultrasonic sensor is used to detect the object in the front of the person by measuring the distance between the object and the stick. For left and right object detection, IR Sensor is used which is very small in range. So, it detects the object which are very close. Using more ultrasonic sensor may create calculation problem. So, IR Sensor is Preferred. The voice playback module will assist the blind person to reach the destination through the command or microphone.

2.BLOCK DIAGRAM

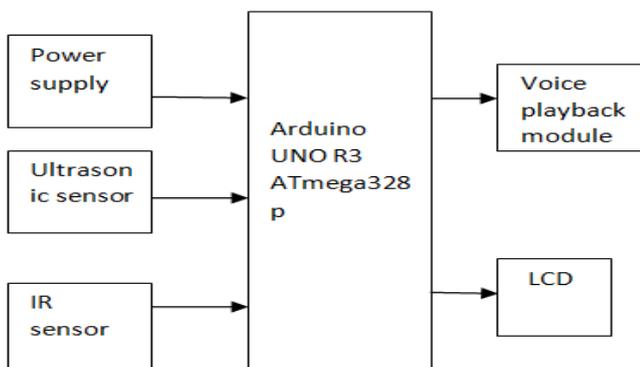


Fig 1: Block Diagram

3. HARDWARE REQUIREMENTS

3.1 ARDUINO UNO R3

Arduino UNO is a microcontroller board based on ATmega328p. It has 20pins out of which 16 digital input and output pins and 6 analog input pins , 16MHZ Quartz crystal, power jack, ICSP header and reset button compareto PIC microcontroller , it is very easy to perform with arduino since it is user friendly, The Operation Voltage is 5V, You can directly connect it to computer with USB cable, power it with AC-DC adapter or battery.

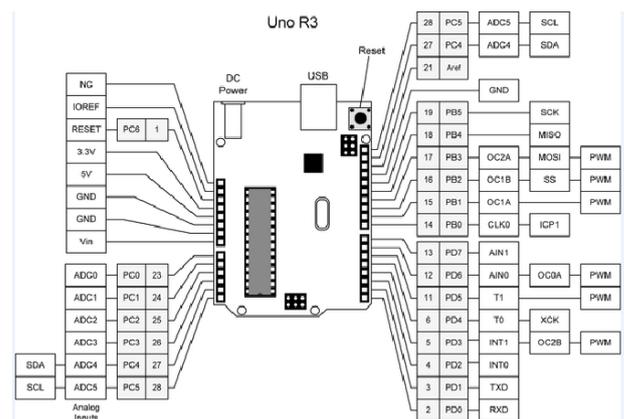


Fig 2: Pin Configuration of Arduino

3.2 ULTRASONIC SENSOR

Ultrasonic sensor is used to detect the object in front of the person . HC-SRC04 ultrasonic sensor has 4 pins-ground, Vcc, trigger and Echo . It ranging from 2cm to 400cm. Mainly it has two opening –one is transmitter which is used to transmit the signal and another one is receiver which is used to receive the signal. It sends ultrasound waves at high frequency and receive back the signal .

3.3 IR SENSOR

IR Sensor which is used as obstacle detector where it transmits the infrared waves and hits the object and reflected back the signal to sensor . it ranges from 700nm to 1mm. IR output various depending on infrared rays that have been received. Since, this variation cannot be analyses as such, output provide for comparative circuit. If IR

receiver does not receive any signal, the output of the comparator goes low and LED does not glow whereas if it receive any signal, the output goes high and LED Starts Glowing

3.4 VOICE MODULE PLAYBACK

This module detects the user spoken word through a microphone or a speaker. It will alert the person it they found any object or obstacles through a speech commands which is already stored in the system. This project uses WTV-SR IC as recognition module. This module can record as well as fixed voice playback, recording content uploaded and a variety of control modes can be chosen. It has a great advantage in the duration time of recording and cost performance.

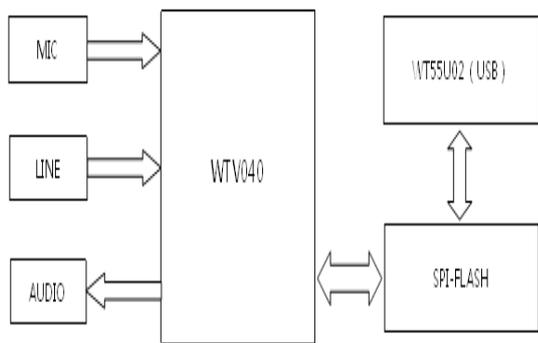


Fig 3: Circuit diagram of voice playback module

3.5 LCD 16*2 DISPLAY

A 16*2 LCD is a basic module where 2 represents lines and 16 represents characters where each character is displayed in 5*7 pixel matrix. This LCD has two registers namely command and data. The command register is used for storing command instructions given to the LCD to do predefined tasks like clearing and controlling the display, initializing and so on. The data register is used for storing data which is given by the user.

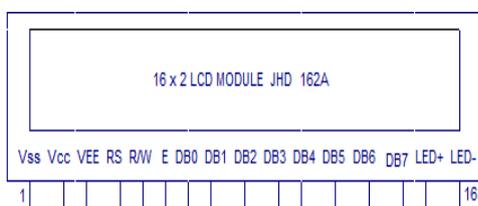


Fig 4: Pin Description of LCD

3.6 VOLTAGE REGULATOR

A voltage Regulator is a stabilizer that is designed to automatically stabilize a constant level. The Circuit is made up of linear voltage regulator 7805 along with the capacitors and resistors with bridge rectifier made up of diodes. Voltage

sources in a circuit may have fluctuations resulting in not providing fixed voltage outputs. A voltage regulator IC maintains the output voltage at a constant value. It is used to stabilize the voltage level according to the circuit. LM7805 IC provides +5Volts regulated power supply with provisions to add a heat sink.

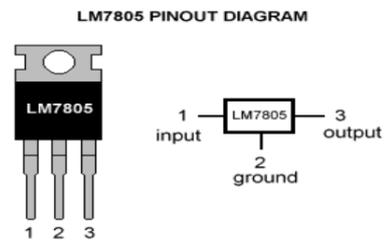


Fig 5: Pin description of voltage regulator

4. METHODOLOGY

The working behind this blind stick is that it is used for special purpose as a sensing device for the blind people. The circuit provides 5V power supply for the circuit and maintains its output of the power supply at constant level. It is used widely to detect objects using ultrasonic sensor and IR sensor. If any object is present, the ultrasonic sensor detects the object by measuring the distance between the object and the user and sends the data to the arduino UNO. To determine the distance of an object , calculate the distance between sending the signal and receiving back the signal.

$$*Distance=speed*time$$

The speed of the signal travelling through air is 341m/s. The time is calculated between the sending and receiving back the signal. Since the distance travel by the signal is double, it is divided by two i.e.,

$$Distance=*Distance/2$$

IR sensor is placed at right and left of the stick to detect the object. Since, it is very small range, it detects the closer objects. Arduino processes with this data and calculates with the command conditions. If any object is found nearer, it sends the command to the user through the speaker or microphone. The command is already stored in the voice playback module which sends alert message to the user about the object.

The command condition is as follows:

[1] If the distance between the objects and the person is 30 inch, it will send the command as the obstacle is nearer to the person.

[2] If the object is about 60-90 inch, it will send the command as the obstacle is just closer and reaching the person.

[3] If the object is about 90-120 inch, it will send the command as the object is far away from the person.

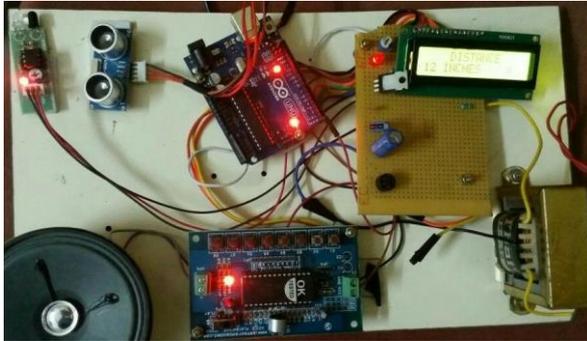


Fig 6: Output

5. FUTURE SCOPE

A variety of future scope are available that can be used of with the stick such as usage of Global positioning System can help the blind person to source to destination route information. GPS can help to find the shortest and best path as accordingly to Google (Bing map based on real time coordinates). GSM attachment can help in future for any immediate casualty help. It can also contain special arrangement to connect the walking stick to aadhar card of blinds, helping the government serve the physically disable even better. Water sensor that sense any kind of water allowing the safe walk of the blind people in order to avoid slipping .

6. CONCLUSIONS

The Blind Walking Stick has been finally made into prototype which can be used to guide the blind . Its aims to solve the problems faced by the blind people in their daily life. The system also takes the measure to ensure their safety . This project will operate to help all the blind people in the world to make them easier to walk everywhere they want. It was done to help the blind to move in front very well. It is used to help the people with disabilities that are blind to facilitate the movement and increase safety.

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