ANALYSIS ON DETECTION MODULE FOR ASSISTING SIGHT IMPAIRED USING ARDUINO

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ABSTRACT
A sense of vision is a crucial feature of human beings that is inherently granted by God however some people are unable to visually see things in their environment. Individuals' inability to recognize obstacles, potholes, staircases, pedestrians, vehicles, and other objects in their environment is one of the biggest challenges they encounter in daily life. The major goal is to make navigation easier for visually challenged persons. The sensor computed processor Arduino module is used to demonstrate a system. People who are blind and walking on the roadways will be able to pass through on their own without assistance. This device was created using an Arduino kit and a detecting module to assist the sight impaired in reaching their destination.
Keywords- Arduino nano, Ultrasonic sensor, SD module.

1. INTRODUCTION

The World Health Organization (WHO) estimates that 284 million people are blind. Around 39 million of them are blind, with the remaining 245 million suffering from various vision impairments. People aged 65 and up make up the top 60%. As the world advances at a quicker rate, new systems are invented every day to make life more comfortable in every manner conceivable. People with physical limitations, on the other hand, require greater assistance than regular people. As a result, technology has arisen to try to create answers so that they can live in society as regular individuals. The main goal is to help the visually impaired; once an impediment is detected, a verbal warning signal is issued.

This setupprovides the solution to reach the destination without any support. This system is designed to detect the obstacles and also the obstacle direction by using Arduino nano. An automatic voice signal is generated indicating the directionimmediately whenever the obstacle is present in the given range. This system consists Arduino nano, Ultrasonic sensors, SD module and a speaker. This system detects the obstacle present in the given range and compares the left and the right distance, based on the distance a voice signal is generated whether to move left or right. If the obstacle is detected in front, then immediately the ultrasonic sensors compare the left distance and right distance, if the left distance is more with no objects when compared to right distance then the voice signal is generated such as “turn left”.

This system is simple and light in weight. It provides one of the best solutions to assist the visually impaired. The main aim of this system is to provide an efficient way to navigate the visually impaired without any support and not depending on others. This system also helps in reducing the risk and hurts that may occur due to no sense of vision.

2. PROPOSED BLOCK DIAGRAM

In this system we have interfaced the following Arduino nano with three ultrasonic sensors, sd module and a speaker.The ultrasonic sensors are connected to analog pins of Arduino nano, the sd module CS, MOSI, MOSO, SCK pins are connected to 10, 11, 12, 13 digital pins of arduino nano. The speaker is connected todigital pin 9 of the arduino nano. The ultrasonic sensors are used to detect the obstacles.

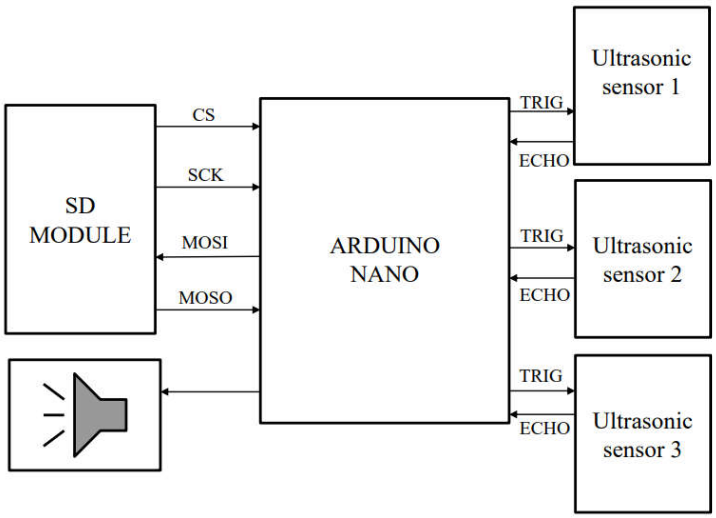

Figure .1. Block diagram of smart approach to assist visually blind

3. METHOD AND METHODOLOGY

The method proposed in this project is the interface of Ultrasonic sensor, Arduino Nano, Micro SD card module and 4-ohm speaker.The Ultrasonic sensor transmits the waves, which bounces off of an object. It pings the obstacles with Ultrasound. The Arduino board sends a short pulse to trigger the detection, then listens for a pulse.Micro SD card which is connected in the circuit, that gives a voice warning according to the direction of the obstacle.

3.1 ARDUINO NANO

The Arduino Nano is breadboard friendly designed board with the smallest dimensions. The Arduino Nano comes with pin headers that allow for an easy attachment onto a breadboard and features a Mini-B USB connector.It is a Microcontroller board based on Atmega328P.It has 14 digital input pins and 8 analog pins. The input voltage limit is 6-20 v. It has 6 PWM pins among the digital pins.

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 openingone 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.

3.3SD MODULE

The micro-SD card module is fairly simple to connect. It has six pins, VCC pin supplies power for the module which is connected to 5V pin on the Arduino. The operating voltage of any standard micro-SD Cards is 3.3 V.This module has an onboard level shifter and voltage regulator.The Micro SD Card Adapter Module's characteristics and specs are as follows: Operating Voltage: 4.5V - 5.5V DC, Current Requirement: 0.2-200 mA, 3.3 V Voltage Regulator On-Board, FAT32 file system is supported. Micro SD cards up to 2GB and Micro SDHC cards up to 32GB are both supported.

3.4 4-Ohm SPEAKER

The goal of a speaker is to provide audio output that listeners can hear. The transducers that transform electrical waves into sound waves are known as speakers. It enables a low-voltage audio amplifier to deliver more power to an audio speaker. It performs well and is commonly utilized for a variety of audio tasks. The speaker has a 4-ohm resistance and a 5W power rating. 4 inches in length.

4. FLOW CHART

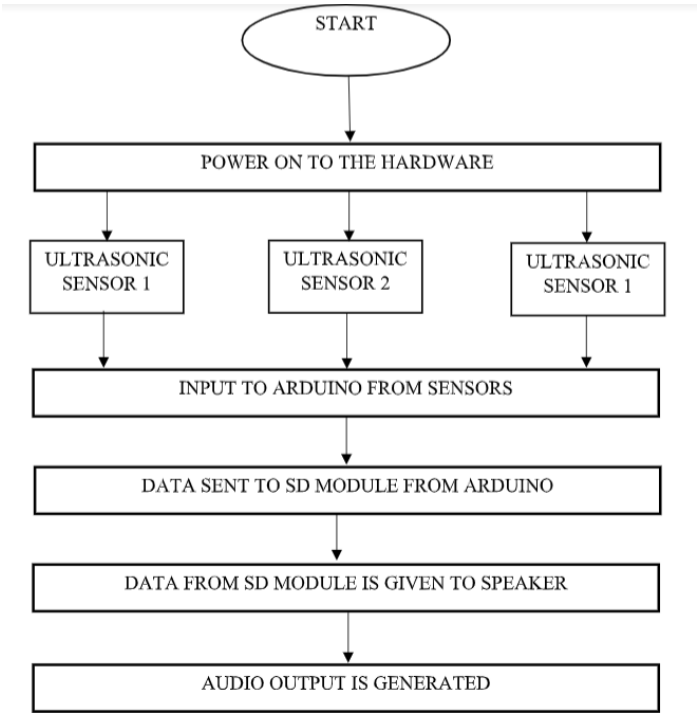

Figure .2. Flow chart of Smart approach to assist visually blind

5. HARDWARE IMPLEMENTATION, TESTING & VERIFICATION

This circuit is theinterface of three Ultrasonic sensors that are coupled to an Arduino Nano, SD module and a 4-ohm speaker for three distinct directions. When the circuit is switched on, the ultrasonic sensors send signals in all three directions. When an impediment is detected in front of you, the speaker will issue a voice warning to move left or right. When the obstruction is detected from all sides, the ultrasonic sensor calculates the shortest distance to move left or right. The orientation is decided based on the distance from the obstruction.

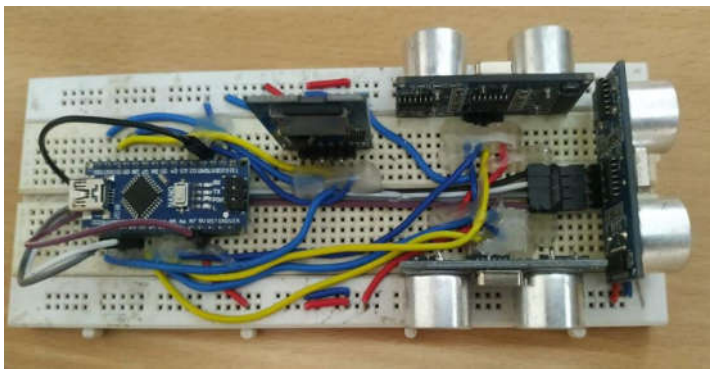

Figure 3. Interfacing with Arduino and sensors along with SD module

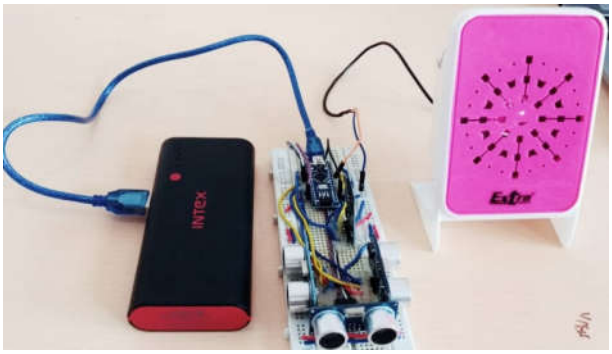

Figure .4. Interfacing with speaker and Dc supply

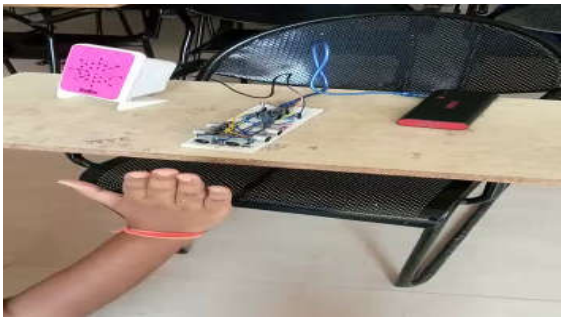

Figure .5. Overall system

CONCLUSION

At the end of our project, we can say that our project has the potential to lessen the hazards and injuries that visually impaired persons face while walking in public. Because they are aware of the possible threat, this cannot be handled lightly. The Smart Approach to Assist the Visually Impaired lays the groundwork for the next generation of assistive devices that will help the visually impaired navigate both indoor and outdoor spaces safely. It is both effective and efficient. The main objective is to detect the obstacle present and determine in which direction the obstacle is present and then navigate to move right or left.The ultrasonic sensors detect the obstacle and also the direction of obstacle.The speaker and the SD card module are used for the navigation by assisting through voice.

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