



Helping stick for blind people

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Abstract: In India, as it is true for all developing countries, a considerable number of people, especially from the lower state of society, suffer from visual disabilities. Visual impairment or vision less may cause people difficulties with daily activities such as walking, driving, or socializing, to lead a life very dependent on others. Hence, there are millions of visually impaired or blind people in this world who are always in need of helping hands. For many years, these have become a well-known attribute to blind person's navigation and later efforts have been made to improve the cane by adding remote sensor. Blind people have problem when they walk on the street or stairs using white cane, but they have sharp haptic sensitivity. The electronic walking stick will help the blind person by providing a much more convenient means of life. The main aim of this project is to contribute our knowledge and services to the people who are visually challenged. In addition, it will help in automated driving. If this feature is installed in vehicles, then it will help to prevent accidental collisions.

Keywords: Obstacle detection; Voice commands; Handicapped aids; Navigation system

1. Introduction

No one cares about beggars, and in case of blind ones, they are just being neglected everywhere [1]. In India, also, the picture is same; sometimes they are killed in road while begging. Hence, in India we have to make some technology for them. Being an engineer, it is our duty to do so. Hence, we have tried to design a blind people's helping stick [2,3]. The circuit we have made can be installed in a stick for blind people. So that they can easily get notifications about the incoming obstacles in front of them [4,5].

Another thing is that the number of road accidents are rapidly increasing. To stop this, we can use the same technology to introduce "Vehicle Collision Protection System (VCPS)".

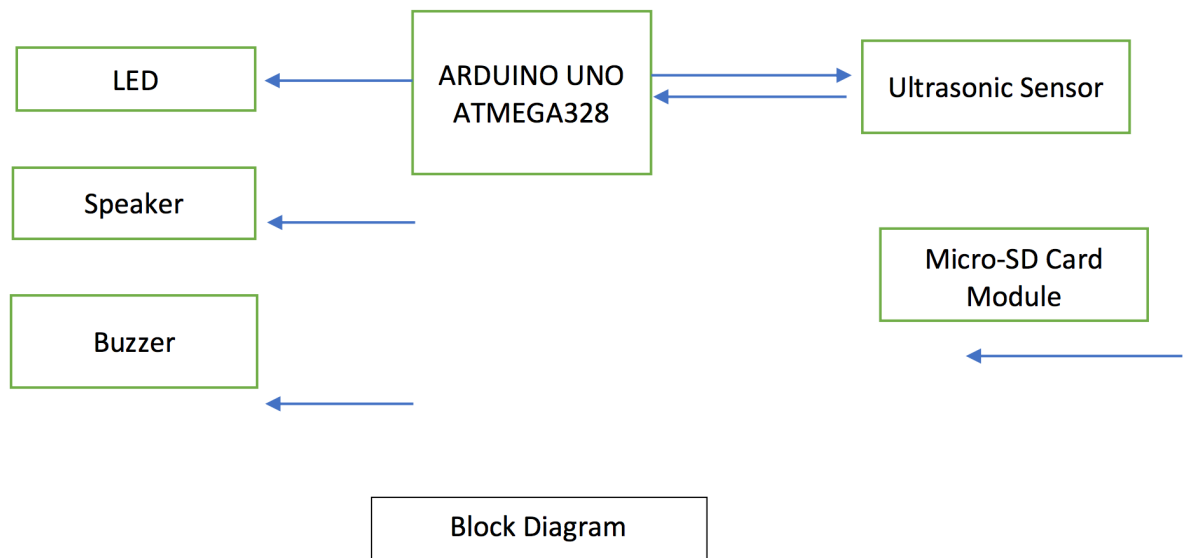
Keeping in mind both cases, we have tried to develop an obstacle detection system with voice alert. This project uses Ultrasonic Sensor to detect any obstacle in the given range [6,7]. If some obstacle detected then it sends the information to the Arduino and Arduino warns the user about an obstacle in the given range to prevent collision.

2. Working principle

The system consists of an Arduino UNO microcontroller, Ultrasonic Sensor, Micro-SD card adapter module, Buzzer, LED and Speakers. In figure, the block diagram of circuit and the circuit diagram is given below.

The obstacle detection part of the system contains two ultrasonic transmitters-receivers. It uses a 40KHz ultrasonic signal to acquire information and can detect the presence of any obstacle within the specified measurement range of approximately 0.03 to 4 meters.

It operates by sending out a pulse of ultrasound. Eventually the pulse is reflected from a solid object in the path of the pulse. The time between the outgoing pulse being transmitted and its echo being received corresponds to the distance between the transmitter and the object or the obstacle.



3. Technical specification

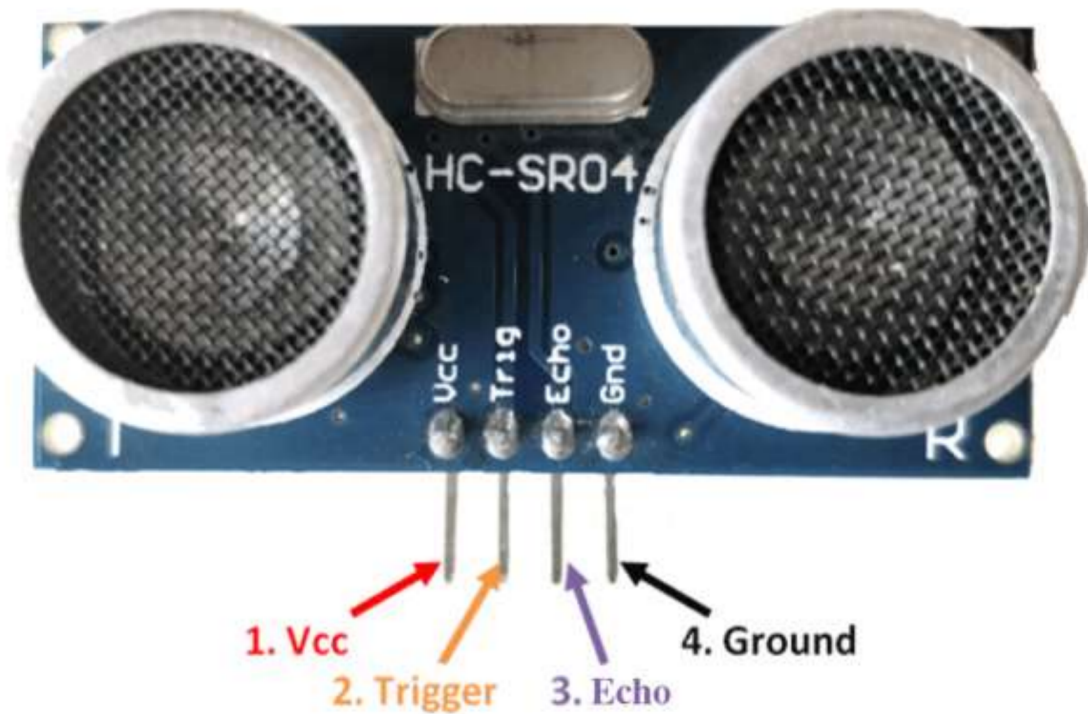
3.1 ARDUINO UNO



3.2 Specification of ARDUINO UNO

| Feature | Specification |
|--------------------------------|--|
| Microcontroller | ATmega328 |
| Operating Voltage | 5V |
| Input Voltage(recommended) | 7-12V |
| Input Voltage(limits) | 6-20V |
| Digital I/O Pins | 14(of which 6 provide PWM output) |
| Analog Input Pins | 6 |
| DC Current per I/O Pin | 40mA |
| DC Current for 3.3V Pin | 50mA |
| Flash Memory | 32KB of which 0.5KB used by bootloader |
| Serial Read Only Memory (SRAM) | 2KB(ATmega328) |
| (EEPROM) | 1KB(ATmega328) |

3.3 Ultrasonic sensor



3.4 Specification of ultrasonic sensor

| Electrical Parameters | HC-SR04 Ultrasonic Module |
|-----------------------|--|
| Operating Voltage | DC-5V |
| Operating Current | 15mA |
| Operating Frequency | 40KHZ |
| Farthest Range | 4m |
| Nearest Range | 2cm |
| Measuring Angle | 15 Degree |
| Input Trigger Signal | 10us TTL pulse |
| Output Echo Signal | Output TTL level signal, proportional with range |
| Dimensions | 45*20*15mm |

3.5 Micro SD card adapter module



4. Photographs of working project

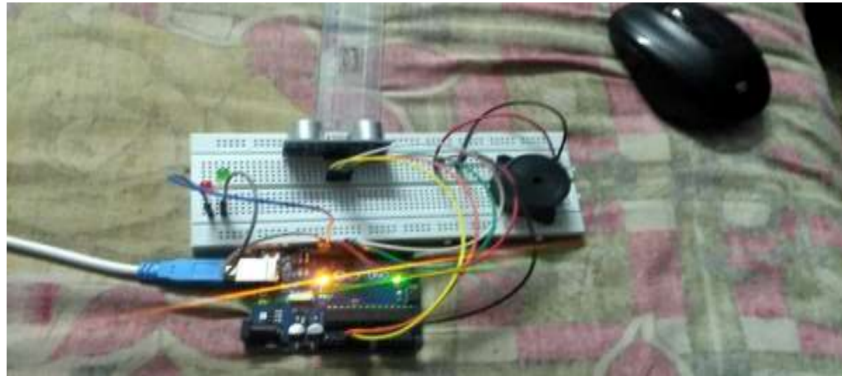


Fig 1 – Circuit with Obstacle

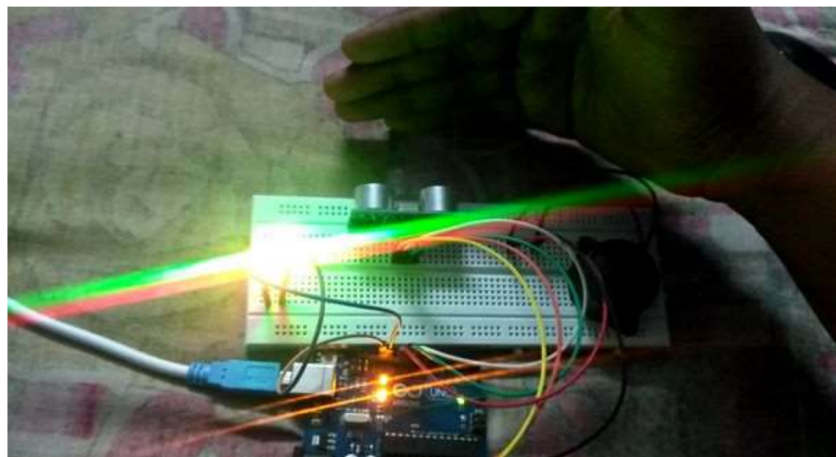


Fig 2 – Circuit without Obstacle

5. Future scope for improvement and conclusion

In case of the Blind Stick (Helping Hand) we can further improve by using a camera that will detect the type of obstacle in front of the user by image processing technique.

This device can be installed on vehicles to prevent road accident. With this device, we only can detect obstacle within its range and give a warning to its user until now. However, if we can detect the speed of an incoming object towards us and the speed of our own, then we can assume the time of collision. First, the device will warn the user to stop until the vehicle is inside the safety distance, and then it will pull an emergency safety break to stop the vehicle when it has crossed the safety distance limit. However, to prevent the collision, both the vehicles has to be equipped with this VCPS (Vehicle Collision Protection System) device. This will help our country to reduce the number of road accidents. This will give vehicles a step closer towards automated driving. In addition, after installing this we can call our vehicles as an Artificially Intelligent Vehicle.

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