A Theme-based Project Report
On

SMART BLIND STICK

By

SYED MAHBOOB ALI

1602-18-733-055

TASSAIN RASOOL MALIK

1602-18-733-035

Department of Computer Science & Engineering

Vasavi College of Engineering (Autonomous)

(Affiliated to Osmania University)

Ibrahimbagh, Hyderabad-31

2021

ACKNOWLEDGEMENT

We would like to express our heartfelt gratitude to Mr. S Vinay Kumar, our project guide, for her valuable guidance and constant support, along with her capable instructions and persistent encouragement.

We are grateful to our Head of Department, Dr. T. Adilakshmi, for her steady support and the provision of every resource required for the completion of this project.

We would like to take this opportunity to thank our Principal, Dr. S. V. Ramana, as well as the management of the institute, for having designed an excellent learning atmosphere.

We are thankful to and fortunate enough to get constant encouragement, support and guidance which helped us in successfully completing our project work.

TABLE OF CONTENTS

LIST OF FIGURES……...……..IV
1. INTRODUCTION……..……..……1
1.1 OVERVIEW……..……..……1
1.2 MOTIVATION……..…..…1
1.3 PROBLEM DEFINITION ……..…...1
1.4 OBJECTIVES……..…….…...1
2 SOFTWARE REQUIREMENT SPECIFICATION……...…2
2.1 ARDUINO IDE 1.8.15 …….……2
3. SYSTEM ARCHITECTURE (DESIGN)…….……..3
3.1 COMPONENTS USED……..…….…...…..3
3.1.1 ARDUINO UNO……...……3
3.1.2 BUZZER……...…….4
3.1.3 ULTRASONIC SENSOR……..…4
3.1.4 BATTERY (9V) …….……...5
3.1.5 JUMPER WIRES…….……..5
3.2 CIRCUIT DIAGRAM……...……6
3.3 BLOCK DIAGRAM OF THE STICK …….……6
3.4 CONNECTION DIAGRAM OF THE SMART STICK …….7
4. CODE……...……8
5. RESULTS/SCREENSHOTS…….10
6. CONCLUSION AND FUTURE WORK…….….13
7. REFERENCES…….….14

LIST OF FIGURES

Figure 3.1.1 ARDUINO UNO……3
Figure 3.1.2 BUZZER……4
Figure 3.1.3 ULTRASONIC SENSOR……..……4
Figure 3.1.4 BATTERY (9V)…….……5
Figure 3.1.5 JUMPER WIRES……...……5
Figure 3.2 CIRCUIT DIAGRAM..…….……6
Figure 3.3 BLOCK DIAGRAM OF THE SMART STICK …….……6
Figure 3.4 CONNECTION DIAGRAM OF THE SMART STICK ……..……..7
Figure 5.1 TINKERCAD SIMULATION……10
Figure 5.2 BUZZER……..…10
Figure 5.3 ARDUINO UNO……..…11
Figure 5.4 ULTRASONIC SENSOR…….…..11
Figure 5.5 9 V BATTERY……12
Figure 5.6 COMPLETE STICK ……...……12

ABSTRACT

Due to the absence of visual perception, people are deprived of enjoying the beauty of nature and lack to fulfill their desires and needs. Visually impaired people have small interactions in the surrounding area . The physical movement is the combative situation of unsighted people therefore it is difficult to explain that whether they want to depend on other people for moving from one place to another . According to Research, 253 million people are visually impaired and from that 36 million people are completely blind and 217 million people are living with low sight or vision . Blind people face obstacles in unknown or new places and they have to take the support of a sighted person. The majority of visually impaired persons are unemployed. Scientists work decades to build up the blind stick to detect obstacles in the outdoor environment and warn unsighted people about obstacles in their surroundings. Because limited jobs are available for blinds and they have to depend on the family to support them financially. To address these problems, there is a need for affordable small sticks to assist the visually impaired peoples. Internet of Things (IoT) brings revolution by automating the manual processes to automated processes with the help of other emerging technologies like wireless sensor networks, data analytics, cloud computing, machine learning, etc. IoT digitalizing every field of life from medicine to agriculture and education to industry. Sensors are providing the base to smart automation by sensing and transmitting information via wireless sensor networks. IoT is an appropriate technology to address the problems of visually impaired peoples by introducing smart stick for assistance.

1. INTRODUCTION

1.1 OVERVIEW

IoT provides assistance and support to physically disabled people in maintaining a healthy life, promoting economic and social enjoyment. Blindness is a condition where visual vision is impaired because of physiological or neurological causes. The 50 percent blindness is entitled to the lack of integration in the production of the optic nerve or visual center of the retina and the absence of visual light perception is 100 percent blindness. The main purpose to develop this application was to fulfill all the requirements of the visually impaired users.

1.2 MOTIVATION

There are about 285 billion visually impaired people worldwide, of whom 39 million are completely blind. The number of blind people around the world will rise to double by 2020 according to WHO and IAPB. Blind people are having difficulty moving or surviving without support. IoT is an appropriate technology to address the problems of visually impaired peoples by introducing smart stick for assistance.

1.3 PROBLEM DEFINITION

We have created designed and built an “Ultrasonic Blind Walking Stick” device which will help blind people to walk with ease independently. As a simpler version, we have used only one ultrasonic sensor in this project. For better accuracy and assistance two or three sensors can be used.

1.4 OBJECTIVES

The main objective of this project is to help blind people to walk with ease and to be warned whenever their walking path is obstructed with other objects, people or other similar odds. As a warning signal, a buzzer is connected in the circuit, whose frequency of beep changes according to the distance of object. The closer the distance of obstruction, the more will be the buzzer beep frequency. We can say that the beep frequency is inversely proportional to the distance.

2. SOFTWARE REQUIREMENT SPECIFICATION

2.1 ARDUINO IDE 1.8.15

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.This software can be used with any Arduino board.

This IDE (Integrated Development Environment) is part of Arduino Create, an online platform that enables developers to write code, access tutorials, configure boards, and share projects. Designed to provide users with a continuous workflow, Arduino Create connects the dots between each part of a developer's journey from inspiration to implementation. Meaning, you now have ability to manage every aspect of your project right from a single dashboard.

The Arduino Web Editor is hosted online, therefore it will always be up-to-date with the latest features and support for new boards.

This IDE lets you write code and save it to the cloud, always backing it up and making it accessible from any device. It automatically recognizes any Arduino and Genuino board connected to your PC, and configures itself accordingly.

An Arduino account is all you need to get started.

On the online IDE we are able to automatically detect the kind of board and the port it is connected to without you having to individually select them.

The Serial Monitor reads the board selected at that moment in the Board dropdown. If you need to change board (for instance you have more than one board connected to your PC), just select the one you would like to read from in the dropdown. The PORT infos in the panel will be updated as a result.

3. SYSTEM ARCHITECTURE (DESIGN)

The main component used for this device is the ultrasonic sensor. The ultrasonic sensor transmits a high frequency sound pulse and then calculates the time to receive the signal of the sound echo to reflect back. The sensor has 2 circles. One of them acts as the transmitter and transmits the ultrasonic waves. The other one acts as a receiver (mostly a small microphone) and receives the echoed sound signal. The sensor is calibrated according to the speed of the sound in air. With this calibrated input, the time difference between the transmission and reception of sound pulse is determined to calculate the distance of the object. This circuit is powered by a 9-volt battery .

3.1 COMPONENTS USED

3.1.1 ARDUINO UNO

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your Uno without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

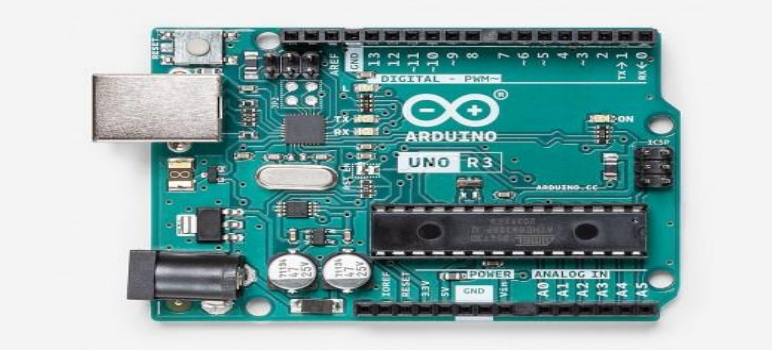

Figure 3.1.1 ARDUINO UNO

3.1.2 BUZZER

Micro Buzzer-5V-Black are used for making beeps, tones and alerts. To use, connect short pin to ground and the other pin to 5 voltage level.

Figure 3.1.2 BUZZER

3.1.3 ULTRASONIC SENSOR

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

Figure 3.1.3 ULTRASONIC SENSOR

3.1.4 BATTERY (9V)

The nine-volt battery, or 9-volt battery, is a common size of battery that was introduced for the early transistor radios. It has a rectangular prism shape with rounded edges and a polarized snap connector at the top. This type is commonly used in smoke detectors, gas detectors, clocks, walkie-talkies, electric guitars and effects units.

Figure 3.1.4 BATTERY (9V)

3.1.5 JUMPER WIRES

A jump wire (also known as jumper, jumper wire, jumper cable, DuPont wire or cable) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

Figure 3.1.5 JUMPER WIRES

3.2 CIRCUIT DIAGRAM

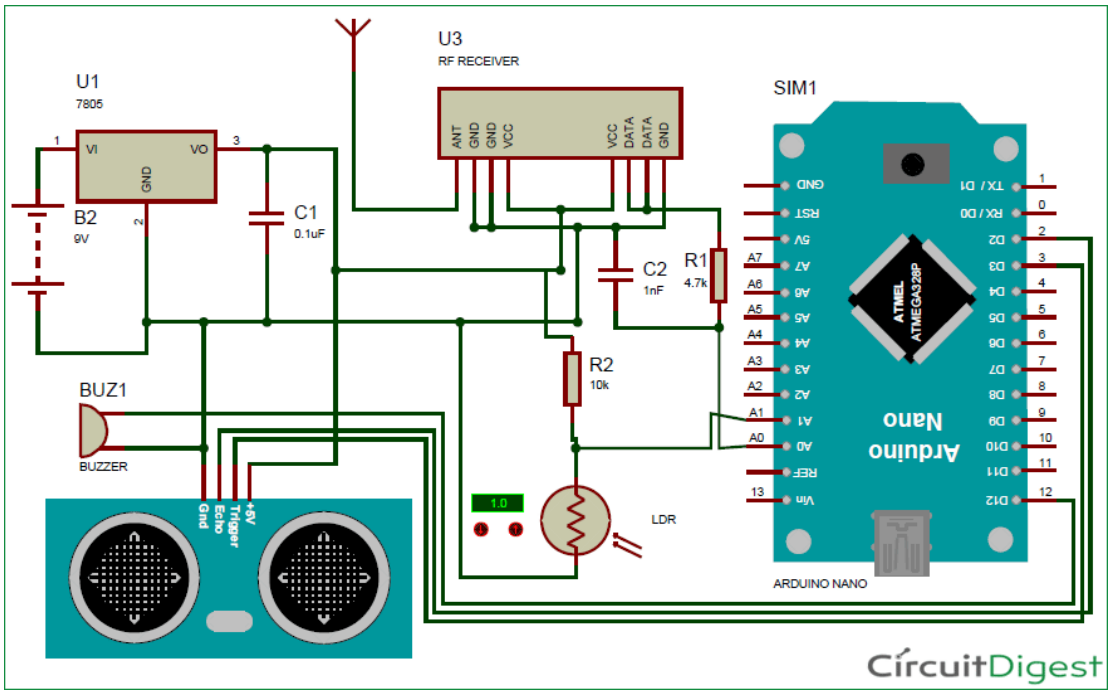

Figure 3.2 CIRCUIT DIAGRAM

3.3 BLOCK DIAGRAM OF THE SMART STICK

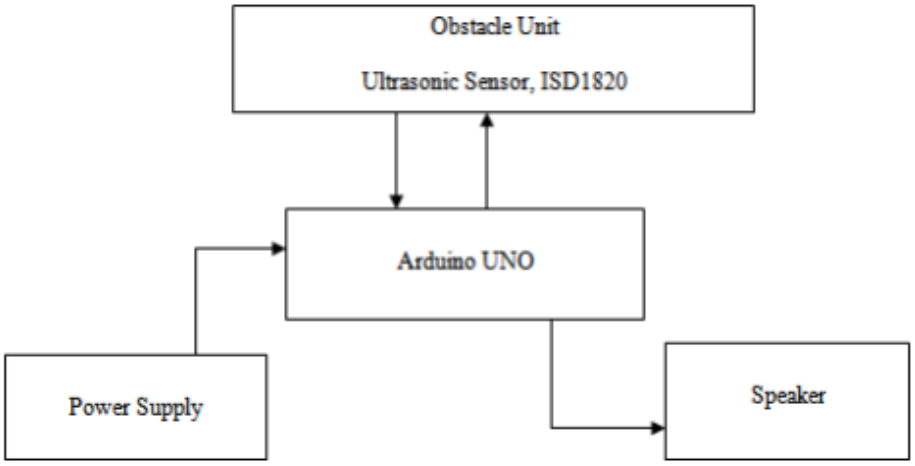

Figure 3.3 BLOCK DIAGRAM OF THE SMART STICK

3.4 CONNECTION DIAGRAM OF THE SMART STICK

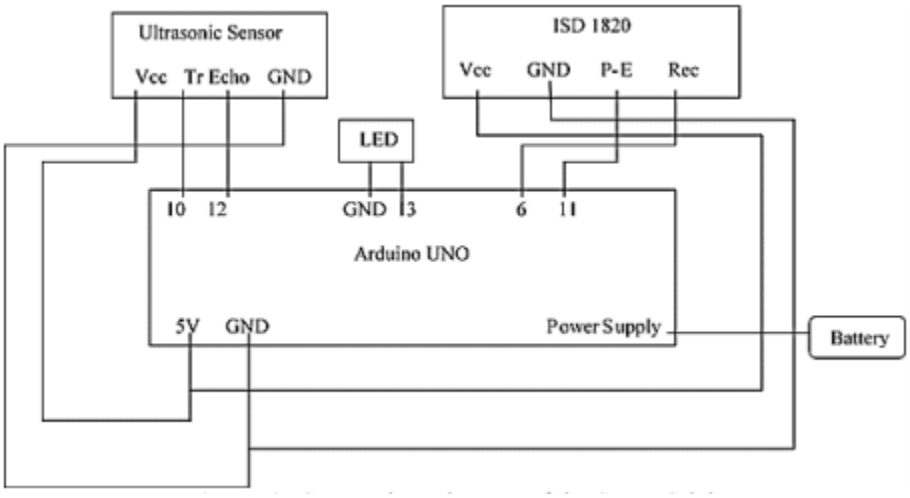

Figure 3.4 CONNECTION DIAGRAM OF THE SMART STICK

4. CODE

```
int trigger_pin = 2;

int echo_pin = 3;

int buzzer_pin = 10;

int time;

int distance;

void setup()

{

        Serial.begin (9600);

        pinMode (trigger_pin, OUTPUT);

        pinMode (echo_pin, INPUT);

        pinMode (buzzer_pin, OUTPUT);

}

void loop()

{

    digitalWrite (trigger_pin, HIGH);

    delayMicroseconds (10);

    digitalWrite (trigger_pin, LOW);

    time = pulseIn (echo_pin, HIGH);

    distance = (time * 0.034) / 2;
```

```
  if (distance <= 30)
        {
        Serial.println (" Object is near ");
        Serial.print (" Distance= ");
        Serial.println (distance);
        digitalWrite (buzzer_pin, HIGH);
        delay (500);
        }
   else {
        Serial.println (" object is far ");
        Serial.print (" Distance= ");
        Serial.println (distance);
        digitalWrite (buzzer_pin, LOW);
        delay (500);
       }
}
```

5. RESULTS/ SCREENSHOTS

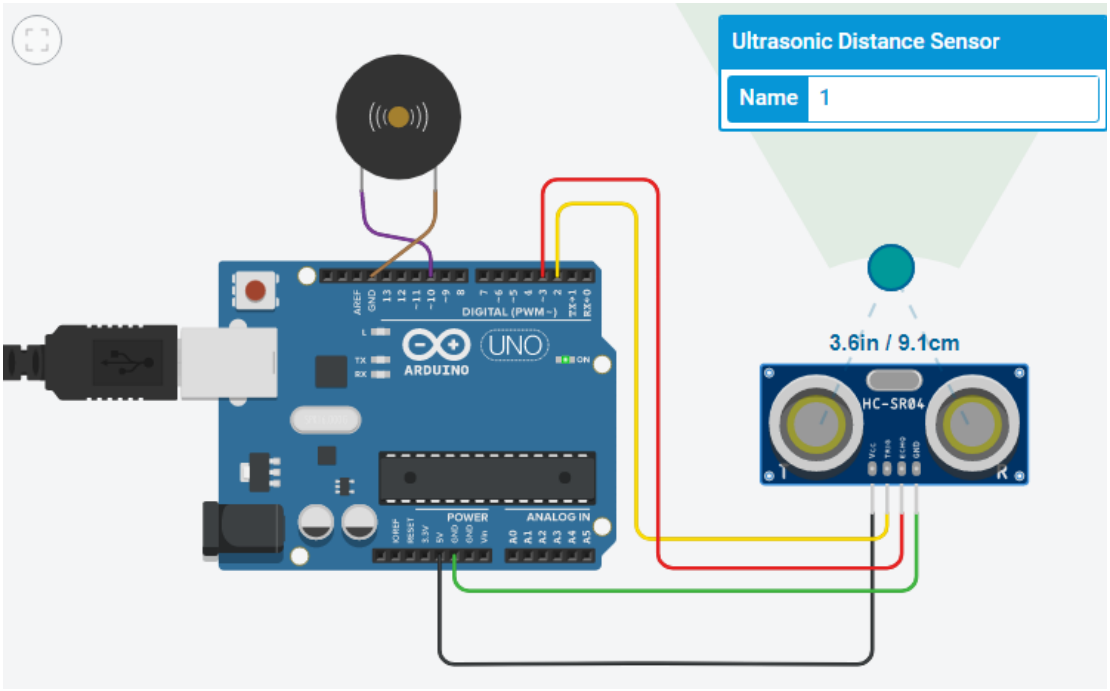

Figure 5.1 TINKERCAD SIMULATION

Figure 5.2 BUZZER

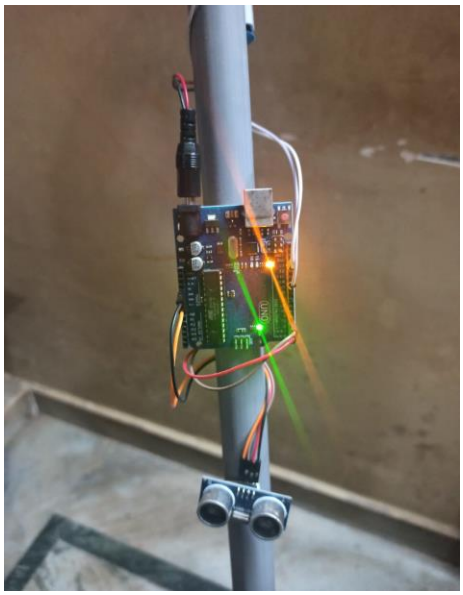

Figure 5.3 ARDUINO UNO

Figure 5.4 ULTRASONIC SENSOR

Figure 5.5 9VBATTERY

Figure 5.6 COMPLETE STICK

6. CONCLUSION & FUTURE WORK

Finally, the blind walking stick was turned into a product that can be used to guide the blind. The goal is to solve the problems that blind people face in their everyday lives. The program is also taking the step to guarantee their safety. The main purpose is to develop a prototype in the forms of voice messages that can detect objects or obstacles in front of users and feeds alarm back. This program targets people with disabilities who are blind to encourage movement and improve health. The second goal is accomplished using ultrasonic sensor and buzzer to complete the design to investigate the nature of the smart blind handle. This is an Automatic System project. Allow people with disabilities to move around freely. The initiative will work to help all of our country's blind people make it easier for them to travel wherever they wish. This project is being done to help the blind man travel very well in front. This system provides a low cost, reliable, compact, low-power consumption and robust navigation solution with obvious short response time. Although the device with sensors and other components is hard-wired, it is light in weight. Additional aspects of this device can be enhanced by wireless connectivity between system components, thereby increasing the range of the ultrasonic sensor and introducing a technology to evaluate the speed of obstacles approaching. When creating such an effective solution, visually impaired and blind people were at the top of our priorities in all developing countries.

7. REFERENCES

[1] Assistive Infrared Sensor Based Smart Stick for Blind People, Ayat A. Nada| Science and Information Conference 2015 July 28-30, 2015 London, UK

[2] AyushWattal, Ashuthosh Ojha, Manoj Kumar “Obstacle Detection Belt for Visually Impaired Using Raspberry Pi and Ultrasonic Sensors

[3] B.Hoyle, D.Withington, D.Waters, ”UltraCane”, Available from:”http://www.soundforesight.co.uk/index.html”’. June 2006.

[4] Benjamin and team members, “Smart Stick at Bionic Instruments Company Researches”, 2011.

[5] SMART BLIND STICK USING ARDUINO, R. Dhanuja1, F. Farhana2, G. Savitha3International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 05 Issue: 03 | Mar-2018 www.irjet.net p-ISSN: 2395-0072