SMART CANE FOR BLIND AND DEAF PEOPLE

PROJECT REPORT

Digital Logic And Design(CSE1003)

SLOT-B1

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Chapter1: ABSTRACT:

The main aim of this research paper is to provide a simple, affordable yet an efficient solution for the visually impaired. The idea behind the design of the stick was to keep it structurally similar i.e. thin, light weight and easy to handle, yet give an active feedback to the user regarding hazards in his walking path. The smart white cane uses the ultrasonic sensors arranged in such a way that it detects knee level obstacles and even those above the waist. The user is notified about the same by a haptic feedback in form of vibrations.
This can help the user in navigating easily even without the help of other individuals or dogs. Also, this can considerably alleviate the risk of the user injuring himself.

Chapter2: INTRODUCTION:

The white cane, due to its primitive design, is unable to offer the blind and visually impaired a level of independence that is achievable with modern technology. The Smart Cane looks to upgrade the white cane by increasing security and usability of the cane while ensuring an affordable price for an older and lower income demographic. This was done by including an ultrasonic sensor to detect potential obstacles at an extended distance from the user, vibrating motors to alert the user of these obstacles via haptic feedback, and an adjustable and ergonomic handle in order to increase the comfort and ease of the cane. Observations and basic testing confirm the effectiveness of the vibrations in the handle and the accuracy of the ultrasonic sensor up to 1.5 meters past the tip of the cane.

Consumer and medical technology has made significant advancements over the past 60 years. However, the functionality of canes for the visually impaired remains limited, relying on the user's ability to physically detect objects and forcing the user to be entirely responsible for their safety. This burden can be mitigated with the added security of an object detector. In addition, the standard white cane has no range of physical options. It places additional burden on the user by forcing a change in handle grip depending on how crowded the surroundings are. The white cane thus requires the user to adapt to the cane rather than having a cane that will adapt to the user. To address these shortcomings, The Smart Cane project examines how canes can be technologically equipped to improve their functionality in a way that is also economically accessible. The goal for the Smart Cane project is to eliminate this problem by designing, building, and testing a cane for the blind that utilizes computer and sensory technology to provide object detection capabilities and freedom of physical range

Chapter 3: LITERATURE SURVEY:

Who are visually impaired people?

Visual impairment, also known as vision impairment or vision loss, is a decreased ability to see to a degree that causes problems not fixable by usual means, such as glasses. Some also include those who have a decreased ability to see because they do not have access to glasses or contact lenses. Visual impairment is often defined as a best corrected visual acuity of worse than either 20/40 or 20/60. The term blindness is used for complete or nearly complete vision loss. Visual impairment may cause people difficulties with normal daily activities such as driving, reading, socializing, and walking. The individuals who are affected by visual impairment are known as visually impaired people.

There are approximately 37 million people across the globe who are blind, over 15 million are from India. Currently most visually impaired people rely on other people or dogs. Many disabled people prefer to do things independently rather than rely on others.

Problems faced by the visually impaired:

Blind mobility is one of the main challenges encountered by visually impaired persons in their daily lives. The blind people life and activities are greatly restricted by loss of eyesight.

They can only walk in fixed routes that are significant in their lives, with blind navigation equipments and the accumulated memories in their long-term exploration.

Crossing at urban intersections is a difficult and possibly dangerous task for the blind, hindering independent safe navigation. Assistive technology researchers have been working on this problem for years, not many of the proposed solutions being widely adopted.

Our project aims to provide an affordable and possible solution to help the visually impaired people navigate through traffic signals and board the required bus without the help of another individual.

EXISTING ASSISTIVE SOLUTIONS FOR THE VISUALLY IMPAIRED:

Guide dogs: Guide dogs, (also known as service animals or assistance animals), are assistance dogs trained to lead blind and visually impaired people around obstacles.

Although the dogs can be trained to navigate various obstacles, lots of them are (red–green) color blind and are not capable of interpreting street signs. The human does the directing, based on skills acquired through previous mobility training. The handler might be likened to an aircraft's navigator, who must know how to get from one place to another, and the dog is the pilot, who gets them there safely.

Limitations: A lot of special training is required both for the dog and the user and a lot of time is required for them to get adjusted to each other. Moreover, dogs tend to get distracted even after several months of training and therefore are not reliable.

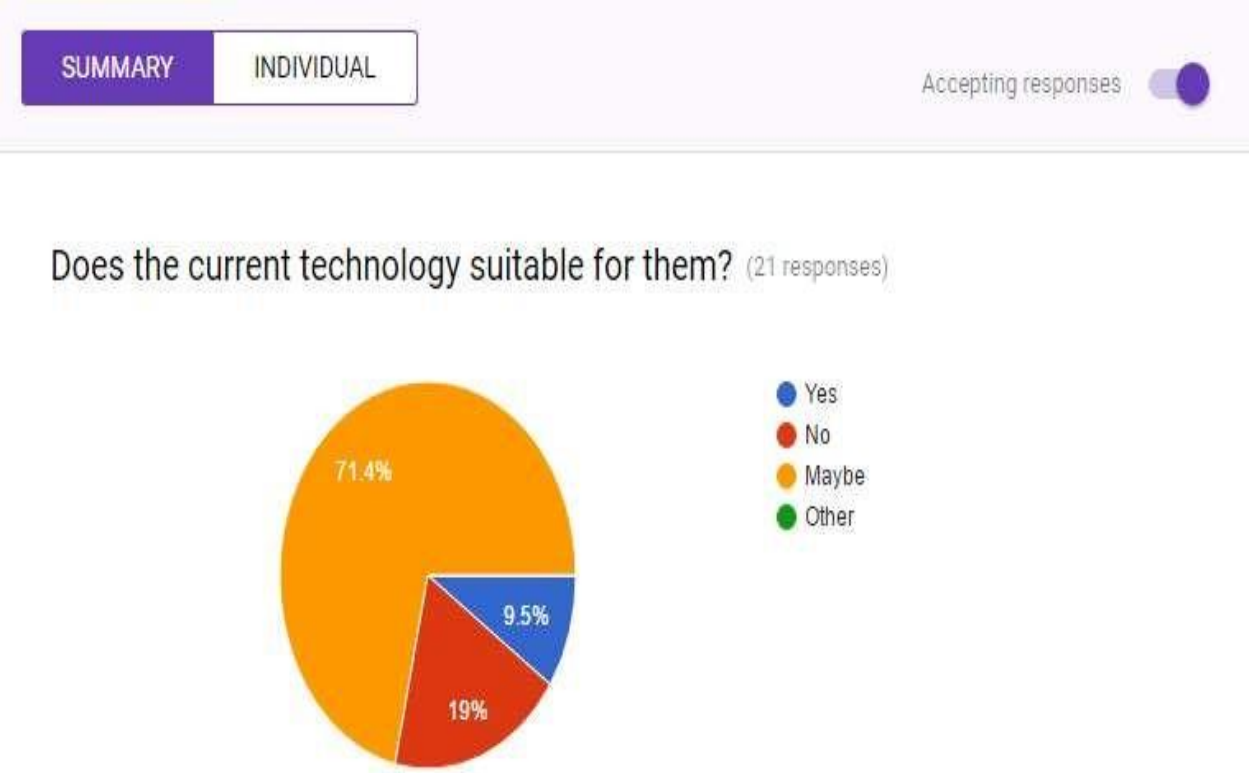
Other individuals: Visually impaired people are forced to seek the help of others in many situations and day to day activities and navigation. The individual is usually a friend or relative with a little training on how to assist a visually impaired person.

Limitations: It is not wise to always depend on others, no matter how close they are to us. At some point, people tend to get annoyed and a dispute may occur.

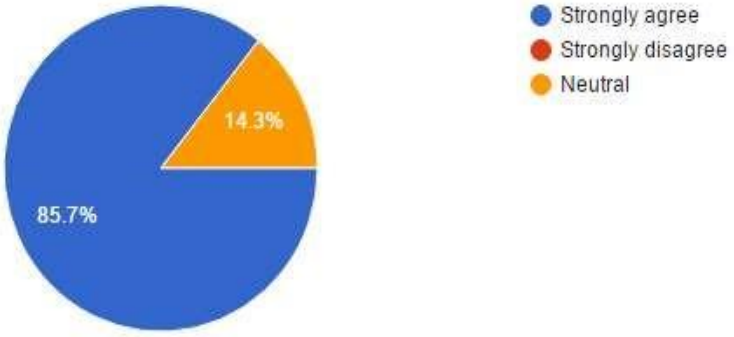
The Regular Walking Cane: The regular walking stick/cane has been the standard equipment of most blind people. It significantly reduces the dependency on others.

Limitations: It can only be used to detect obstacles in a very close vicinity. Obstacles are detected by touch only and it is inappropriate at times to touch all the objects that are in the way.

SURVEY RESPONSES:



Can technology improved their current lifestyle? (21 responses)

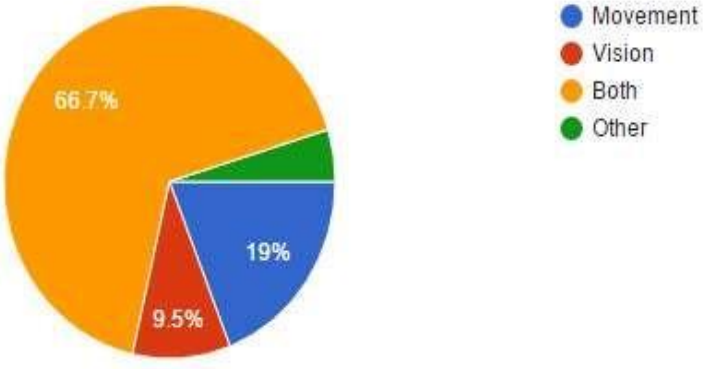


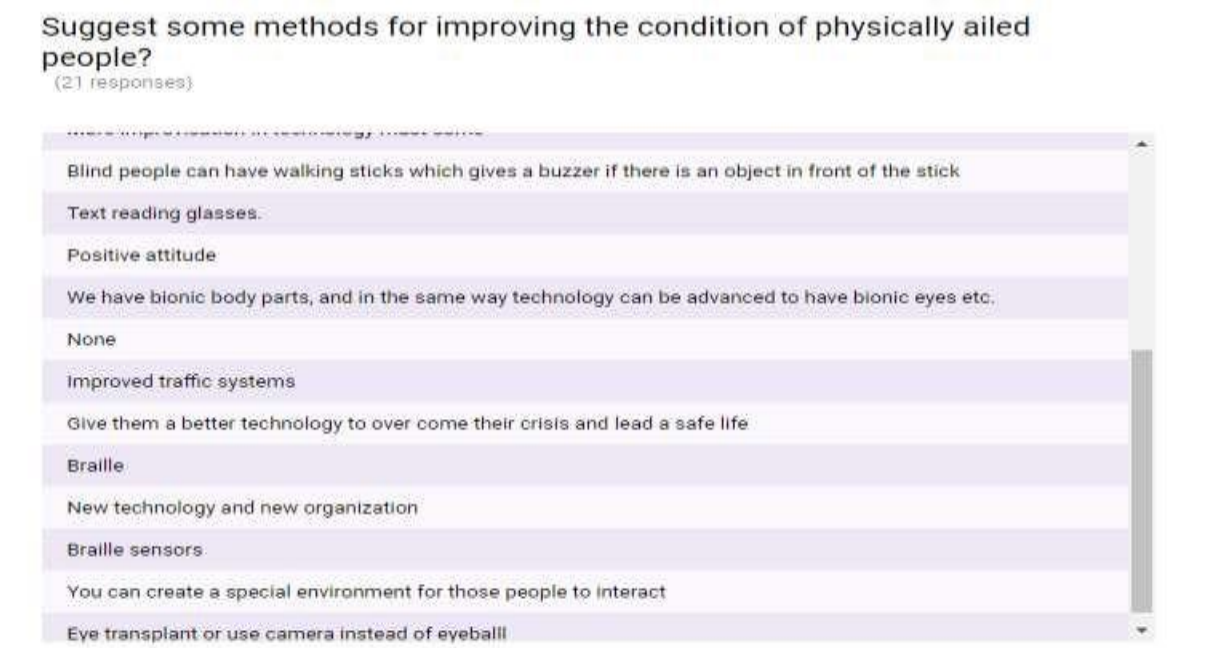
Suggest some methods for improving the condition of physically ailed people?

(21 responses)

- Increase the number of announcements and help desks on public transport centers
- Improve the technology to make new devices to assidt them
- Please provide enough technological facilities to them
- Open centres all over the country for such people
- They should be provided with some machines which can identify the hindrance be and objects in their path and it should show the right and safe path for their movement
- Providing them with technologies that can help them
- More improvisation in technology must come
- Blind people can have walking sticks which gives a buzzer if there is an object in front of the stick
- Text reading glasses.
- Positive attitude
- We have bionic body parts, and in the same way technology can be advanced to have bionic eyes etc.
- None

What do are the problems mainly faced by them? (21 responses)





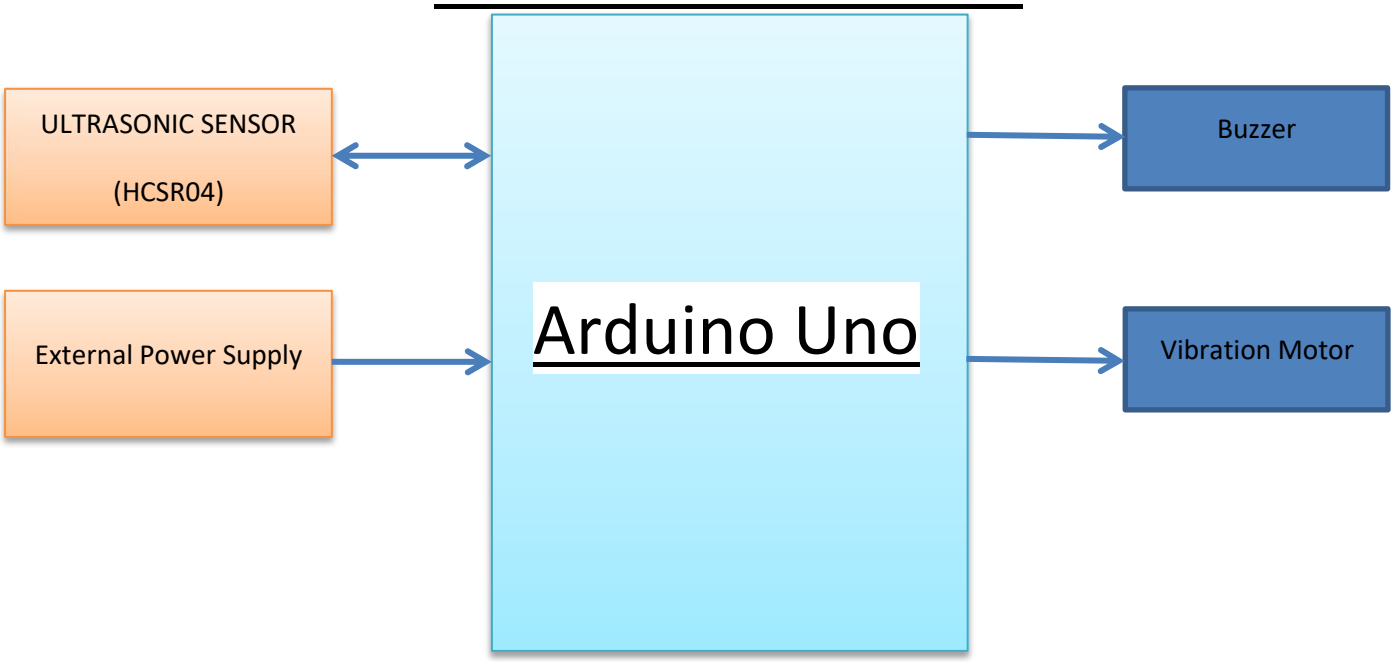
Chapter 4 -CONCEPTUAL AND BLOCK DIAG. :

How does it works:

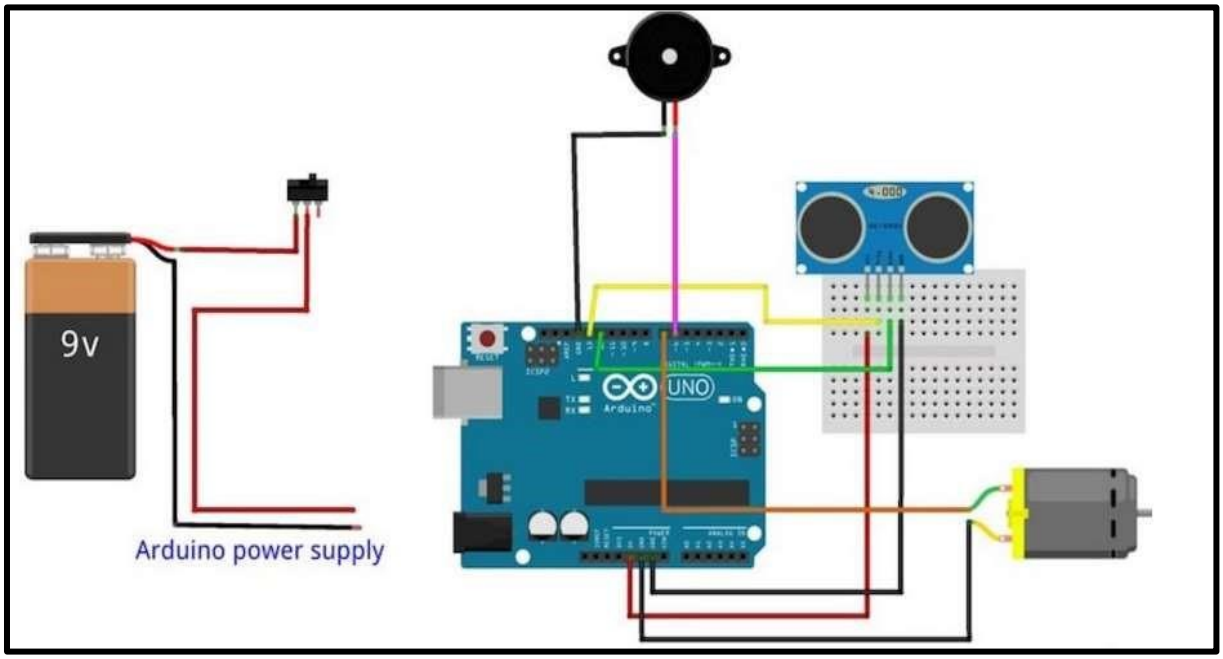
The technology behind the Arduino Smart Cane is pretty straight forward. There are mainly three blocks behind it: input, controller, and output. The input consists of an ultrasonic sensor that is capable of detecting obstacles in front of it at a range of up to 400cm.But I fixed the range upto 70 cm. It is interfaced to a controller: the Arduino which determines if an obstacle is too close to the cane and triggers the output if it is. The output consists of a vibration motor to provide haptic response and a piezo buzzer.

INPUT:	OUTPUT:
a) Power supply b)Ultrasonic Sensor: Both receive and send signals	a) Piezo buzzer b) Vibration motor

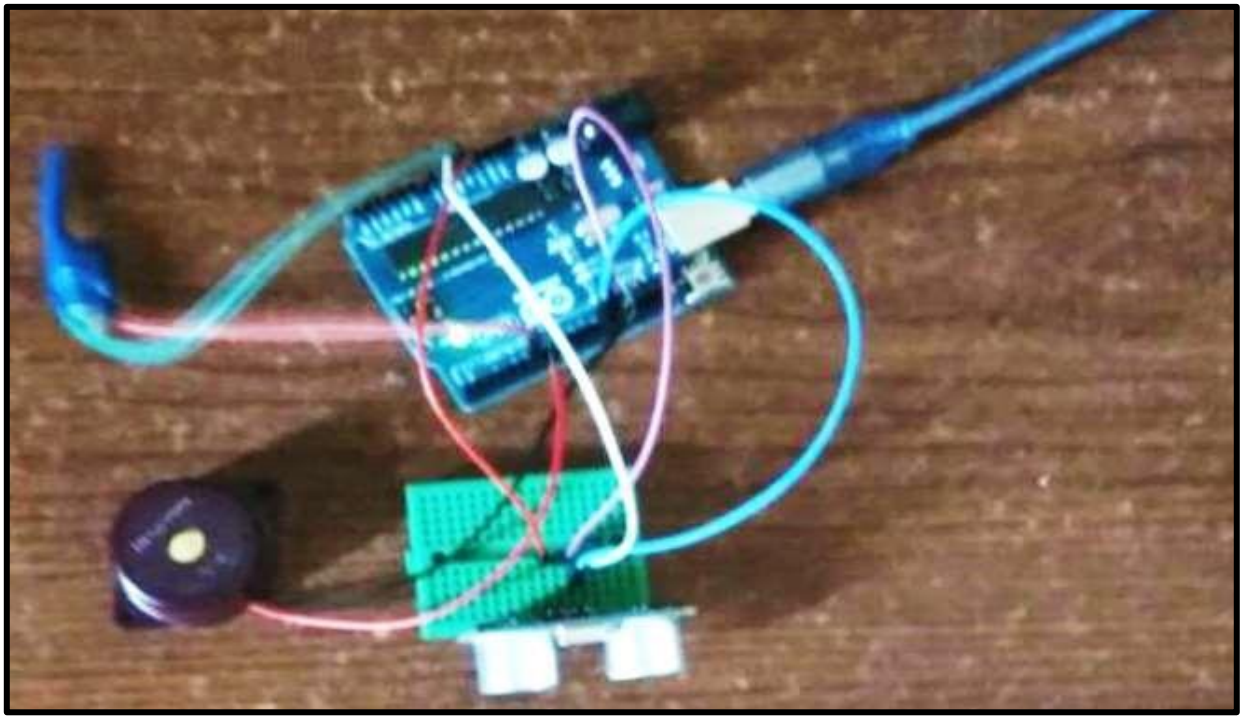
SCHEMATIC MODEL:



Chapter 5- CONCRETE:



SCHEMATIC CIRCUIT



ORIGINAL CIRCUIT

VIBRATION MOTOR

ARDUINO AND BREADBOARD BOX

ULTRASONIC SENSOR

PIZEO BUZZER

POWER SUPPLY

SMART STICK

CONNECTIONS:

FROM	TO
Ultrasonic VCC	Arduino 5v
Ultrasonic GND	Arduino GND
Ultrasonic TRIG	Arduino D13
Ultrasonic ECHO	Arduino D12
Buzzer RED	Arduino D7
Buzzer BLACK	Arduino GND
Vibrator motor pin	Arduino D6
Vibrator motor pin 2	Arduino GND
9 volt battery RED	Toggle switch pin 1 9
volt battery BLACK	DC male power jack(-)
Toggle switch pin 2	DC male power jack (+).

Chapter 6: COMPONENT ANALYSIS:

Smart Cane for blind people:

1.Arduino UNO

INTRODUCTION:

Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL),permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself kits.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (*shields*) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

Arduino Uno SMD R3

Developer	Arduino
Manufacturer	Many
Type	Single-board microcontroller
Operating system	None
CPU	Atmel AVR (8-bit), ARM Cortex-M0+ (32-bit), ARM Cortex-M3 (32-bit), Intel Quark (x86) (32-bit)
Memory	SRAM
Storage	Flash, EEPROM

HISTORY

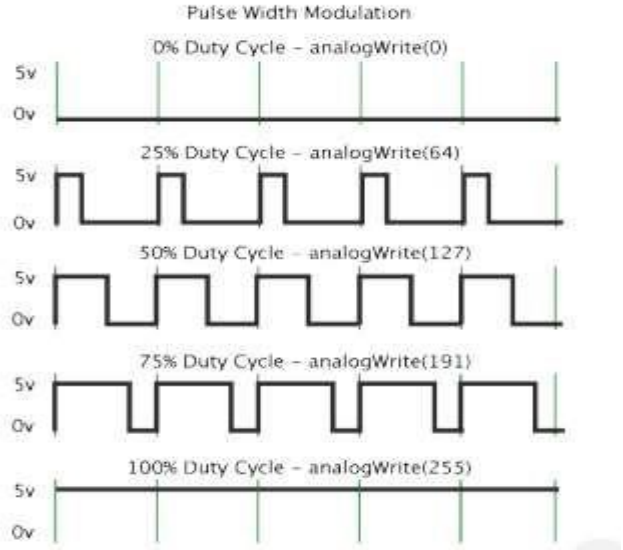
The origin of the Arduino project started at the Interaction Design Institute Ivrea (IDII) in Ivrea, Italy. At that time, the students used a BASIC Stamp microcontroller at a cost of $ 100, a considerable expense for many students. In 2003, Colombian student Hernando Barragán created the development platform Wiring as a Master's thesis project at IDII, under the supervision of Massimo Banzi and Casey Reas, who are known for work on the Processing language.

APPLICATION IN OUR PROJECT:

The Smart Cane's sensors and motors are powered by an Arduino microcontroller. The Arduino is a programmable electronic platform which allows users to easily create prototypes. Along with a breadboard and other pieces of circuitry equipment, the Arduino can be used to make various electronic input, output, and sensory systems. Aside from basic electronic hardware, a wide range of complex devices, including sensors, are made to be compatible with the Arduino system. The Arduino programming language is C based, and can be used to create a wide variety of programs. The Arduino is also made more accessible by its low cost. Most boards (including the Uno, which the Smart Cane uses) cost less than Rs 600.

Pulse Width Modulation

The Arduino allows for input and output by plugging wires into 'pins.' Input pins read data (such as information from a sensor), and are capable of taking in a continuous range of values. Thus, through sensors, the Arduino can be continuously updated with information about the environment around it. The output pins send a current to any device connected to them, such as a motor or a light bulb. Unlike the input pins, there are only two possibilities for the voltage: 5V or 0V. Gradually changing the speed of the motor requires a continuous change in voltage, which is not possible with the

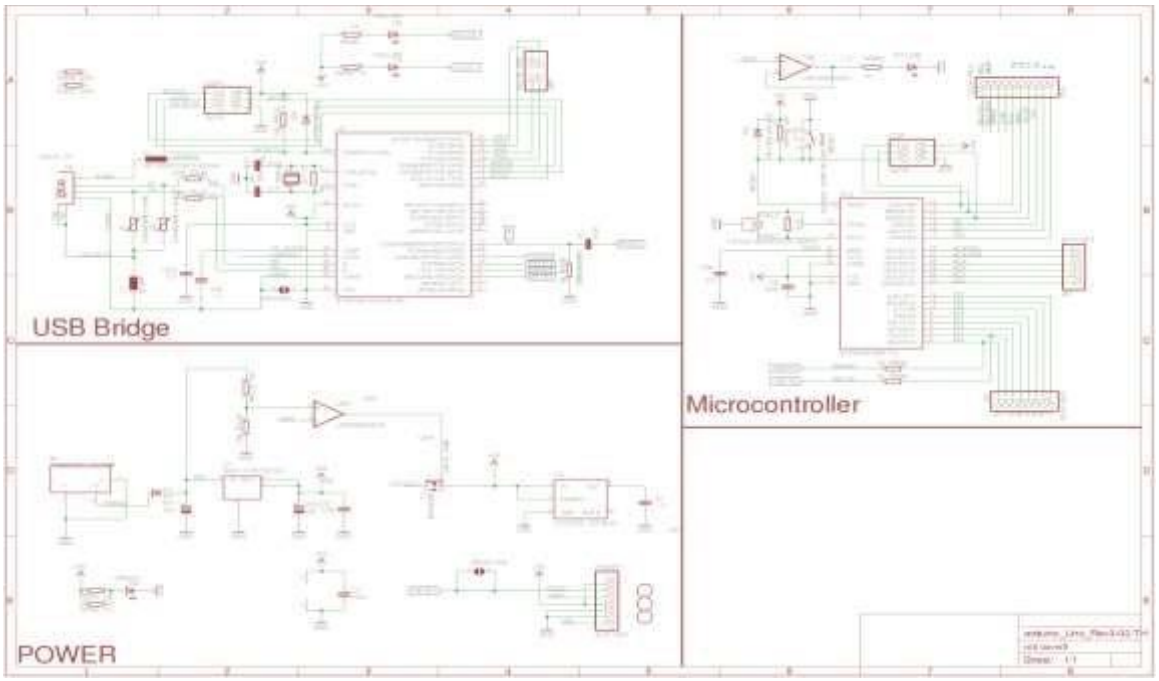


output pins.

Fig:This diagram shows how the number of pulses sent changes depending on the analogWrite value

However, the Arduino does allow for (and has special output pins dedicated to) pulse width modulation (abbreviated as PWM). Instead of ranging over many voltages, the voltage rapidly changes from0V to 5V. Essentially, PWM simulates a gradual change from one voltage to another, allowing for anything connected to the pin to also vary along a continuum. For example, if 5V are being outputted one fifth of the time, this is known as a 20% duty cycle, and the simulated voltage is one fifth of 5V, i.e. 1V. A function built into the Arduino, analogWrite(), allows a program to make use of the PWM function simply by plugging in a value ranging from 0 to 255, with the latter being the maximum possible

BLOCK DIAG:



2.Ultrasonic sensor (HCSR04)

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit.

FEATURES:

- Static current: 2mA max
- Induction Angle: 15°
- Detection Range: 2 – 200cm
- High precision up to 3mm

Description

Pins

This module has 4 pins- Vcc (5V), Trig, Echo, GND. Trig (trigger) is used to send out an ultrasonic high level pulse for at least 10µs and the Echo pin then automatically detects the returning pulse.

Measuring Distance

The time it takes the sound wave to be sent, hit the object and return back to the sensor is measured. This time is then multiplied by the speed of sound (343m/sec = 0.0343cm/µs = [1/29.1] cm/µs approx.) to give the total distance traveled by the ultrasonic wave, which is then divided by 2 (to account for the fact that the wave was sent, hit the object, and then returned back to the sensor, hence covering twice the distance to the object)

Distance = (Time for wave to return * Speed of sound) / 2.

APPLICATION IN OUR PROJECT:

Arduino Usage

This sensor module uses any 2 digital pins on the Arduino for Trig and Echo, and does not necessarily have to be pins 9 and 10. The code for measuring distance with Chineduino Uno Rev3 [Product Link] is given as:

```
#define trigPin 10 // Connect Trig to Uno digital pin 10
#define echoPin 9 // Connect Echo to Uno digital pin 9
void setup() { Serial.begin (9600); pinMode(trigPin,
OUTPUT); pinMode(echoPin, INPUT);}
void loop() { long time, dist;
digitalWrite(10, LOW); // Trig
delayMicroseconds(2);
digitalWrite(10, HIGH); // Trig
delayMicroseconds(10);
digitalWrite(10, LOW); // Trig
time = pulseIn(9, HIGH); // Echo
dist = (time/2) / 29.1; // divide by 29.1 or multiply by 0.0343
Serial.print(dist); Serial.println("cm");
```

```
delay(500);}
```

Serial monitor after uploading the code and test out the limits of the sensor. It can detect up to 200cm(2m), but sometimes maybe able to detect even further. Then use these limits to print out the distance values only when the value is within these limits. One way to do this is to replace the lines

```
Serial.print(dist);
Serial.println("cm");
```

with

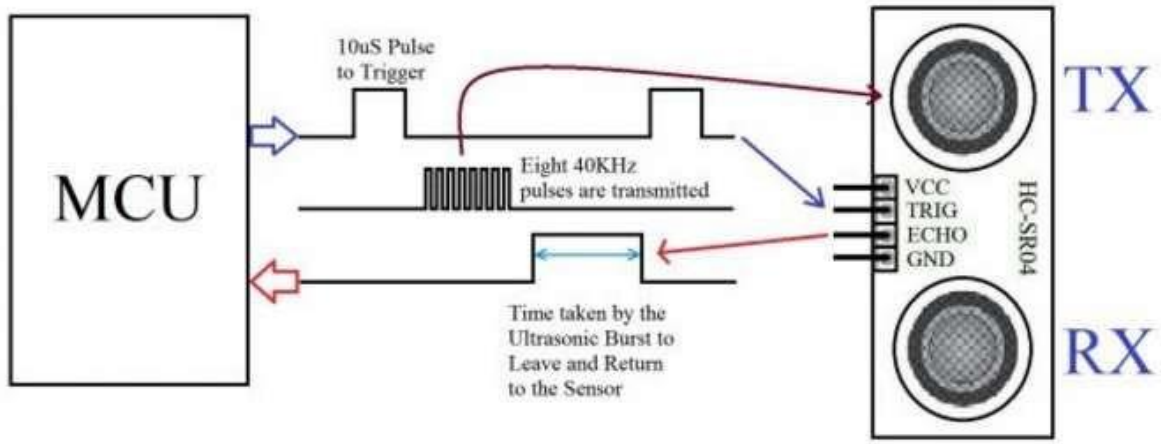
```
if (dist<=0||dist>=200){
Serial.println("-"); } else
{
Serial.print(dist);
Serial.println("cm"); }
```

The Ultrasonic Sensor The sensor used in the Smart Cane is the RadioShack® Ultrasonic Range Finder. It functions by sending out an extremely high frequency sound wave from one speaker, which is deflected by obstacles directly in its path. Using the speed of sound through air at room temperature, thedistance of the obstacle from the sensor can be calculated from the time it takes the ultrasonic pulse to leave the sensor, reflect off the nearest object, and return to a second speaker.

$$346.5(m/s)=d/\Delta t$$

The specific distance is calculated by the sensor and is outputted to the Arduino. This data is made accessible to the Arduino through code released by RadioShack® under a GNU General Public License. The detecting range of the sensor is from 3–400 centimeters, with a detecting angle of 30 degrees.12 However, the accuracy of ultrasonic sensors is limited not only by distance, but also by the surfaces of detected objects. A surface that absorbs sound or causes echoing, such as foam, would result in inaccurate readings.

BLOCK DIAG:



3. Piezo Buzzer

The Piezo Buzzer is used in applications that need an alarm or as an indication of an event.

Features

Piezo Buzzer

Piezo Buzzer

2 pins for easy mounting on breadboards.

Operating Voltage: 1.5-12V

Description

Piezo buzzer is an electronic device commonly used to produce sound. Light weight, simple construction and low price make it usable in various applications like car/truck reversing indicator, computers, call bells etc. Piezo buzzer is based on the inverse principle of piezo electricity discovered in 1880 by Jacques and Pierre Curie. It is the phenomena of generating electricity when mechanical pressure is applied to certain materials and the vice versa is also true. Such materials are called piezo electric materials. Piezo electric materials are either naturally available or manmade. Piezoceramic is class of manmade material, which poses piezo electric effect and is widely used to make disc, the heart of piezo buzzer. When subjected to an alternating electric field they stretch or compress, in accordance with the frequency of the signal thereby producing sound.The Piezo Buzzer is excellent for use in alarms, is also able to play tones and can be powered directly from the Chineduino Uno Rev3 and arduino.

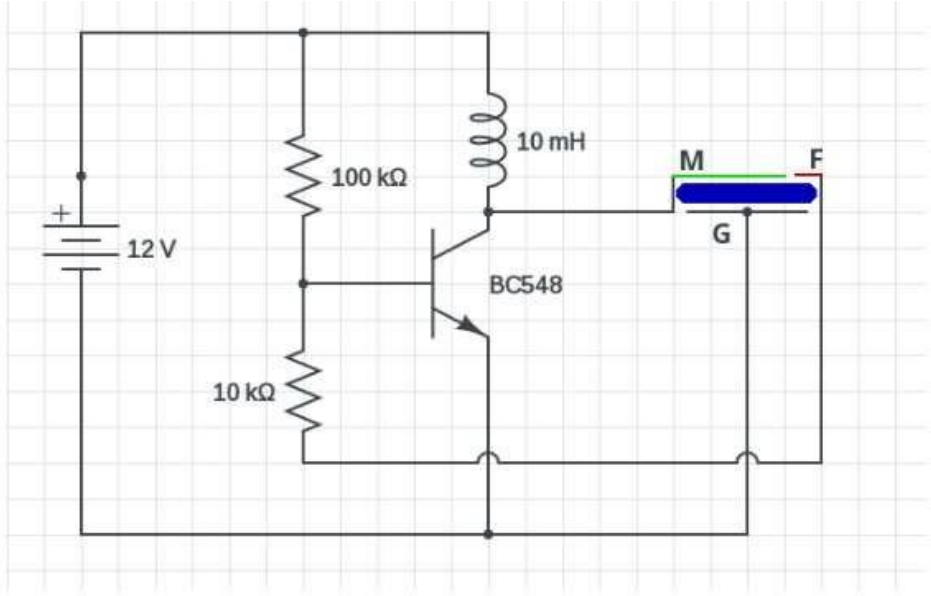
APPLICATION IN OUR PROJECT:

We use this to alert the user from coming obstacle by making a beep soundhe new version of Arduino IDE support the tone() function which can be used in the following way:

```
// This code is used to control the output tone of the buzzer from a potentiometer
// Human hearing range is from 20-20000 Hz
// The tone function however supports frequency values from 31-65535.
// Connect a potentiometer on Analog pin A0.
// Use of the tone() function will interfere with PWM output on pins 3 and 11 (except on Mega)

unsigned long dur = 10;  // 10ms duration of each tone

void setup() {
}

void loop() {
```

```
unsigned int freq=analogRead(A0); // this returns a value from 0 to 1023
freq=map(freq,0,1023,31,20000);
tone(8, freq,dur);
}
```

CIRCUIT DIAG:



Note the piezoelectric element's pinout, **M** is the main terminal, **F** is the feedback terminal and **G** is the ground plate.

4: VIBRATING MOTOR:

Brushless Dura Vibe™ Vibration Motor **What**

is a vibration motor?

Vibration motor is a compact size coreless DC motor used to informs the users of receiving the signal by vibrating, no sound. Vibration motors are widely used in a variety of applications including cell phones, handsets, pagers, and so on. The main features of vibration motor is the magnet coreless DC motor are permanent, which means it will always have its magnetic properties (unlike an electromagnet, which only behaves like a magnet when an electric current runs through it); another main feature is the size of the motor itself is small, and thus light weight. Moreover, the noise and the power consumption that the motor produce while using are low. Based on those features, the performance of the motor is highly reliable. The vibration motors are configured in two basic

varieties: coin (or flat) and cylinder (or bar). There are some components in both of their internal constructions

There are two basic types of vibration motor. An eccentric rotating mass vibration motor (ERM) uses a small unbalanced mass on a DC motor, when it rotates it creates a force that translates to vibrations. A linear resonant actuator (LRA) contains a small internal mass attached to a spring, which creates a force when driven.

APPLICATION IN OUR PROJECT:

Our transistor effectively acts as a switch, turning the motor on and off. It is important to note that with an N-type transistor it is "switched on" when there is a voltage above the transistor's threshold voltage applied to the gate. Without going into too much detail, we are essentially turning the motor on when we set pin 6 to high, and turning it off when set to low. Please note that for a P-type transistor this is the opposite.

```
void setup()
{
  pinMode( 6 , OUTPUT);  // Must be a PWM pin
}

void loop() {

  analogWrite( 6 , 153 );  // 60% duty cycle
delay(500);              // play for 0.5s

  analogWrite( 6 , 0 );    // 0% duty cycle (off)
  delay(4000);             // wait for 4s

}
```

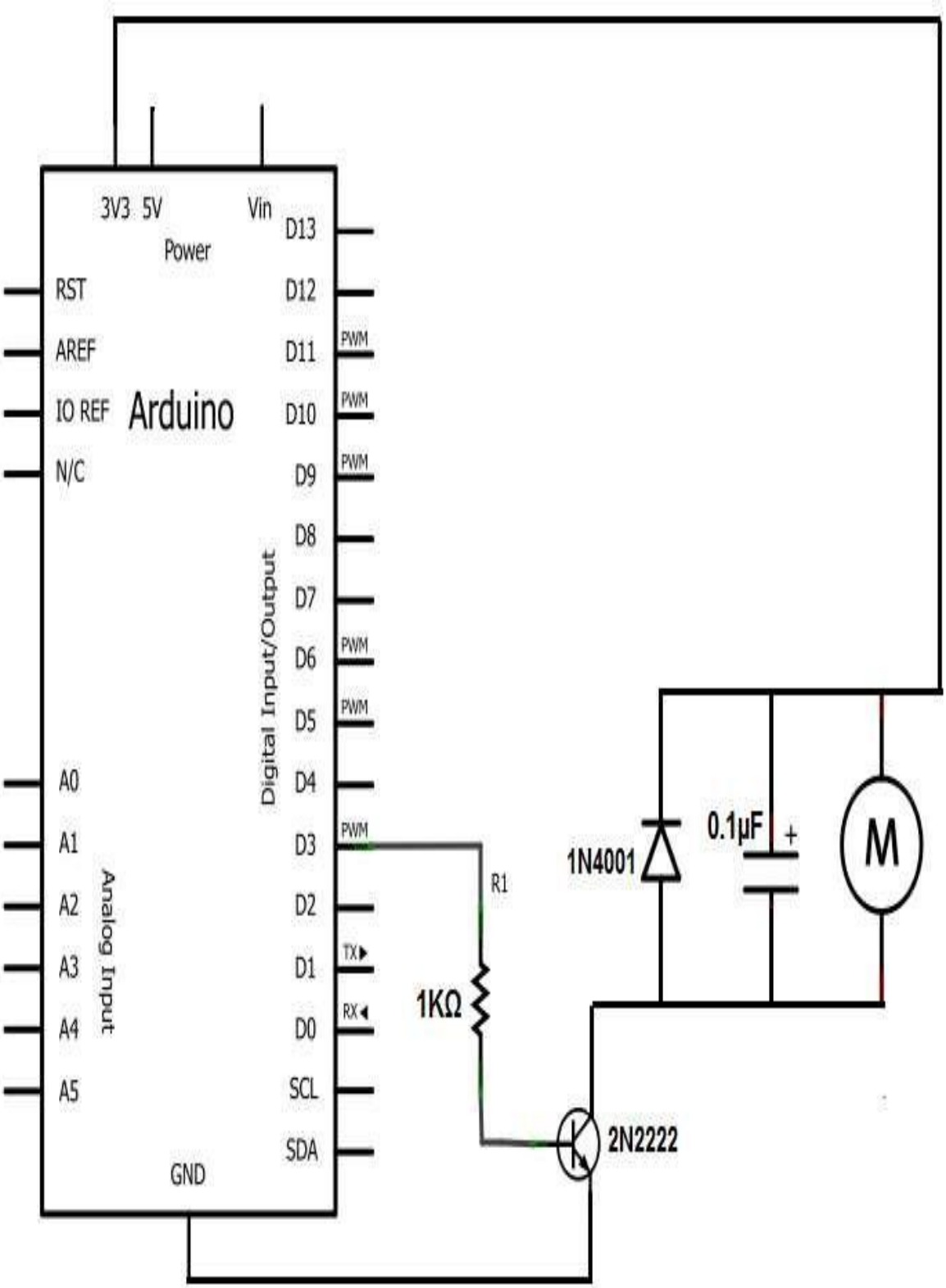
n this example, we have a 3V motor and a 5V supply. This means we need to set the duty cycle to 3 / 5 = 60%. If 255 is 100%, then 60% is 153 (= 255 * 0.6). So we can drive our motor at its rated voltage using the following command:

```
analogWrite( 6 , 153 );
```

And then to turn it off, we can use:

```
analogWrite( 6 , 0 );
```

Circuit Diag:



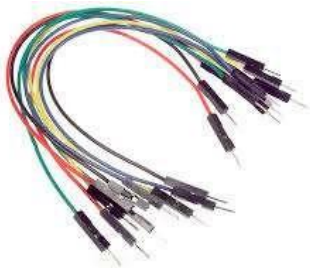
5:Some other minor components:

1. **Mini breadboard.**
   breadboard is a construction base for prototyping of electronics

2. **9 volt battery and 9 volt battery connector and Dc male jack**
   For providing external power to circuits

3. **A Toggle switch**
   For switching the cane on or of

4. **Jumper wires**
   For connecting circuits and componemts



Chapter 7: SOFTWARE CODE EXPLANATION:

A program for Arduino may be written in any programming language for a compiler that produces binary machine code for the target processor. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio.[39][40][41]

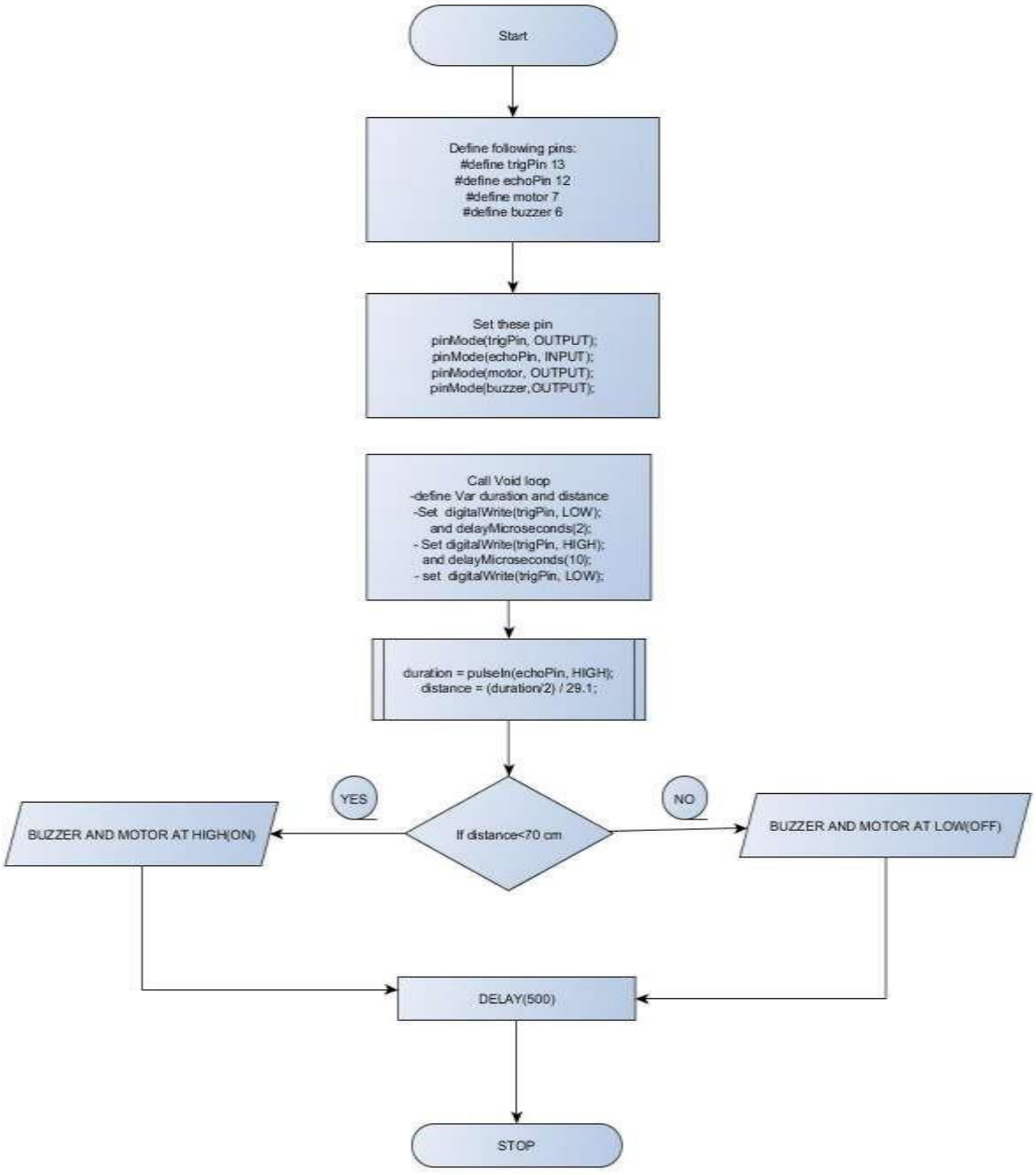
The Arduino project provides the Arduino integrated development environment (IDE), which is a cross-platform application written in the programming language Java. It originated from the IDE for the languages *Processing* and *Wiring*. It includes a code editor with features such as text cutting and pasting, searching and replacing text, automatic indenting, brace matching, and syntax highlighting, and provides simple *one-click* mechanisms to compile and upload programs to an Arduino board. It also contains a message area, a text console, a toolbar with buttons for common functions and a hierarchy of operation menus.

SOURCE CODE:

```
#define trigPin 13
#define echoPin 12
#define motor 7
#define buzzer 6

void setup()
{
                 pinMode(trigPin, OUTPUT);
                pinMode(echoPin, INPUT);
                pinMode(motor, OUTPUT);
                pinMode(buzzer,OUTPUT);
 }
void loop()
{
                long duration, distance;
                digitalWrite(trigPin, LOW);
                delayMicroseconds(2);
                digitalWrite(trigPin, HIGH);
                delayMicroseconds(10);
                digitalWrite(trigPin, LOW);
        duration = pulseIn(echoPin, HIGH);
        distance = (duration/2) / 29.1;

        if (distance < 70) // Checking the distance, you can change the value
        {
```

```
            digitalWrite(motor,HIGH); // When the the distance below 70cm
            digitalWrite(buzzer,HIGH);
        }
        else
        {
            digitalWrite(motor,LOW);// when greater than 100cm
            digitalWrite(buzzer,LOW);
        }
        delay(500);

}
```

FLOWCHART



CHAPTER 8: FUTURE SCOPE:

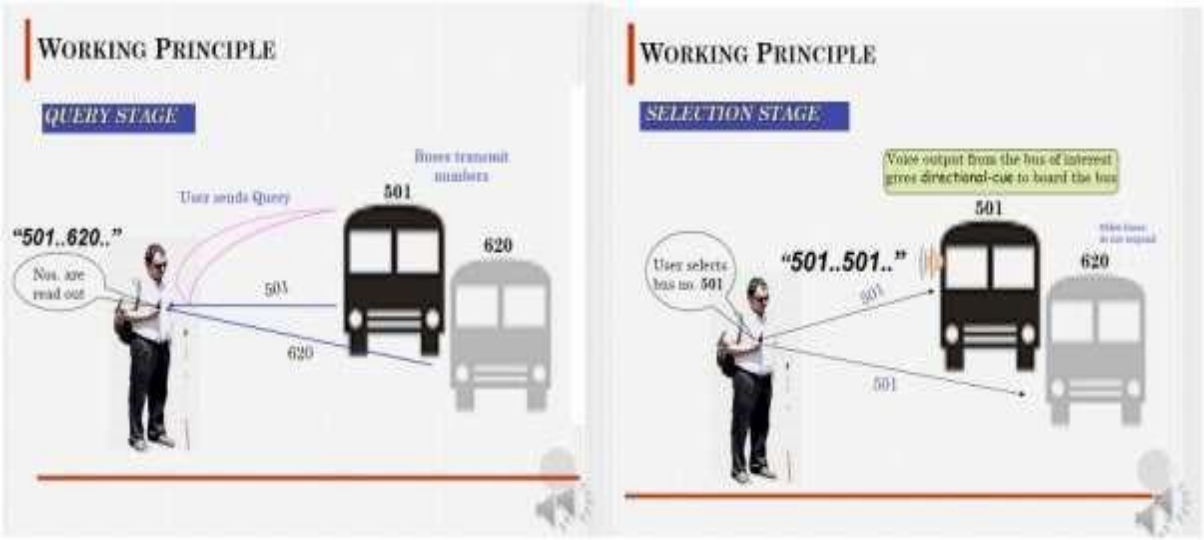
In the future, we would like to implement Bus Information Unit into our system. This would greatly benefit the user in outdoor navigation and greatly reduces the depency on others.

The Bus Information Unit would work as follows:

The system comprises of two modules: (i) User Module and (ii) Bus module. Once the user hears a bus approaching the bus stop, he presses the Query Button on the User Module, transmitting a RF signal to all buses in the vicinity. Each bus responds to the User Module by transmitting its route number. All numbers received are sequentially read out by the user module. User may proceed to select the desired route number by pressing the Selection Button which triggers a voice output from a speaker located at the entry of the selected bus. This acts as an auditory cue and assists in moving towards the entry door of the bus. The system allows for flexibility to customize operation according to user specific bus usage patterns, saving time and effort. Using an auditory interface, the user can store the route numbers of commonly boarded buses (called a restricted set) in the user module. This allows the user to concentrate only on relevant bus numbers.

- Auto-Query mode (optional): The device automatically scans for buses at regular intervals and notifies the user. This eliminates the user's need to continuously press the query button.

- Pre-selection mode/Restricted set: In case the user is interested in boarding one particular bus, he or she can store its route number in advance and use the selection button to check if the desired bus is present at the bus stop. This allows the user to skip the query phase and immediately check for the desired bus.



The overall design of the bus module is divided into two parts:

(i) Speaker and Antenna module installed on the railings of the bus

(ii) Under-the-Seat Module comprising of the battery, amplifier and control circuits. The long wire antenna connectors enable installation of the antenna at a suitable place (top of the speaker box) for better communication.

For easy maintenance and timely indication of system failures, a LED grid has to be incorporated to indicate successful charging in progress, sufficient battery power and a healthy functional system. The environmental noise is predicted to be very high in some cities compared to others. Thus, there was a need to keep the volume of the loudspeakers adjustable. A variable potentiometer has to be provided so that the sound level can be adjusted manually.

Outcome Variables:

a) The approximate distance when bus is queried successfully indicates the distance between user and bus when the user module first speaks out the number of the bus. This provides information of when the user is notified of the incoming bus and his preparedness to board.

b) Approximate Distance of user from Bus when it stops gives the measure of the distance the user has to navigate between the place where he is standing and the front door of the bus which he has to board. It is also indicative of the real life conditions in India as the buses do not stop at the designated place owing to road conditions/traffic.

c) Number of Queries done / help sought is a measure of the number of times user needs to press query, (and he hears “no buses”) before the speaker reads out the numbers of the buses. This gives us an estimate of the user’s ability to sense an approaching bus. A higher value would indicate that the user is not able to distinguish the distinct sounds of the engine of the bus as it enters the bus stop.

d) Successful Number of Queries (Failure when "no buses") gives indication of the working of the query system and to determine whether the bus numbers of nearby buses are received and sequentially spoken out by the user module.

e) Number of Selections Done (Number of times the user needs the audio cues)-After identification and selection of a desired bus, the bus loud speaker calls out the bus number.

The user has to navigate the distance between him and the bus and if required can trigger the sound multiple times.

f) Successful Boarding (Yes / No); If No, Reason for failure to board–This gives the success rate of boarding after a series of trials and helps us understand any difficulties the user is facing in accessing the system in real life settings.

A post-trial feedback session was undertaken to validate whether the system actually helped the users eliminate their problems of boarding a desired bus. The feedback received from the users on using the system in identifying their desired bus and its entry door through audio cues was immensely valuable.

Key Usage Scenarios:

a) Multiple users- As the bus module responds to more than one user module via RF communication, more than one user can board the bus simultaneously
b) Identifying the entry of the bus- As the speaker is located at the entry of the bus, users are able to navigate towards the bus door without having to trail the bus body with hand/white cane.
c) Re-orientation of path to traverse- In case the bus has moved some distance owing to traffic congestions etc. the user can trigger the speaker output from the bus multiple times and hence orient himself towards its entry. This eliminates the need of relying on sighted assistance.
d) Multiple bus scenario-Visually impaired users are able to identify an incoming bus by the characteristic engine sound. In case multiple buses enter the depot, identifying their bus of interest is a problem owing to the dynamic nature of the traffic and commuters congestion. Our bus identification system helps the user to keep track of the location of the bus by triggering voice output from the bus speaker.
e) Bus stopping far from stop- In some public buses we often see that drivers do not bother to stop the bus at the designated place. This leads to the need for more distance to be travelled by the user, thus leading to a higher probability of missing the bus. As the speakers output is audible from a distance of 30m, the bus identification system assists in navigation towards the bus. This output further informs the driver and conductor that a person with special needs wants to board their bus.
f) User alerted in advance- As this system is completely user triggered, it enables the user to query the bus well in advance of the bus stopping at the bus stop. Thus, while being seated at the bus stop, the user can be alerted about the approaching bus

CHAPTER 9: RESULT

We were successfully able to develop the Smart Cane using Ultra Sound sensor and Arduino. The range for obstacle detection is set to 70cms to avoid setting off the buzzer and vibrator off in indoor situations. However, the range can be extended up to 400cms. The Smart Cane is Light in weight and is easy to use. Therefore, it is user-friendly, just like the normal cane. No special training is required to learn how to use the Smart Cane. The visually impaired people are sure to like this product and will definitely find it useful. Both young and old people can easily use this device.

CHAPTER 10: CONCLUSION

The Smart Cane's goal is to bring the white cane up to technological modernity while maintaining its affordable price. The Smart Cane is geared towards an elderly, less affluent demographic group that would demand comfort, accessibility, and affordability from the product. Observations and test results prove that the Smart Cane reached its goal and satisfied the needs of its target demographic. Using the ultrasonic sensor, Arduino board, and vibration motor, the Smart Cane greatly increased the object detection range of the white cane, thereby improving the lives of the blind and visually impaired users. Besides the cane's technological improvements, the design was altered to give the user a more comfortable and ergonomic handle. Along with the locking hinge system, the Smart Cane's handle alleviates the need for the user to change their grip on the handle based on their cane's position. Overall, the Smart Cane's use of technology and ergonomic design has greatly improved upon the traditional white cane, and has taken a great leap towards improving the lives of the visually impaired. The smart cane is a practically feasible product and convenient to carry around like any other walking stick. This could also be considered a crude way of giving the blind a sense of vision. This also reduces the dependency on other family members, friends and guidance dogs while walking around. It can serve as a benchmark in aid for the blind like crutches are for the paraplegic.

CHAPTER 11:: REFERENCES

1)VIT LIBRARY

2)SOME LINKS:

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