**1. INTRODUCTION**

**1.1. Problem Statement:** Increase in the number and use of vehicles also increased the risk of accidents. In this fast-moving generation, in order to save time, we mostly prefer to travel at night which is more prone to accidents. There are many reasons for causing accidents viz. sleepiness and drunken during driving. In both the cases it is difficult to control the driving and avoid accidents. In this project, we proposed a solution to buzzer an alarm and to apply the brakes automatically by approximating the distance from an opposite vehicle.

**1.2 Existing System:** Present cars have a few solutions for the safety of the drivers like air bags. These are used to protect the driver from injury but not to avoid the accidents. To avoid the accidents there is another solution using eye blink sensor, this sensor counts the number of seconds the driver has closed his/her eyes and if it crosses the limit then it gives an alert sound to avoid the accidents. But there may be other reasons or the driver may be in unconscious state to hear the alert sound.

**1.3 Proposed System:** Our project Anti Accident alert system is developed to overcome the problems in the existing system. It contains three modules the Alert buzzer sound, the Automatic braking system and the Wi-Fi messaging. If the driver is sleepy the Buzzer gives an alert sound to make the drivers awake, if the driver is unconscious or drunk and avoids the buzzer sound then the automatic breaking system works after a certain distance is sensed by the ultrasonic sensor then the breaks are automatically applied slowly not abruptly to avoid the accidents, incase if the brakes got jammed or failed then Wi-Fi module helps us to send an alert message to their family members.

**1.4 Feasibility Study:** The feasibility of the project is analyzed in this phase. During system analysis, the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential. Three key considerations involved in the feasibility analysis are

* Economical Feasibility
* Technical Feasibility
* Social Feasibility
* **Economical Feasibility:** This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because the cost of our project is less than 2000. And the components can be easily available.
* **Technical Feasibility**: This study is carried out to check the technical feasibility, that is, the technical requirements of the system. In our project only the Arduino, Arduino software and a few hardware components are required that are easily available. So, our project is technically feasible.
* **Social Feasibility:** The aspect of study is to check the level of acceptance of the system by the user. The user must not feel threatened by the system, instead must accept it as a necessity. Our project doesn’t require the user to know anything much about the system and helps the user to avoid accidents and can have a safe journey.

**2. LITERATURE SURVEY**

**2.1 Study of Related Papers:**

1) **Shirish Srivastava, Rishi Kumar Kanaujia, S. K Singh,”Design of Collision Avoidance System based on Ultrasonic Sensor ”**

In this paper, authors had proposed a prototype collision avoidance system based on Ultrasonic sensor. The use of the collision avoidance system will help in saving human lives. This system will become more accurate and reliable and can be use in vehicle of a common man to assist him/her while driving. In India, nearly 1.5 lakh people are killed every year in road accidents. More than 5 lakh accidents being witnessed on an average each year. About 78% of the accidents occur due to the fault of drivers and there is a need to ensure proper training for drivers. These numbers are shocking as so much of loss is being done to human life and also damage to property which cost a monetary burden. So need of time is a system that can assist the drivers while driving on road and can warn about decreasing distance margin between two vehicles. With tremendous development in the field of electronics in the last few years it is possible to develop such a system that can warn drivers before a collision and can also avoid it.

Many luxury cars are already coming in market with such facility but it is beyond the reach of common man. So we are proposing a prototype collision avoidance system that will be easily accessible to common man. In particular collision avoidance system is a system that is placed within a car to warn its driver of any danger that may lie ahead on the road. In this paper we are giving the Design of a Collision Avoidance System Based on Ultrasonic Sensor as a cost effective alternative to existing technology which can be implemented in a modest man’s vehicle. With the help of Ultrasonic sensor distance can be measured and this measured distance can be used to give audio visual alarm and also automatic control of system. This kind of system can be used in areas prone to high accident rates in vehicles and in heavy traffic zones.

**2)Nilima G. Maraskolhe, Shubham S. Lokhande, Nayna P. Lokhande, Prof. Bhushan S. Rakhonde,” Advance Automatic Breaking System For Vehicle”**

In this paper authors had proposed that it is used for big networks where the large number of vehicles used like for bus station’s by using camera. By using camera, we can get the online information and get the information about the vehicle condition. It is helpful to public sector and users. It is also avoids the traffic jams and protect to vehicle from accident. Driving is a compulsory activity for most people. People use their vehicle to move from one place to other place. The number of vehicle is increasing day by day. Proportionally the numbers of accidents are also increasing. Nowadays, the numbers of accident is so high and uncertainly. Accident will occur every time and everywhere and cause worst damage, serious injury and dead. These accidents are mostly caused by the delay of the driver to hit the brake. The increasing demand for flexibility as well as technological Even though there are several advanced technological innovations are available today for vehicle safety, the growth in the number of accidents is continues regularly. Most of these accidents are especially due to collision or intersectional accidents.

One of the most important causes behind the intersectional accident is bad weather conditions. Recently it has been reported that nearly 36% of the accidents in the India are occurred due to bad weather conditions. Here bad weather condition means a high rain or high snow falling or bad dark light etc. in those specific conditions the drivers feel very hard to drive to recognize the vehicles and speed of the vehicles which passing around them and may cause to severe accidents. The main aim is to obstacles when the sensor senses the obstacles. The breaking circuit function is to brake the car automatically when the sensors detect any.

Automatic Breaking is a technology for automobiles to sense an imminent collision with another vehicle, person or obstacle or a danger such as a high speed approach to a stop sign and to respond with the breaking system by either recharging the brakes or by applying the brakes to slow the vehicle without driver input. Efforts have been reported for sensing vehicle surroundings with different visible, non visible (infrared) light and time of-flight sensors. Although ultrasonic sensors are well accepted technology for distance sensing applications.

**3)Kuchimanchi Chirantana and G V R N D Satya Sai Kanth,” Collision Warning With Automatic Braking System For Electric Cars “**

In this paper authors had proposed that automatic collision warning with braking system brings major transportation benefits in terms of safety, efficiency, affordability and usability, and environment in order to achieve its development goals. This cost-effective method of collision warning along with automatic braking can be made available also to low budget cars by which there can be a tremendous decrease in the death rate due to accidents. Collision warning system with automatic braking is a combination of several technologies. Over the years, automotive safety has gained an increasing amount of interest from the general public, governments, and the car industry. A successful way to attain continuous improvements in safety development is a working process based on real world situations and the feed-back of this information into the product development. This working method has been found very effective in passive safety development.

The present study applies this working process into development of new active safety systems. Active safety systems require a wider scope of the study and performance goals, thereby expanding to accident occurrence beside injury protection and opponent vehicle beside host vehicle. The aim of this paper is to present some of the latest active safety development and to put them into context of the working process. Collision detection is done by using Ultrasonic sensor and Stop indication using flashing LED and LCD display. Braking is done using a servo motor connected to parking brake lever to ensure optimal braking force and minimum braking distance. Electro mechanical actuation using mechanical actuator making the operation extremely fast thereby safety ensured braking. Power of the prime mover is cutoff using a relay switch to reduce power wastage and break wear. All these devices are controlled using Arduino Mega 2560 which is a microcontroller programmed to do the specified task.

**2.2 Technology Overview:**

**2.2.1 IoT Introduction:**

Since numerous decades the word internet is being used, yet IOT appeared simply after selection of RFID (Radio Frequency Identification). IOT lead a world in which virtual and physical world go close by close. It is noticed that around 2025 more than trillion articles get associated with each other. In IOT all things have their own remarkable RFID ids and information is conveyed among themselves and help in driving an improved human way of life. The essential underlying foundations of IOT are 3. They are sensing, embedded processing of data, connectivity. To run the application by IOT strategy includes few stages. To begin with making the things shrewd and giving them an interesting RFID. Subsequent to making things smart the exact next stride is communicating of information that controls and commands other things. The last step is the things require get the information and take after the command sent by other.

Key Elements of IOT are:

* + **Sensing***:* Sensors gather the data about the environment and alter as information removing the fluffy data. Sensors are autonomous as they interface without any interference of physical wiring which is making them free to sense. These sensors likewise record and transmit the information.
  + **Intelligence:** Objects are made brilliant utilizing progressed processors(basically some MCUs which store, handle data, transmit the information) Usage of micro scale controllers which gather the information sent from sensors, prepare the information and create the output which can be utilized as command to the machine. Smart connected hard wares are generally dormant unless they are tend to read or process the data or even take the decisions. So the intelligent equipment segments are having ultralow vitality utilization rest mode ability. Addressing ability, Addressability and identification embedded processing also part of intelligence or smartness of the device. Identification empowers the objects to be connected to data. For this reason WLAN, WAN, RFID (Radio Frequency Identification), NFC (Near Field Code) are utilized.
  + **Communication***:* Other than smartness of objects; communication one more component for a flawless perfect output. The information that is prepared is transmitted with the goal that it goes as a command for other different things. IOT requires a mode for transmitting the data at the device level to cloud based administration for consequent handling. For this Wi-Fi (WLAN or WAN), BLE (Bluetooth low vitality), ZigBee. Assembled information is transmitted to a cloud based service where the information coming in from the IoT device is aggregated with other cloud based data to provide useful information for the end user. The data being consolidated can be data from other web sources and in addition from others subscribing with comparable IoT gadgets. Frequently, there will be a few data processing required to provide useful information that is not necessarily obvious in the raw data.

**2.2.2 Arduino Software:**

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read input by sending a set of instructions to the microcontroller on the board. 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.

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. A program written with the IDE for Arduino is called a sketch. Sketches are saved on the development computer as text files with the file extension. ino. Arduino Software (IDE) pre-1.0 saved sketches with the extension .pde.

The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU tool chain, also included with the IDE distribution.

The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware. A minimal Arduino C/C++ sketch, as seen by the Arduino IDE programmer, consists of only two functions:

**setup:** This function is called once when a sketch starts after power-up or reset. It is used to initialize variables, input and output pin modes, and other libraries needed in the sketch.

**loop:** After setup has been called, function loop is executed repeatedly in the main program. It controls the board until the board is powered off or is reset.

**3. REQUIREMENT SPECIFICATION**

**3.1 Functional Requirements:**

The following is the functional requirements for the vehicle.

* The vehicle shall react in accordance to the input from its sensors.
* The vehicle shall control its moveable parts (e.g. wheels).
* The vehicle shall be able to move left side with buzzer sound and LED light when an obstacle is at specific distance.
* The vehicle shall be able to automatically stop when an obstacle is nearer.
* The vehicle shall give an alert message to peer contact when an obstacle is very nearer.

**3.2 Non-Functional Requirements:**

The following is the Non-functional requirements for the vehicle.

* Safety
* Maintainability
* Reliability
* Security

**3.3 S/W & H/W Requirements**

* **Software Requirements:**
* Integrated development environment(IDE): Arduino
* **Hardware Requirements:**
* Arduino UNO
* Ultrasonic Sensor
* Buzzer &LED
* 220 ohm Resistor
* DC Motor
* L293D Motor Driver
* 9v Battery & Jumper wires
* ESP8266 WIFI Module
* Bread board

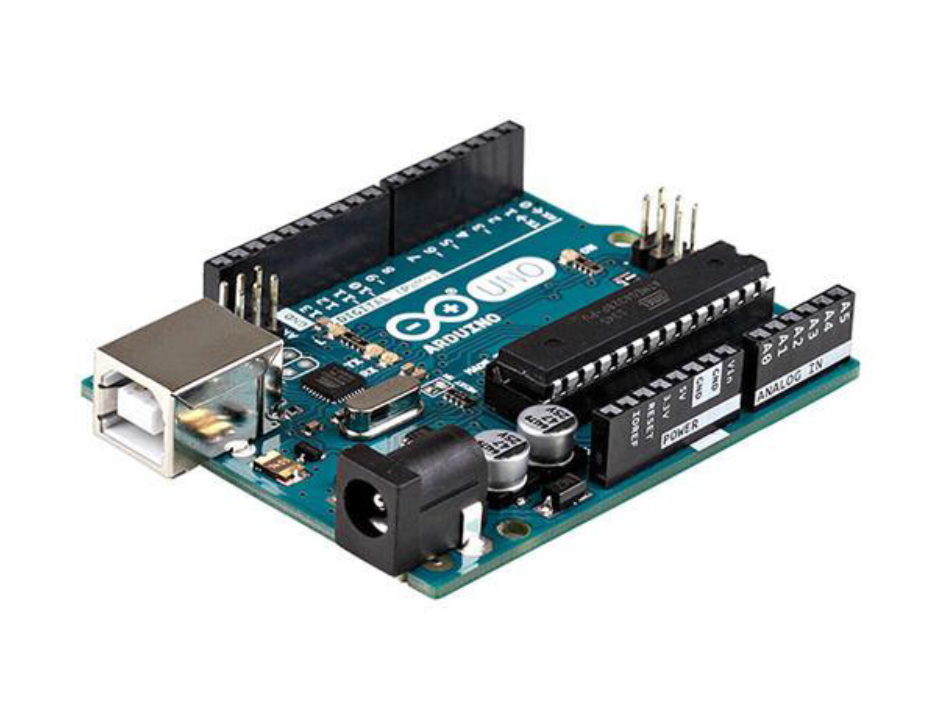
**4. SYSTEM ANALYSIS**

**4.1 COMPONENTS:**

**4.1.1 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 quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller. We need to connect it to a computer with a USB cable or power it with a Ac-to-DC adapter or battery to get started.

Basically, the Arduino software (IDE) includes a serial monitor which allows simple textual data to be sent sequentially from one board to another. The instructions are transmitted through the Bluetooth port which is matched against the various combinations of predefined texts to switch the appliances to on/off. If the matching instruction is detected the correspondent pin number gives a high signal to switch, that shows on. On the other hand, while the correspondent pin number gives low output signal to the switch that shows it off.



**Figure 4.1.1.1: Arduino Uno**

**4.1.2 Ultrasonic Sensor:**

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object. Since it is known that sound travels through air at about 344 m/s (1129 ft/s), you can take the time for the sound wave to return and multiply it by 344 meters (or 1129 feet) to find the total round-trip distance of the sound wave. Round-trip means that the sound wave travelled 2 times the distance to the object before it was detected by the sensor; it includes the 'trip' from the sonar sensor to the object AND the 'trip' from the object to the Ultrasonic sensor (after the sound wave bounced off the object).

Distance = Time x Speed of sound

2

To find the distance to the object, simply divide the round-trip distance in half. It is important to understand that some objects might not be detected by ultrasonic sensors. This is because some objects are shaped or positioned in such a way that the sound wave bounces off the object, but are deflected away from the Ultrasonic sensor.

**Figure 4.1.2.1: Ultrasonic Sensor**

**4.1.3 Buzzer:**

A buzzer or beeper is an audio signalling device which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. The electric buzzer was invented in 1831 by [Joseph Henry](https://en.wikipedia.org/wiki/Joseph_Henry). They were mainly used in early doorbells until they were phased out in the early 1930s in favor of musical chimes, which had a softer tone.

When piezoelectric materials are under pressure, the pressure causes changes along the surface of the material, these pressure differences result in compression along one surface and strain along the other one. As a result, the positive charges collect on one side of the material, and the negative charges collect on the opposite side. This generator effect converts mechanical energy into electricity. In the reverse piezoelectric effect, used in buzzers, applying an electrical field causes the length of the surface to change and converts electrical energy into mechanical energy that creates sound waves the human ear is able to detect.



**Figure 4.1.3.1: Buzzer**

**4.1.4 LED:**

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p-n junction diode. which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electro luminescence, and the colour of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor.

Appearing as practical electronic components in 1962, the earliest LEDs emitted low-intensity infrared light. Infrared LEDs are still frequently used as transmitting elements in remote-control circuits, such as those in remote controls for a wide variety of consumer electronics. The first visible-light LEDs were also of low intensity and limited to red. Modern LEDs are available across the visible, ultraviolet, and infrared wavelengths, with very high brightness.

Early LEDs were often used as indicator lamps for electronic devices, replacing small incandescent bulbs. They were soon packaged into numeric readouts in the form of seven-segment display and were commonly seen in digital clocks. Recent developments in LEDs permit them to be used in environmental and task lighting. LED s have allowed new displays and sensors to be developed, while their high switching rates are also used in advanced communications technology.

**Figure 4.1.4.1: LED**

**Figure 4.1.4.1: LED**

**4.1.5 Resistor:**

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators.

Resistors determine the flow of current in an electrical circuit. Resistance, voltage and current are connected in an electrical circuit by Ohm's Law. When a resistor is introduced to a circuit the flow of current is reduced. The higher the value of the resistor the smaller/lower the flow of current

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**Figure 4.1.5.1: Resistor**

**4.1.6: Dc Motor:**

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems.

A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

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**Figure 4.1.6.1: DC Motors**

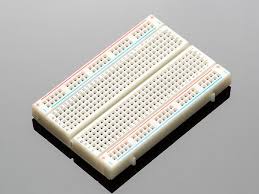
**4.1.7 Wires:**

A jump wire (also known as jumper, jumper wire, jumper cable, DuPont wire, or DuPont cable – named for one manufacturer of them) 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 4.1.7.1: Wires**

**4.1.8 Breadboard:**

A breadboard is a construction base for prototyping of electronics. Originally it was literally a bread board, a polished piece of wood used for slicing bread. A breadboard is a construction base for prototyping of electronics.

**Figure 4.1.8.1: Breadboard**

**4.1.9 L293D Motor Driver:**

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge Motor Driver integrated circuit (IC).The l293d can drive small and quiet big motors as well, check the Voltage Specification at the end of this page for more info.

It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. As you know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, Hence H-bridge IC are ideal for driving a DC motor.

In a single L293D chip there are two h-Bridge circuit inside the IC which can rotate two dc motor independently. Due its size it is very much used in robotic application for controlling DC motors. Given below is the pin diagram of a L293D motor controller. There are two Enable pins on l293d. Pin 1 and pin 9, for being able to drive the motor, the pin 1 and 9 need to be high. For driving the motor with left H-bridge you need to enable pin 1 to high. And for right H-Bridge you need to make the pin 9 to high. If anyone of the either pin1 or pin9 goes low then the motor in the corresponding section will suspend working. It’s like a switch.

**Figure 4.1.9.1: L293D Motor Driver**

**4.1.10 Battery (9v**):

An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, smartphones, and electric cars.  In this project, we have used 9-volt lithium battery as a source of energy



**Figure: 4.1.10.1 (a) Connectors Figure:4.1.10.2 (b) Battery**

**4.1.11 Blynk App**:

Blynk is a Platform with IOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets. It's really simple to set everything up and you'll start tinkering in less than 5mins. Blynk is not tied to some specific board or shield. Instead, it's supporting hardware of your choice.

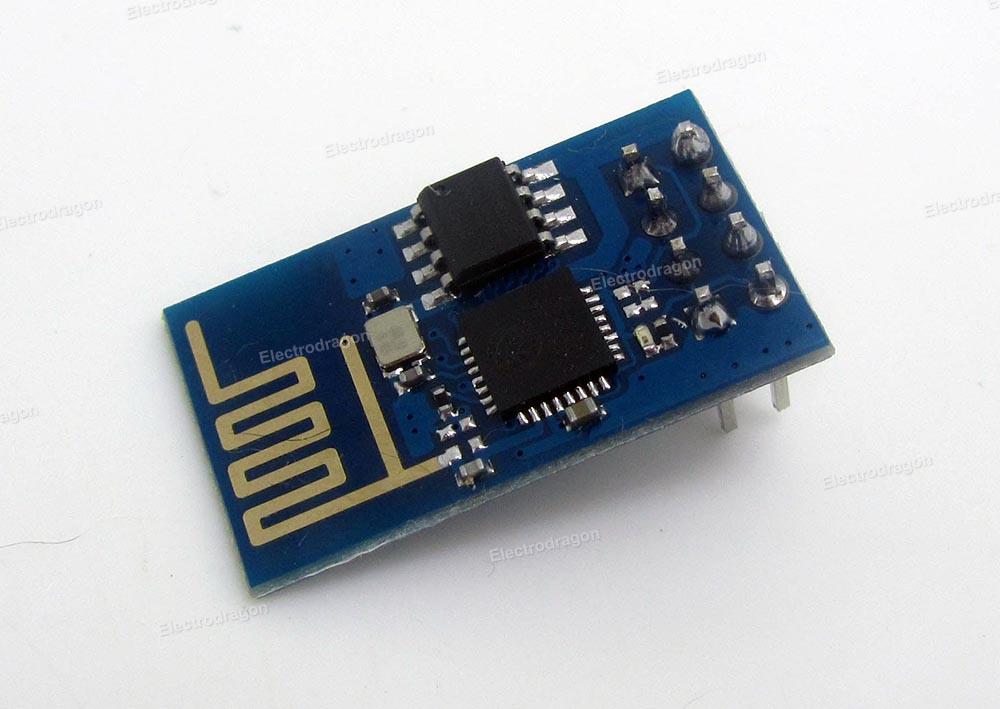


**Figure 4.1.11.1 Blynk App**

**4.1.12 ESP8266 WIFI module**:

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that’s just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existance interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.



**Figure 4.1.12.1: ESP8266 WIFI MODULE**

**4.2 Working Principles:**

**4.2.1 Alert System:**

The Sensor is a sonar type, it is used for calculating the distance/direction of an object from the time it takes for a sound wave to travel to the target and come back. Ultrasonic transmitter transmits the ultrasonic waves toward a road surface to find out the obstacle. If the ultrasonic wave detects the obstacle the range that obstacle detected is 15 meters then it will produce a reflected wave. An ultrasonic receiver is used for receiving the ultrasonic waves reflected from the roads surface to generate a reception signal.

There is ultrasonic transducer that will transform back the sound wave to electrical energy. This signal amplified by an amplifier. The amplified signal is compared with reference signal to detect components in the amplified signal due to obstacles on the road surface.

**4.2.2 Automatic Breaking System:**

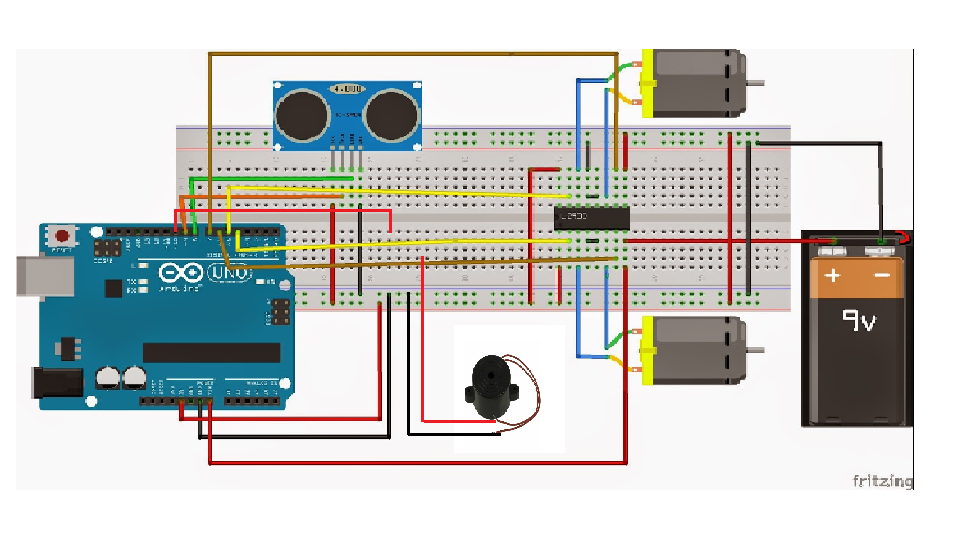
Automatic braking is a technology is a technology for automobiles to sense and avoid collision with another vehicle, it is implemented by using PWM concept with L293D motor driver. To control the DC motor we use L293D motor driver and PWM signal is way to control a speed by applying the correct voltage. In the self-written test software the percentage of the PWM signal and the duration was set to test at which Duty-Cycle the diﬀerent motors reacted, this was done by connecting a variable voltage supply and an oscilloscope. A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. If the distance is less than 10 meters then the sensor senses it then automatic breaking system will applied automatically to avoid the accidents.

**4.3.3 WIFI message system:**

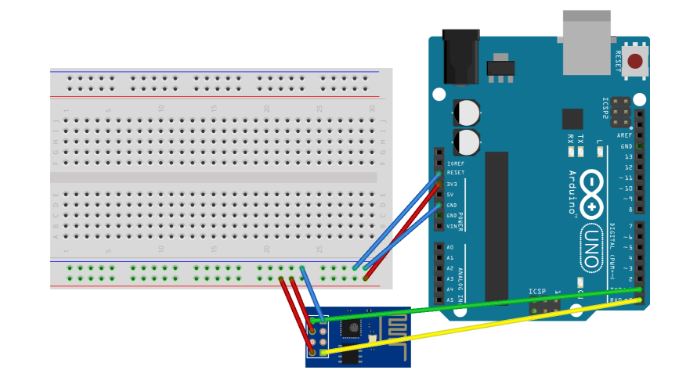
WIFI message system is a technique to get an alert message using ESP8266 WIFI module and blynk android app which is available in play store. Firstly, we have to connect WIFI module to and execute sample blynk program which is available in the Arduino ide and execute AT commands and setup the blynk app to receive an alert message to our peers

**5. SYSTEM DESIGN**

**5.1 SYSTEM ARCHITECTURE:**



**Figure 5.1.1(a) Circuit Diagram**

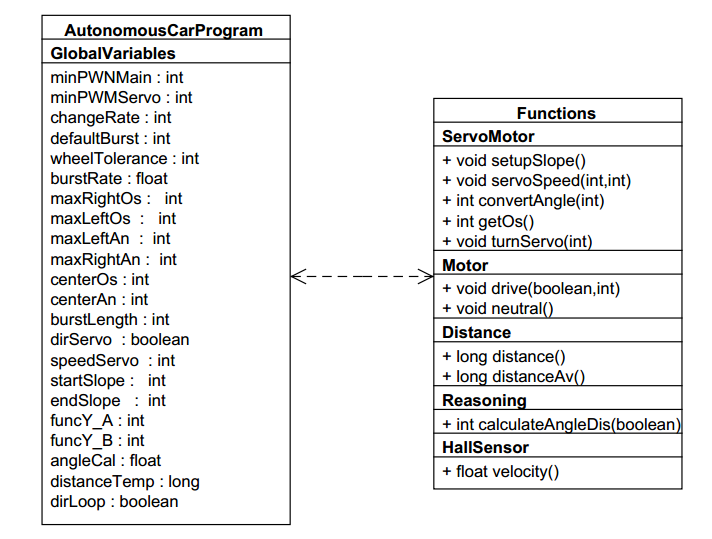
**Figure 5.1.1(b) Circuit Diagram**

**5.2 UML DIAGRAMS:**

The entire idea of this project is implemented based on UML diagrams. In these UML diagrams entire process of implementation and deployment ideas are clearly specified. In this designing part, we have done our implementation design by three types of UML diagrams. They are CLASS DIAGRAM, SEQUENCE DIAGRAM and Usecase DIAGRAM.

**5.2.1 Class Diagram:**

The class diagram is a static diagram. It represents the static view of a prt. Class diagram is not only used for visualizing, describing and documenting distinct aspects of a system but also for constructing executable code of the software application. In this class diagram, there are seven classes and each class will have attributes and operations which specify the working of each class. In this project, all these seven classes are considered in sequence diagram and implemented.

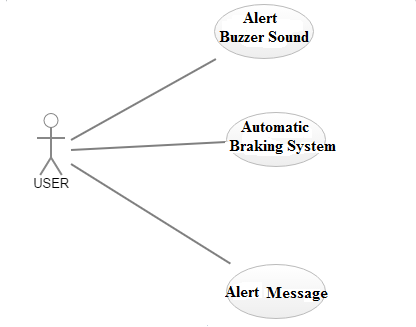


**Figure 5.2.1.1 Class Diagram**

**5.2.2 Use Case Diagram:**

In software and systems engineering, a **use case** is a list of actions or event steps, typically **defining** the interactions between a role (known in the Unified Modeling Language as an actor) and a system, to achieve a goal. The actor can be a human or other external system.

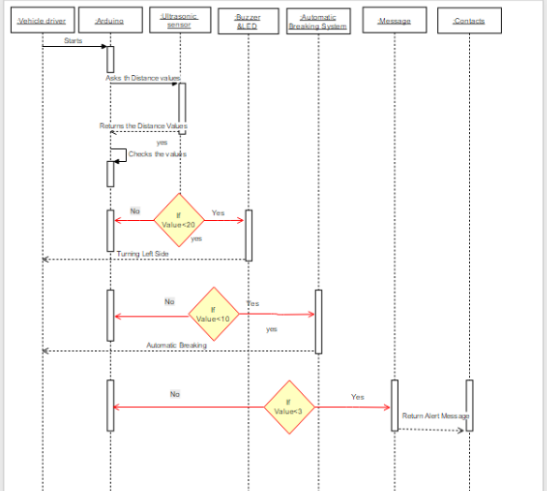
**Here 3 safety systems are kept to vehicle for the user.**



**Figure 5.2.1.2 Use Case Diagram**

**5.2.3 Sequence Diagram:**

A Sequence diagram is an interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. A sequence diagram shows object interactions arranged in time sequence. It depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario.



**Figure 5.2.3.1 Sequence Diagram**

**6. IMPLEMENTATION CODE**

**6.1 Implementation code:**

const int trig = 12;

const int echo = 11;

const int leftForward = 2;

const int leftBackward = 3;

const int rightForward = 4;

const int rightBackward = 5;

const int buzzer = 11;

const int ledPin = 13;

int duration = 0;

int distance = 0;

void setup()

{

pinMode(trig , OUTPUT);

pinMode(echo , INPUT);

pinMode(leftForward , OUTPUT);

pinMode(leftBackward , OUTPUT);

pinMode(rightForward , OUTPUT);

pinMode(rightBackward , OUTPUT);

pinMode(buzzer, OUTPUT);

pinMode(ledPin, OUTPUT);

Serial.begin(9600);

}

void loop()

{

digitalWrite(trig , HIGH);

delayMicroseconds(1000);

digitalWrite(trig , LOW);

duration = pulseIn(echo , HIGH);

distance = (duration/2) / 28.5 ;

Serial.println(distance);

if ( distance > 20 )

{

digitalWrite(leftForward , LOW);

digitalWrite(leftBackward , HIGH);//if the obstacle is greater than 20--moving forward

digitalWrite(rightForward , HIGH);

digitalWrite(rightBackward , LOW);

digitalWrite(buzzer, LOW);

digitalWrite(ledPin, LOW);

delay(100);

}

else if( distance >10 )

{

digitalWrite(leftForward , HIGH);

digitalWrite(leftBackward , LOW);

digitalWrite(rightForward , HIGH);//if obstacle is greater than 10 and lessthan 20-moving left

digitalWrite(rightBackward , LOW);

digitalWrite(buzzer, HIGH);

digitalWrite(ledPin, HIGH);

}

else

{

digitalWrite(leftForward , LOW);

digitalWrite(leftBackward , LOW);// if obstacle is less than 10--automatic braking stop

digitalWrite(rightForward , LOW);

digitalWrite(rightBackward , LOW);

digitalWrite(buzzer, HIGH);

digitalWrite(ledPin, HIGH);

}

}

**Code for WIFI module:-**

#include <ESP8266WIFI.h>

const char\* ssid = “connect";

const char\* password = “\*\*\*\*\*";

void setup() {

Serial.begin(115200); //sets the baud rate for data transfer in bits/second

pinMode(sensorPin, INPUT);//the ultrasonic sensor will be an input to the arduino

pinMode(buzzerPin, OUTPUT);//the buzzer serves an output in the circuit

// digitalWrite(ledPin, HIGH);

// Connect to WIFI network

Serial.print("Connecting to ");

Serial.println(ssid);

WIFI.begin(ssid, password);

while (WIFI.status() != WL\_CONNECTED) {

delay(500);

}

Serial.println("WIFI connected");

// Start the server

server.begin();

Serial.println("Server started");

}

**7. TESTING**

**7.1 TESTING TYPES:**

* **Different Types Of Testing:**

Testing is a process, which reveals errors in the program. During testing, the program is executed with a set of conditions known as test cases and the output is evaluated to determine whether the program is performing as expected. In order to make sure that the system does not have errors, the different levels of testing strategies that are applied at differing phases of software development are:

* **Unit Testing:**

Unit Testing is done on individual modules as they are completed and become executable. It is confined only to the designer's requirements. Each module can be tested using the following two strategies:

* **Black box testing**

In this strategy some test cases are generated as input conditions that fully execute all functional requirements for the program. This testing has been uses to find errors in the following categories: Incorrect or missing functions, Interface errors, Errors in data structure or external database access , Performance errors, Initialization and termination errors. In this testing only the output is checked for correctness. The logical flow of the data is not checked.

* **White box testing**

In this the test cases are generated on the logic of each module by drawing flow graphs of that

module and logical decisions are tested on all the cases. It has been uses to generate the test cases in the following cases:

Guarantee that all independent paths have been executed, Execute all logical decisions on their true and false sides, Execute all loops at their boundaries and within their operational, Execute internal data structures to ensure their validity.

* **Integration Testing**

Integration testing ensures that software and subsystems work together as a whole. It tests the

interface of all the modules to make sure that the modules behave properly when integrated together.

* **System Testing**

Involves in-house testing of the entire system before delivery to the user. Its aim is to satisfy the user the system meets all requirements of the client's specifications.

* **Validation Testing**

The system has been tested and implemented successfully and thus ensured that all the requirements as listed in the software requirements specification are completely fulfilled. In case of erroneous input corresponding error messages are displayed.

**7.2 TEST CASE DESIGN:**

|  |  |  |
| --- | --- | --- |
| **COMPONENTS**  **CONNECTION** | **TESTING** | **RESULT** |
| Ultrasonic sensor | Connection | Test successful |
| LED and buzzer  (Obstacle Distance<20) | Connection | Test successful |
| DC Motors &  L293Dmotor driver  (Obstacle Distance<10) | Connection | Test successful |
| WIFI-module  (Obstacle Distance<2) | Connection | Test successful |

Firstly we tested the LED and buzzer at a particular distance the ultrasonic sensor measures the distance and actives them. After that using L293D motor driver we controlled the two dc motors fitted to the wheels of the vehicle, and at last we worked with the WIFI module ESP266 to get an alert message to the peers.

**8. CONCLUSION**

We hereby would like to conclude by saying that, as India is a developing country and day by day the use and number of vehicles has been increasing, to save time many people prefer night driving. But there are many problems during night driving and many numbers of accidents occur due to the negligence of the driver who’s sleepy or drunk. To avoid these accidents we developed a prototype of Anti Accident Alert System. This prototype will help in saving human lives. With further advancement in technology this system will become more and more accurate and reliable and can be used in the vehicle of a common man to assist him/her while driving.

**9. REFERENCES**

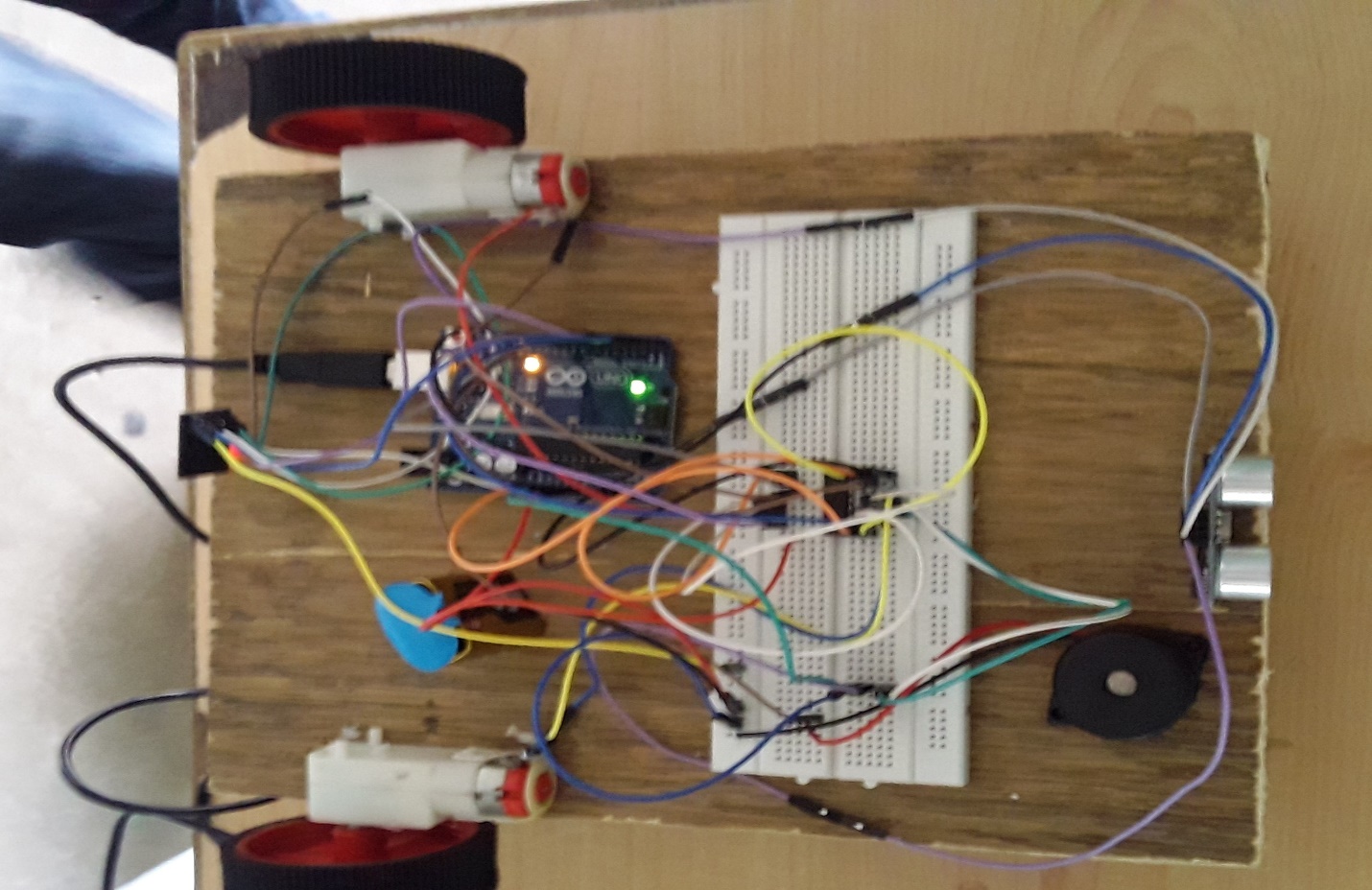
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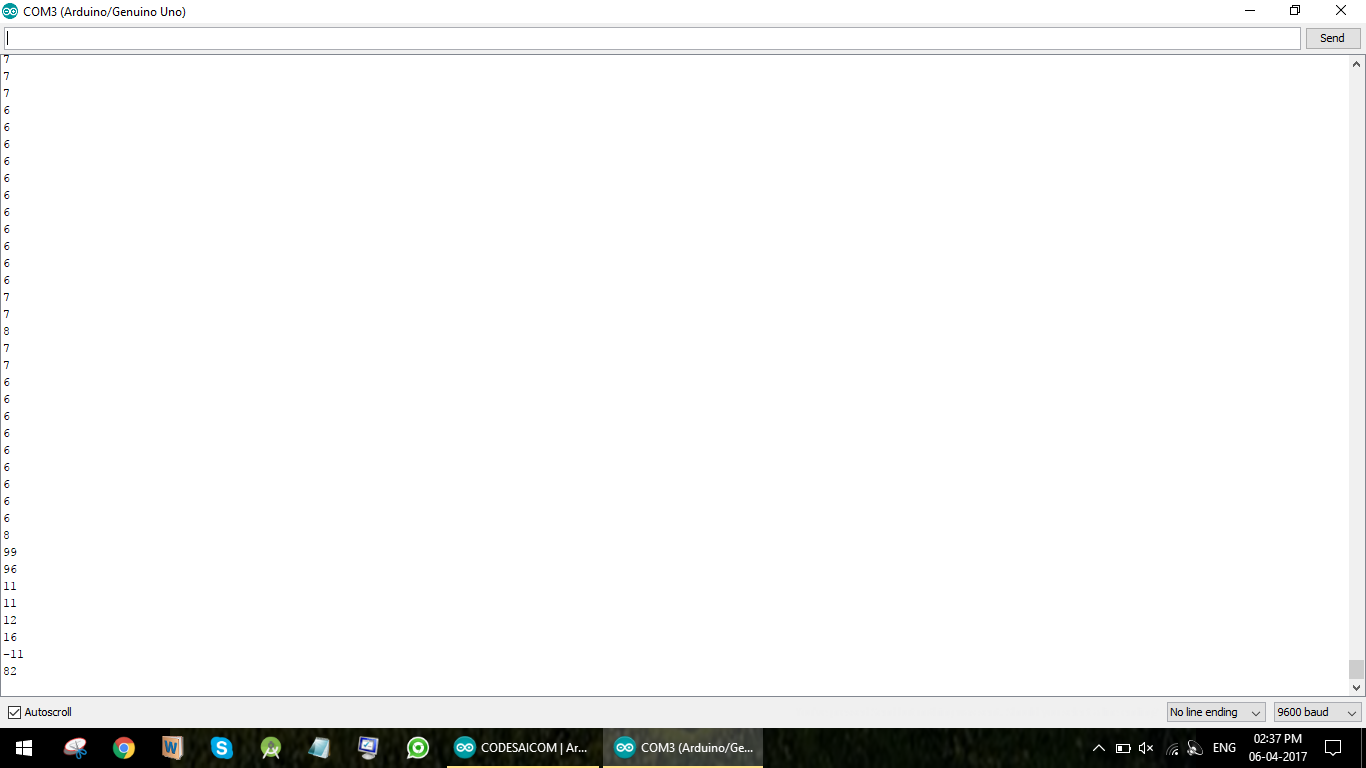
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**10. RESULTS**

From the project we done, we observed that among the 10 times of test run, our project worked very fast for 8 times. When the obstacle distance is below 20cm then the vehicle turn to left side with a LED light and buzzer sound, if the obstacle distance is below 10cm then the vehicle automatically stops with the help of motor driver and if the obstacle distance is less than 2-4 cm alert will send to peers. So by experimenting 10 test run we can say that our success rate in the experimental test run was 80%.





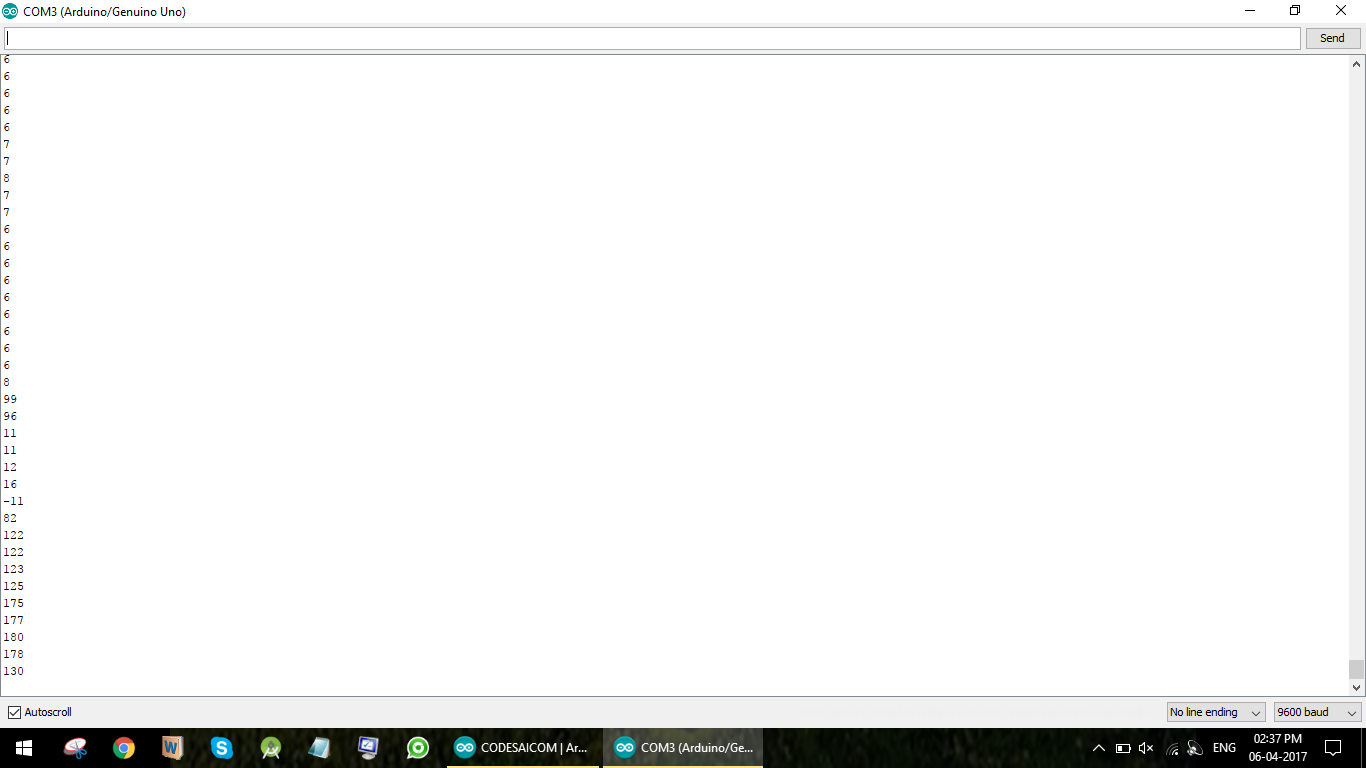
Figure 10.1 Serial Monitor Readings

Figure 10.2 Serial Monitor Readings