



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 8, August 2023

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

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# Automatic Accident Zone Detection with Speed Controller Using Arduino

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**ABSTRACT:** The project's primary goal is to demonstrate smart zone-based speed of the vehicle control utilizing RF and an accident prevention system and an obstacle detection system. When the vehicle is in the zone, the speed is regulated by receiving the signal; hence, every time the vehicle is in the zone, the speed is dropped to a cut-off and maintained until the vehicle exits the zone, at which point the vehicle can accelerate on its own. Identifies obstacles and stops the vehicle to avoid accidents. The identification of a driver's alcohol level; if this content is found, the car is compelled to come to a complete stop. Additionally, a light detection sensor is used to regulate the vehicle's light beam.

## I. INTRODUCTION

The project here is a method for implementing vehicle navigation and safety. The project's goal is to automatically detect zones like "School zones," "Work zones," or "Curve zones," inform the driver, and even control the vehicle's speed. Drivers frequently speed near school zones or engage in reckless driving, inflicting discomfort on other motorists and pedestrians. Even though these rules intended to protect both the public and the drivers of moving vehicles, they are frequently disregarded by drivers of moving vehicles. The major goal is to create a vehicle controller that works on an embedded system (Arduino Micro Controller) and is intended for speed control of moving vehicles as well as zone monitoring. Obstacle detection and stops the vehicle by anti-braking system. The Automatic headlight detection and high- and low-beam control are produced as necessary. When alcohol content is identified, the car automatically stops and the driver is informed that the alcohol content must be cleared before the vehicle may be started again.

## II OBJECTIVE

The main objective of the project is to prevent the accidents in specified zones like School, Hospitals, traffic dense areas and Hilly areas by controlling the vehicle's speed. The obstacle detection is carried out by sensor and it stops the vehicle by anti-braking system to avoid the damages to vehicle, motorist and pedestrians. The light of the opposite vehicle is detected and automatically controls the head light of the vehicle and helps the driver for clear visible of the path. The alcohol content of the driver is detected by alcohol sensor and the vehicle will not start until the clearance of alcohol content, this prevents the probable occurrence of the accidents due to drink and drive.

### Functional Block Diagram and Description:

In this project Arduino UNO, DC Motors, Micro Switches, RF Transmitter and Receiver of ASK Type and IR Transmitter and Receiver are used. The RF Transmitter should be positioned in the forbidden areas, and the Micro controller will receive the signal from the RF Transmitter through its receiver. The controller learns that there is an accident zone as a result of receiving that signal. The vehicle's speed may be changed using the keys. Here, the vehicle is controlled by a DC motor. The controller uses PWM Technique to regulate the speed of the DC Motor. To identify obstructions in front of the vehicle, the IR TX and RX are employed. The Head Light Detector switches, the vehicle's headlight to low beam and vice versa, when it detects high beam from the opposing vehicle. The driver's seat's alcohol concentration may be detected using the alcohol sensor, and if it is, the car is shut off for safety, even utilizing the Buzzer to send out notifications.

**VEHICLE PART:**

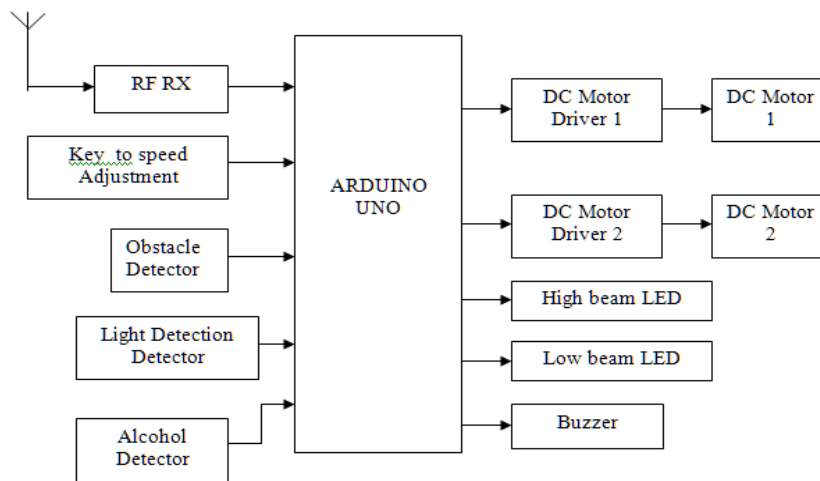


Figure 1.1: Block Diagram of the Model

**TRANSMITTER PART:**

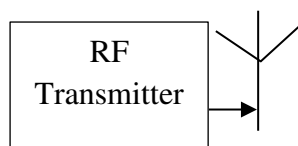


Figure 1.2: Block diagram of Transmitter

**III. DESCRIPTION OF THE MODEL**

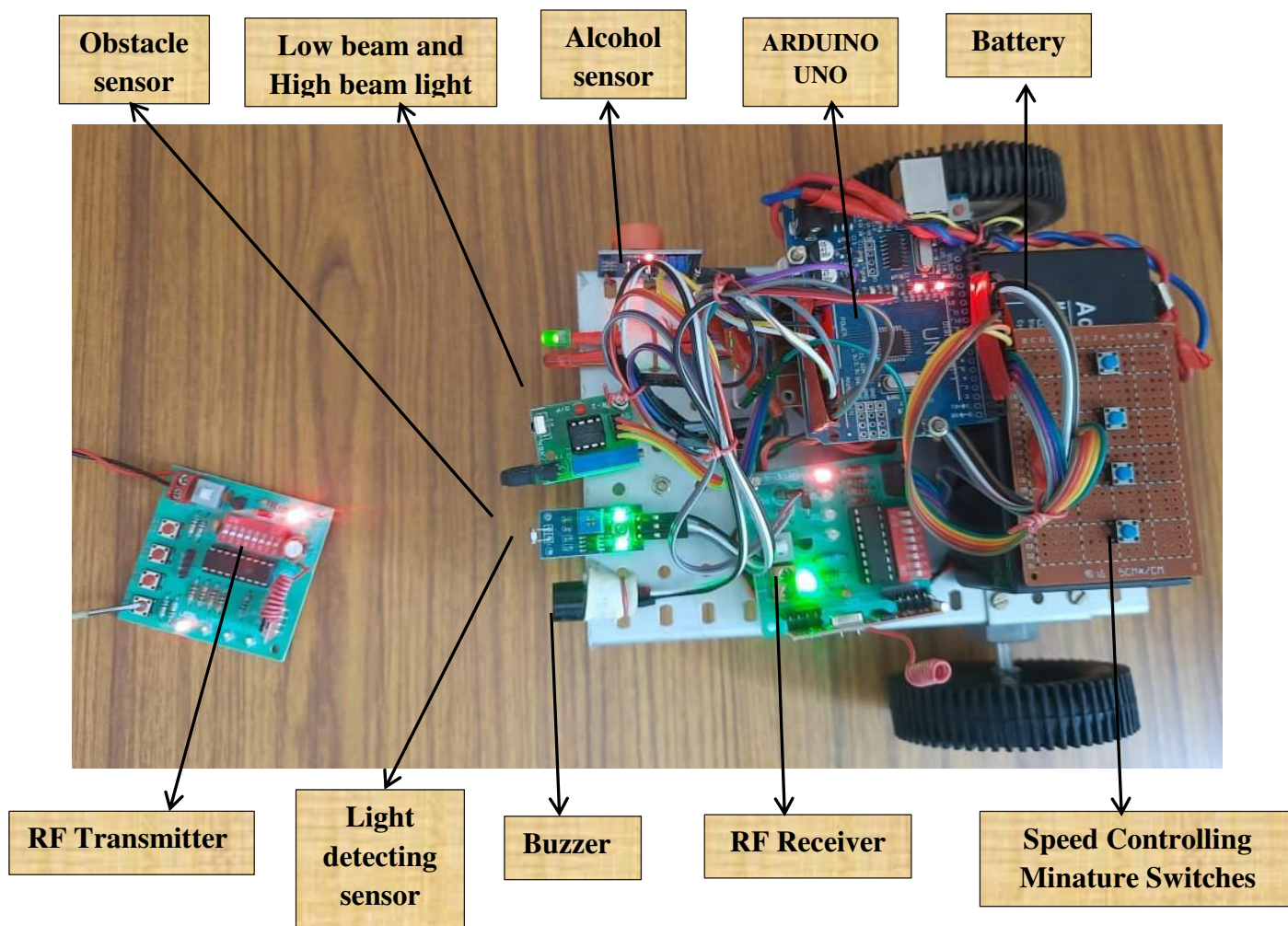
**ARDUINO UNO:** A board-based microcontroller called the Arduino Uno has an ATmega328P on it. It contains a 16MHz ceramic resonator, 6 analog inputs, 14 digital input/output pins, an ICSP connection, a USB connector, and a reset button. This device provides everything needed to support the microcontroller; simply connect it utilizing a USB cord to connect to your computer, power it using the AC-DC converter, or use batteries, and you're ready to begin.

**VOLTAGE REGULATOR:** The LM7805 is a popular integrated circuit (IC) voltage regulator that converts an uncontrolled input voltage source into a stable, regulated output voltage of +5 volts (DC). It frequently finds use in electronic circuits, where it provides a steady 5-volt power source to low-power digital or analog components that require one.

**DC MOTOR:** The DC Motors are used to control the vehicle's speed, which is controlled by the driver through the accelerator while this is controlled by the microcontroller through driver module in the accident zone. Different types of DC Motors are available in the market are used for different application as per the requirement.

**DC MOTOR DRIVING MODULE:** For operating DC and Stepper Motors, the L298N Motor Driver Module is a high power motor driver module. An L298 motor driver IC and a 78M05 5V regulator make up this module. Up to 4 DC motors or 2 DC motors with speed and direction control can be controlled by the L298N Module.

**RF TRANSMITTER:** RF transmitters are electrical components that generate sine waves, continually alter the electric current, and transmit radio waves. The simplest and cleanest type of continuously fluctuating waves, sine waves are produced by oscillators in RF transmitters and are used to carry information such as music and video. These signals are modulated, and then antennas transmit them as radio waves.



**LIGHT DEPENDENT RESISTOR (LDR) SENSOR MODULE:** LDR sensor module is a low-cost digital sensor as well as analog sensor module, which is capable to measure and detect light intensity. This sensor also is known as the Photo resistor sensor. This sensor has an on board LDR (Light Dependent Resistor) that helps it to detect light. This sensor module comes with 4 terminals. Where the “DO” pin is a digital output pin and the “AO” pin is an analog output pin. The result of the module goes high if there is no light and it becomes low in the presence of light. The sensitivity of the sensor can be adjusted using the on board potentiometer.

**MINIATURE SWITCHES:** A small snap-action switch, also trademarked and sometimes called a micro switch, is an electric switch that is activated by a tipping-point mechanism, also known as a "over-center" mechanism, and which requires very little physical force. These switches are used for operating the vehicle the model with different speeds.

**MQ-3 ALCOHOL SENSOR:** The MQ3 sensor is one of the most widely used in the MQ sensor series. It is a MOS (Metal Oxide Semiconductor) sensor. Metal oxide sensors are also known as Chemiresistors because sensing is based on the change in resistance of the sensing material when exposed to alcohol. The MQ3 alcohol sensor operates on 5V DC and consumes approximately 800mW. It can detect alcohol concentrations ranging from 25 to 500 ppm.

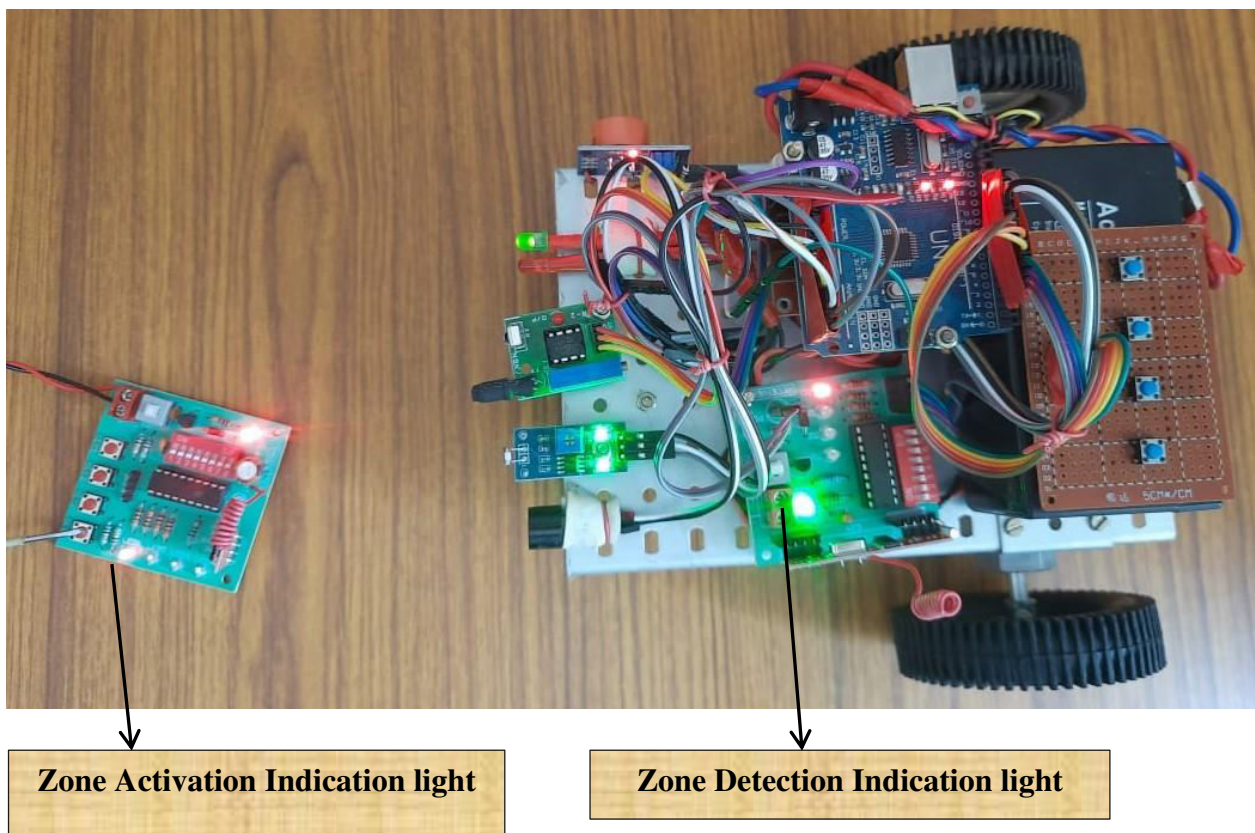
**BUZZER:** A buzzer is a simple audio device that produces sound from an incoming electrical signal. It is also known as a sounder, audio alarm, or audio indication. Piezo buzzers and magnetic buzzers are the two main types of buzzers. If you're building a buzzer circuit, you should be aware of the variations between these two setups. Knowing how each buzzer operates and how to choose the one that is ideal for your purpose is important.

**BATTERY:** A device made up of one or more electrochemical, that transform chemical energy into electrical energy is known as an electric battery. Both a cathode, or positive terminal, and an anode, or negative terminal, are found in

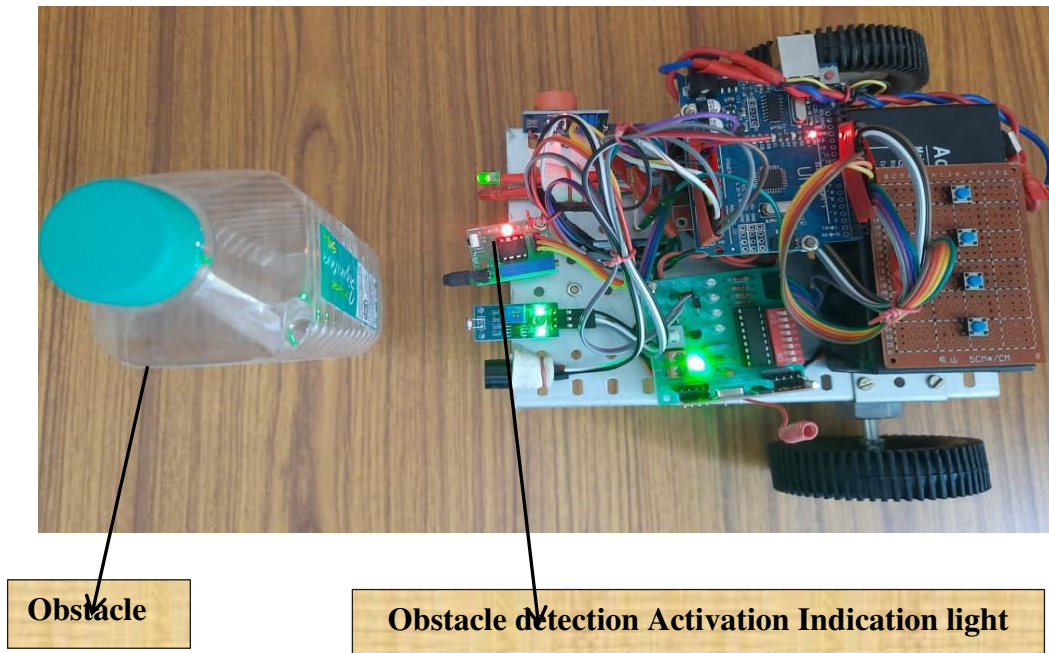
every cell. Ions may migrate between electrodes and terminals thanks to electrolytes, allowing current to leave the battery and do work. Batteries exist in different sizes and forms, from tiny cells used in hearing aids and wristwatches to battery banks the size of rooms that supply standby power for telephone exchanges and computer data centres.

#### IV. RESULTS

**DETECTION OF ACCIDENT ZONE:** The accident zones will be equipped with RF transmitters, which produce continually fluctuating electric current, encode sine waves, and broadcast radio waves. In this model the RF transmitter used is of 433MHz it can make a zone up to 100 meter range. The activation of the zone RF transmitter is shown with activation of light in the model, which is indicated above. RF receivers, which is installed inside the car, which detects the zone as it is indicated by a light at the receiver is as shown above, when vehicle reaches the area in the range of 100 meter. The vehicle reduces the speed automatically reduced to a zone speed and buzzer will be in off condition

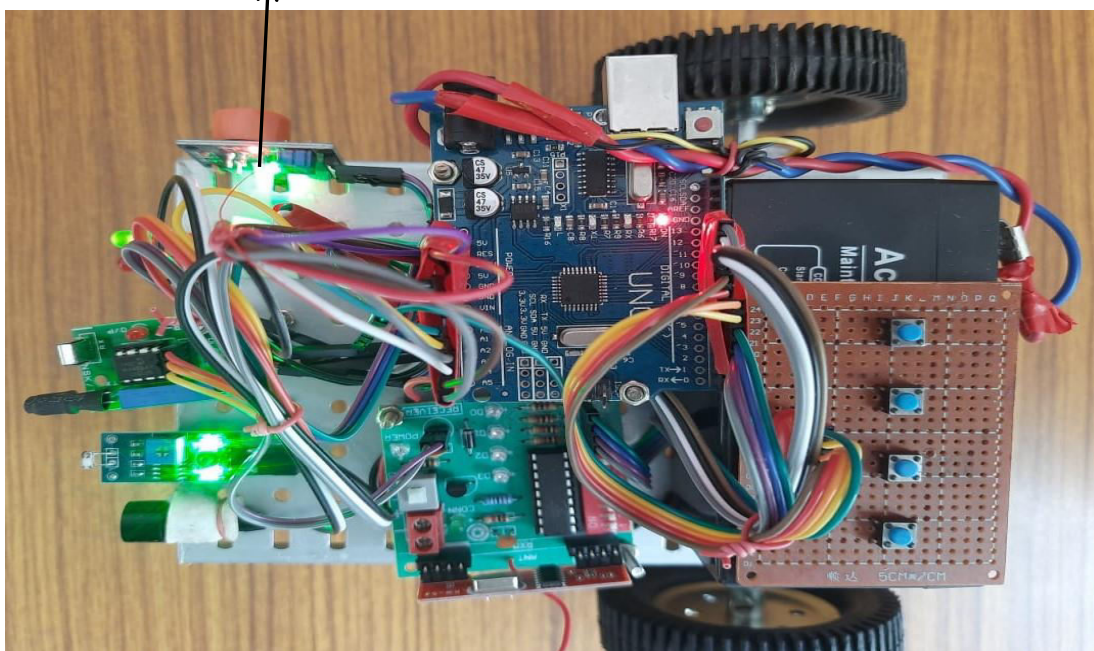


**DETECTION OF OBSTACLE:** The vehicle will be automatically stops by anti-braking system if it finds the obstacle within the specified distance and avoids the accidents. The activation of obstacle sensor is as shown above. The measurement of the distance of the obstacle is depends on the type of sensor used and can be adjusted as per the requirement. In this model, the sensor can detect the obstacle within the range of 15-20cm.



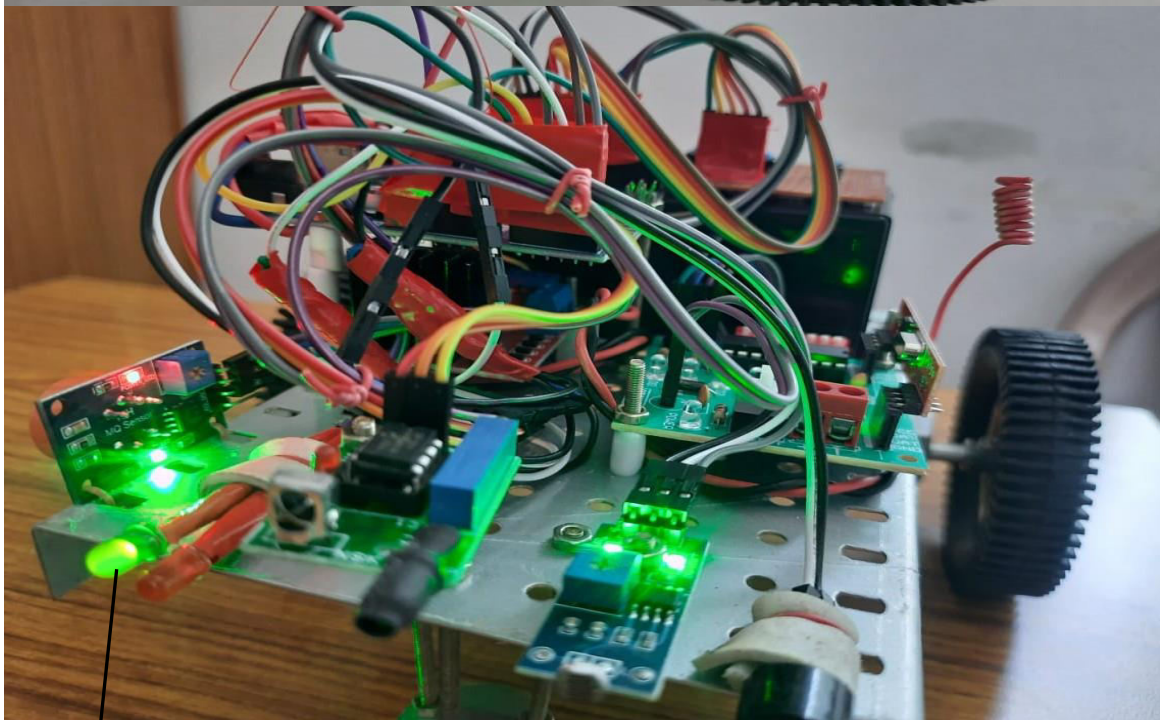
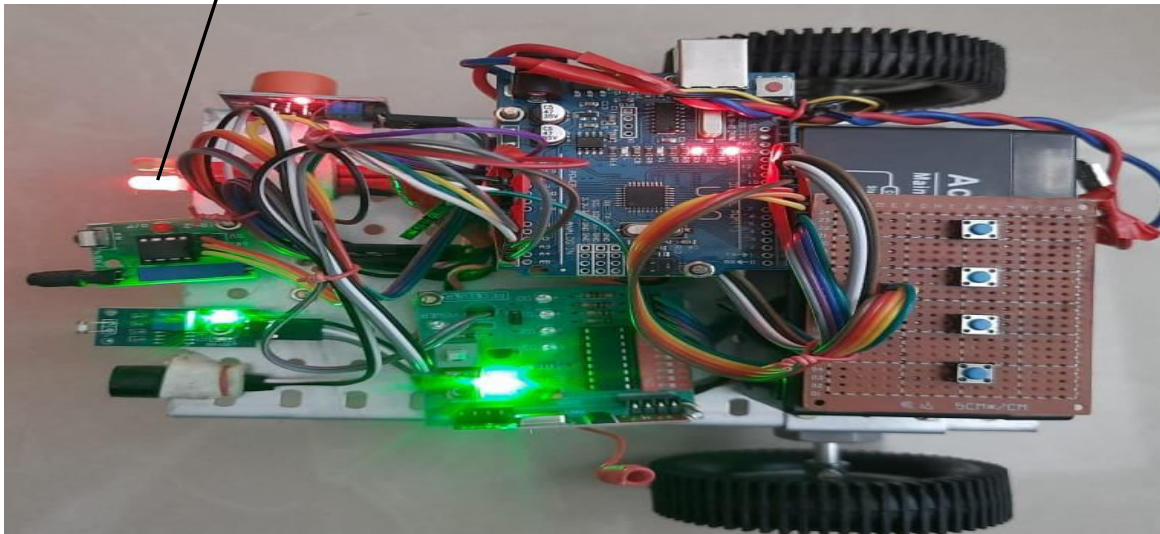
**DETECTION OF ALCOHOL:** The vehicle will not be allowed to start if it finds the alcohol content nearby (in the driver). The driver will be allowed to start the vehicle only with no alcoholic content. The sensor can detect the alcohol content in the range of 25 ppm to 500 ppm. The alcohol content kept near to the sensor with above said range, the sensor is detected the alcohol content is indicated by light as shown above. The drink and drive is the main cause for the accidents. Hence by detecting the alcohol it prevents the accidents and avoids the huge loss.

Activation of Alcohol Sensor



**CHANGENING OF HIGH BEAM TO LOW BEAM:** Normally during the night time the vehicle will be running with high beam is as shown in the picture. If the high beam of the opposite vehicle is detected the high beam detection sensor will automatically changes the vehicle light to low beam, so makes clear visible for the driver and prevents the probable occurrence of the accidents.

High Beam light



Low Beam light

#### APPLICATIONS:

It can be implemented to entire city Accident zones like Traffic junctions, School and hospital zones, Construction Sites, Bus and Railway stations, High way road curves.

Can also be made use for trains and heavy vehicles

#### V. CONCLUSION

Finding accident hotspots including schools, hospitals, hilly terrain, sharp turns, and busy urban areas. In sensitive places like schools and hospitals, the vehicle horn is deactivated and the speed of the vehicle is regulated in accordance with the speed restriction in an accident area.

To prevent injuries to pedestrians, vehicles, and drivers alike, the vehicle is automatically halted when it detects an obstruction or any other object, such as a pedestrian, that is in its route.

The alcohol detecting sensor is used to stop accidents caused by drunk driving. The car won't start if the driver has any detectable alcohol in them till they have none.

The controlling of vehicle head light is made automatically. During the night time normally will be running with high beam, if the high beam of the opposite vehicle is detected then the high beam detection sensor will automatically changes the vehicle light to low beam and makes the clear visible to the driver.

#### FUTURE ENHANCEMENT:

- The Image processing cameras can be used instead of Light sensors for Head light
- The range of RF transceiver can be increased.
- We can develop rain viper system.
- We can provide guidance system for drivers.
- We can replace IR transceiver with ultrasonic for long range obstacle detection.

#### VI. ACKNOWLEDGEMENT

I wish to express my deep sense of gratitude and indebtedness to this great institute of mine, Ghousia College of Engineering, Ramanaagaram, and more profoundly to the Department of Electrical & Electronics Engineering which has given me the privilege of becoming a worthy Electrical Engineer. Special gratitude to Dr. Zahir Hasan, Dr. Javid Akhtar and Dr. Amanulla for their unwavering support and guidance. I am also grateful to the faculty, friends and staff for extended in carrying out this research work.

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