



## Accident Prevention Using Multiple Sensors

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# Accident Prevention Using Multiple Sensors

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## ABSTRACT

In today's world of science and technology, the Transport system is an important part of life. Having this also gives us a sense of the most sophisticated creatures on earth. Cars play an important role in our daily lives but like all other things, there are some positives that are negative as well. Road accidents are a major threat to people's lives. Speed is an important factor in many accidents. Therefore, there is a need to control all accidents. One of the methods of accident detection was, to see the accident in person, which depended on passersby informing the relevant emergency authorities of any safety precautions to be taken but this Road had a hole in it because its efficiency was unreliable. This approach includes delays and inaccuracies due to the problem of witness speaking. This project proposes an effective management approach. First the project concerns the prevention of accidents by sending a nearby vehicle maintenance alarm to prevent a collision, and then for some reason the conflict then the next step is the acquisition of that target smart phone based on the accident detection and notification system which will track the accident with the help of implanted sensors with a small control unit and with a GPS app smartphone, GSM will send a notification to emergency services near the victim's family. Accident detection using ultrasonic sensor provides the facility to detect an accident not only in various street situations but also it might perform well under various natural conditions like rains. This system uses different sensors such as accelerometer, ultrasonic sensor, alcohol sensor, eye blink sensor, smoke sensor. GPS and GSM modules for location of accident spot.

**Keywords:** over speeding prevention, signal jumping, accident alert, overtaking assistance, wireless notification, smart system, accident prevention.



## 1. Introduction

Everyday many lives are lost due to accidents on roads. Normally death happens due to the injury suffered by the passenger in the road accident but most of the time it also has been seen that the information of the accident, reach the emergency department very late, consequently the injured person could not sustain.

In India car use is increasing daily, for that reason accidents, car theft and air pollution are also on the rise. In India, compared to all other cities, Chennai and Delhi tend to have more road accidents. According to the data, per year 4,80,652 accidents result in 1,50,785 deaths and 1,817 deaths per month and 413 deaths per day and 55 accidents per day resulting in 17 deaths. According to one report, the highway is a major killer. On the national highway, 34.5 percent of accidental deaths occurred and on the provincial highway, 29.9% of accidental deaths occurred. The car was hijacked every 13 minutes in NEW DELHI. In the first three months of 2017, it marked a sharp 44% increase over the same period in 2016.

Only about 4% of these vehicles were found. But it can be reduced by applying our suggestion.

According to the Indian government report, every hour 60 accidents occur and more than 70% of them lose their lives on the spot. The existing systems have a few drawbacks such as using an internet connection to send a message, there is no way to prevent it if an emergency signal is started incorrectly, and the configuration is complicated. To overcome obstacles, the novel car module is built with a vibrator and control switch. This program collects all data from different sensors, sends it to pre-stored contacts to prevent risk and to safeguard against unnecessary loss of life.

So there must be an automatic system in every car which not only detect a road accident efficiently but also notify it to the emergency department very instantly.

We may not be able to avoid injuries, but we can still rescue victims. Vehicle collision detection is useful in such



situations. Accident detection using smartphones, GSM and GPS software, vehicular ad-hoc networks, and mobile apps are among the systems suggested by various researchers.

We are proposing a system, a novel approach based on multiple sensors that can detect road accidents and also predict collision about to happen and prevent from accident. If accident happened then the system will give alert on the mobile phone with the help of GSM and also detect the accident location with the help of GPS system.

Accident detection using ultrasonic sensor provides the facility to detect an accident not only in various street situations but also it might perform

## 2. Project Objectives

### **Prevent overspending:**

To detect over speeding we first need to detect speed of vehicle. We plan to use ultrasonic sensor at roadside to sense vehicle at different point. Then according to the time difference between vehicles detected, speed of vehicle will be measured. On comparing speed of vehicle with threshold speed we will decide to open

well under various natural conditions like rains, storm etc.

Apart from that we are proposing four different aspects.

1. Prevent overspending
2. Stop signal jumping
3. Accident alert system
4. Overtaking assistant
5. Drowsiness alarm

This system uses different sensors such as accelerometer, ultrasonic sensor, alcohol sensor, eye blink sensor, smoke sensor.

GPS modules and IOT application for location of accident spot.

or close the speed breaker.

If even after the speed breaker activated vehicle speed is not reduced below threshold then the signal will be passed to vehicle to stop after few seconds.

### **Stop signal jumping**

To stop vehicle from jumping the signal we are going to detect that any

vehicle has crossed the stop line of the signal. If any vehicle crossed the stop line during red signal, the engine of the vehicle will be stopped by sending the signal wirelessly.

### **Accident alert system**

Accident detection will be done with the accelerometer and switch. Accelerometer will sense the vehicle tilt and rotating motion. If vehicles position is abnormal then in this case accident alert will be sent using GSM module as a text SMS. Bodies of text SMS will contain the exact GPS location of the vehicle. GPS coordinates will get from GSP module.

### **Overtaking assistant**

For overtaking indication we will use LED indicator which will be placed

at back side of the car. One ultrasonic sensor will be placed on right corner of the car which will detect if any vehicle is present diagonally. It will give alert to car behind by glowing Red led.

### **Drowsiness alarm**

The Anti-Sleep Alarm has been designed for your right ear that delivers a high alarm pitch to keep you from dozing off to sleep. The Zapper is an anti-drowsy alarm designed to add to the driver's awareness of momentary lapses caused by sleepiness and tiredness. The device is meant to be worn behind the right ear. As the driver's head nods below a present angle, it emits a loud alarm signal alerting the driver to take corrective action.

## **3. Block Diagram:-**



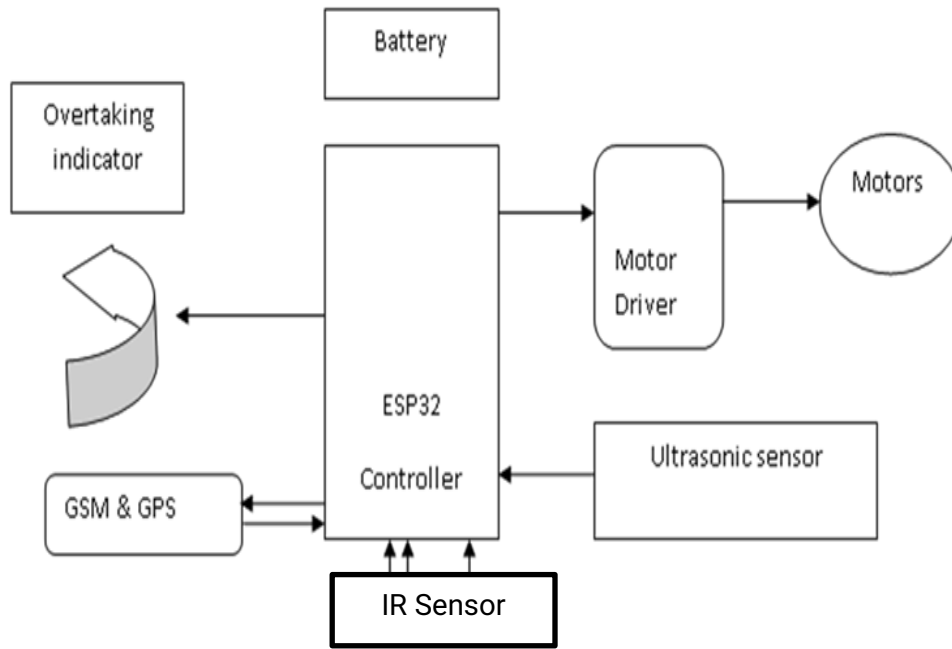


Fig.1 Block Diagram

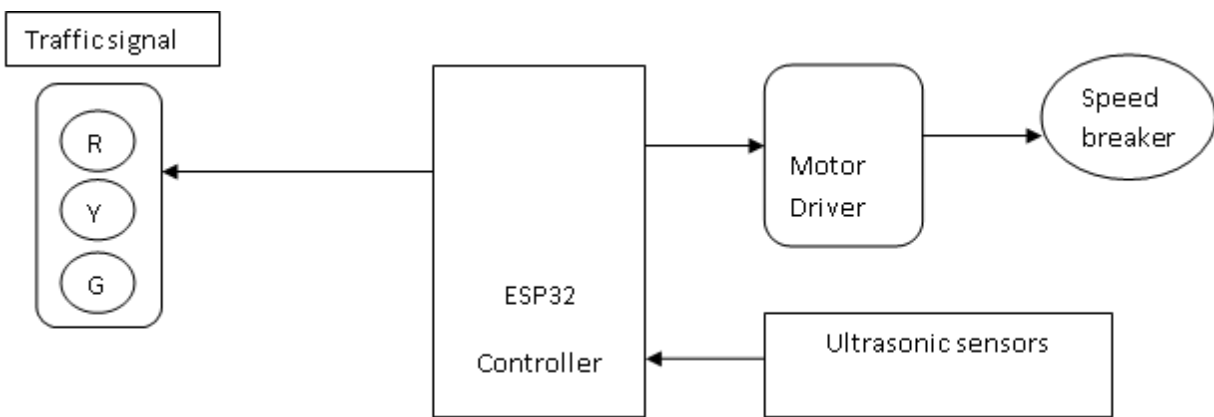


Fig.1.1 Block Diagram for street

#### 4. Working And Methodology

Overall working of the project is also divided in four different parts as per the project module.

- a. Prevent overspending
- b. Stop signal jumping
- c. Accident alert system

- d. Overtaking assistant
- e. Drowsiness alarm

#### Prevent overspending working:

To detect over speeding we first need to detect speed of vehicle. We are using esp32 controller which have built-in

Bluetooth and Wi-Fi.

We have used ultrasonic sensor to sense vehicle at different point. Then according to the time difference between vehicles detected, speed of vehicle will be measured. On comparing speed of vehicle with threshold speed we will decide to open or close the speed breaker.

For example speed of vehicle is 60Kmph and threshold is 40 Kmph then speed breaker will be activated with help of motor. If speed of vehicle is 40Kmph then speed breaker will not be activated.

If even after the speed breaker activated vehicle speed is not reduced below threshold then the signal will be passed to vehicle to stop after few seconds.

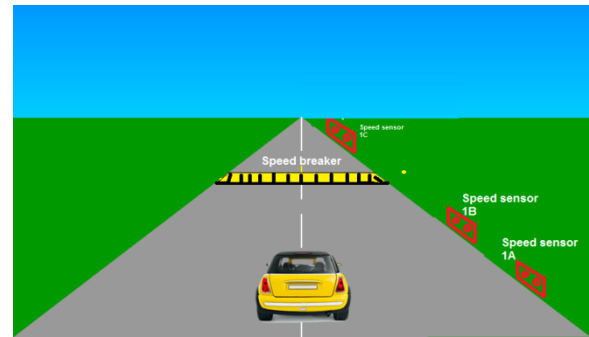
Currently many accidents of vehicles on the highway, it happened because of the many riders who spurred the vehicle exceeds the speed limit. By placing speed monitor device on the road which is specifically accident prone and in traffic police post, is expected that it can prevent traffic accidents.

For it is designed Prototype vehicle speed detection device based Arduino. This prototype uses two ultrasonic sensors. Two ultrasonic

### Stop signal jumping

Now days we see that various types of accidents happens on the road. In India many accidents are caused due

sensors that located in the same line will have ability for measuring velocity.



**Fig.2 speed control using speed breaker**

The first step in this system is calculate the timer when the first sensor detect the motor vehicle, then the timer will stop when the second sensor detect motor vehicle. The velocity value was obtained from the result of quotient between the distance two sensors with the time taken by a motor vehicle to pass through the two sensors.

The velocity value that has been measured from this device is not precision enough. It is caused by a delay in this sensor that can influence time calculation to get velocity value. On the basis of speed the speed breaker will activate to slower the speed. Even after this rider doesn't slower the speed, System will give signal to vehicle to limit the speed of it.

to human negligence like signal jumping practices.

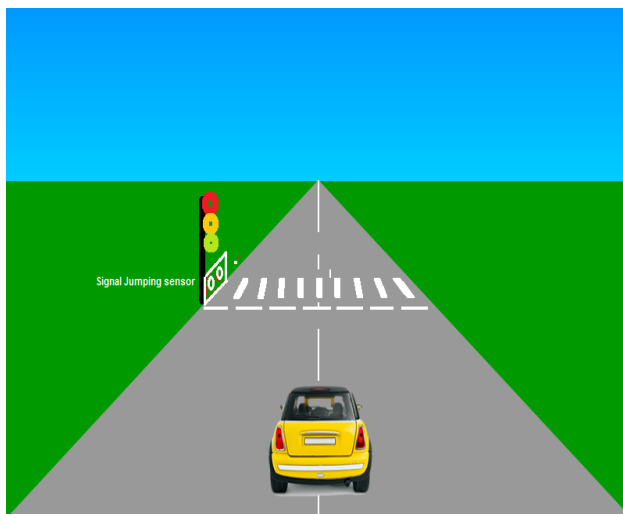
To stop signal jumping we have decided to detect if someone jumps the



signal or not. After this event we will send signal to vehicle to turn off engine until the signal goes green.

Due to this accident due to signal jumping will be prevented. Detection of signal jumping will be done with the help of ultrasonic sensor instead of laser light and LDR.

To stop vehicle from jumping the signal we are going to detect if someone has crossed the stop line of the signal. If any vehicle crosses the stop line the engine of the vehicle will be stopped by sending the signal wirelessly. Of course this system will activate when Red light of the traffic signal is on.



**Fig.3 Signal Jumping Detection**

### **Accident alert system**

Accident alert system main aim is to rescuing people in accidents. This is improved security systems for vehicles. The latest like GPS are highly useful now days, this system enables the parents or owner to get alert on

getting accident. This will reduce the death rate because of accidents.

This accident alert system in it detects the accident with help of accelerometer and the location of the accident occurred will be fetched with help of GPS. Location coordinates will be sent to the specified mobile with help of GSM module.

Accident detection will be done with the accelerometer and switch. Accelerometer will sense the vehicle tilt and rotating motion. If vehicles position is abnormal then in this case accident alert will be sent using GSM module as a text sms. Bodies of text SMS will contain the exact GPS location of the vehicle. GPS coordinates will get from GSP module.

### **Overtaking assistant**

Idea behind this to prevent accidents happens while overtaking on highways.

According to the latest report on country's road accidents and deaths, over 48,000 people died in crashes caused due to overtaking and 'diverging'. "These accidents are also directly linked to speeding and overtaking.

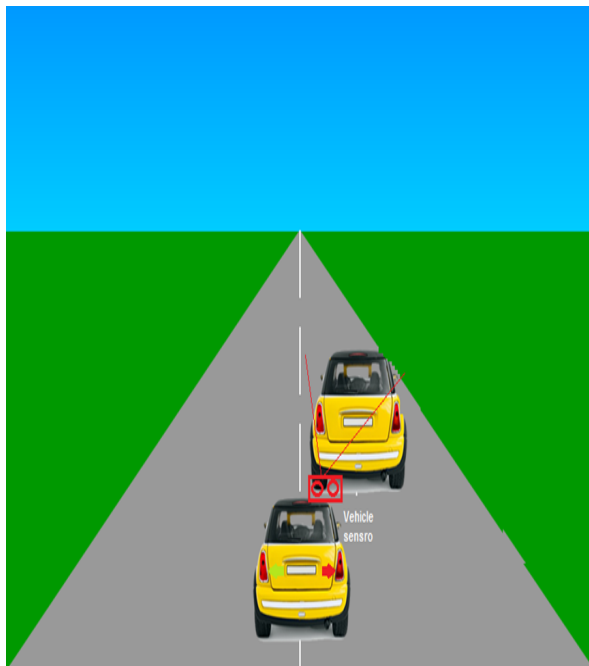
We have proposed a system which will inform the vehicle behind, if it is safe to overtake or not. This could be done



using one more ultrasonic sensor on vehicle's right corner side. If the vehicle sense another vehicle at right side it will give signal not to overtake and vice versa

For overtaking indication we will use LED indicator which will be placed at back side of the car.

One ultrasonic sensor will be placed on right corner of the car which will detect if any vehicle is present diagonally. It will give alert to car behind by glowing Red led.



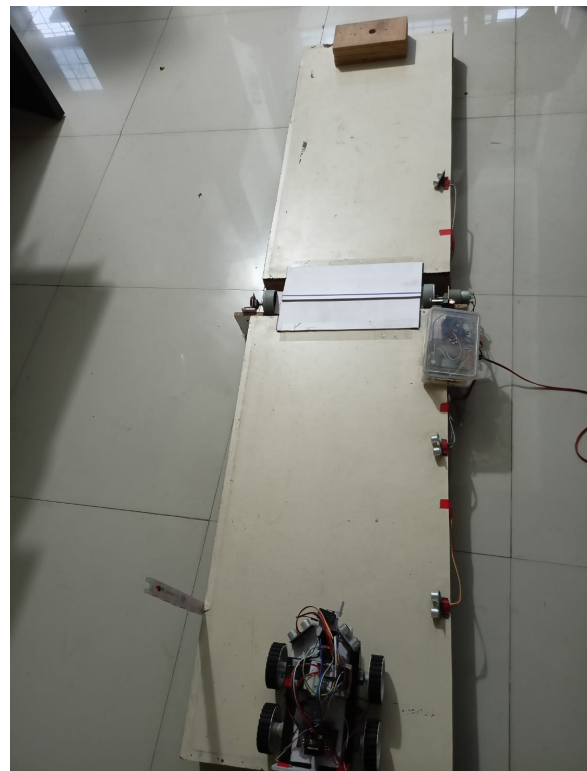
**Fig.4 Overtaking Assistance**

### Drowsiness alarm

Accidents due to driver

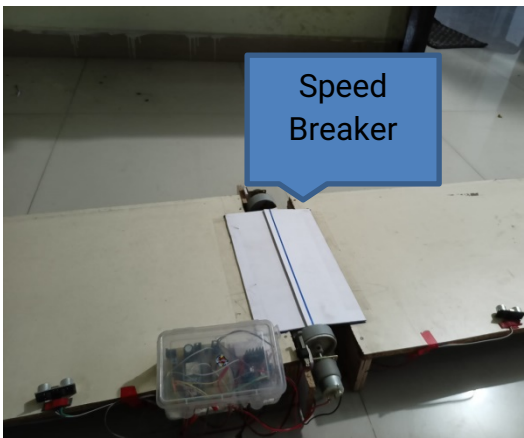
drowsiness can be prevented using eye blink sensors. This sensor module consists of the eye blink sensor frame, the IR sensor and a relay. The vibrator device is connected to the eye blink sensor frame which is to be worn by the driver. This vibrator vibrates whenever an accident occurs or the driver falls asleep. The frame consists of the IR transmitter which transmits the IR rays towards the driver's eyes and an IR receiver which receives the reflected rays when the eyes are closed. The relay provides the extra current required by this module and hence is also connected to the SST microcontroller board.

## 6. PROPOSED SYSTEM:



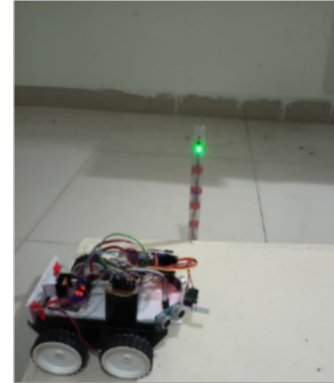
Proposed system contains 4 wheeler prototype car, one track, traffic signal , speed breaker, ultrasonic sensors for speed detection.

### 1. Speed breaker:



Speed breaker will open when vehicle's speed is more that required speed. This breaker will rotate using DC motor. The system is designed in such a manner that for normal speed the track surface will remain flat and vehicle can go through without facing any difficulties. On the other hand if over speeding will detected by the sensors then motor will rotate and create a breaker on the track to stop or control the speed of the vehicle.

### 2. Traffic signal



Traffic signal consists of two different LEDs. One is red and another is green. Red LED light indicating stop sign for vehicle and green LED light indicates go sign for vehicle. If vehicle try to jump the signal then car will automatically turn off for some time and unable to start again for a while. If a person in a car tries to go when light is green then nothing will happen to the vehicle.

### 3. Ultrasonic sensors



The track consist of 3 ultrasonic

sensors which is placed to detect the speed of vehicles. 1<sup>st</sup> sensor will detect the car or vehicle passing. If time to reach from one sensor to another sensor that is 2<sup>nd</sup> sensor is less than the threshold speed then breaker will off or else breaker will open to lower the speed of vehicle. If after passing through breaker car is in speed then the 3<sup>rd</sup> sensor will detect it and turned off the vehicle.

Pair of LED is used for guiding the vehicle from where the object or another vehicle is coming. To detect object ultrasonic sensors are attached on either side of vehicle. For example if the car id coming from the right direction then the ultrasonic sensor will detect it and turned ON the LED on right side. Similarly if object is in left side then the left LED will glow.

At the end of the track a wooden wall is used for showing the accident. If car will hit that wall then a notification will generated and sent to the authorized person. this is called accident alert system.

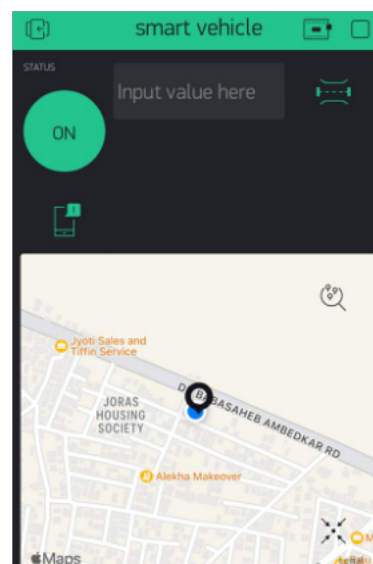
The GPS device located on vehicle will point the exact location of accident occur or accidental spot for emergency services to come for the help or rescue.

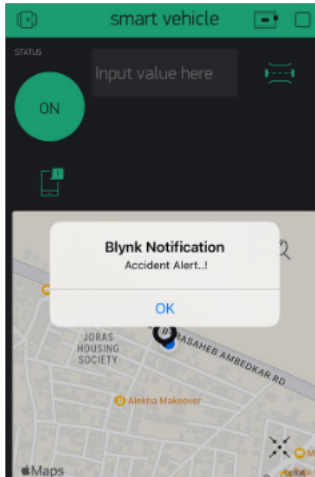
In the case of accident a notification and the location of spot will be indicate on mobile phone.

## 7. RESULTS:

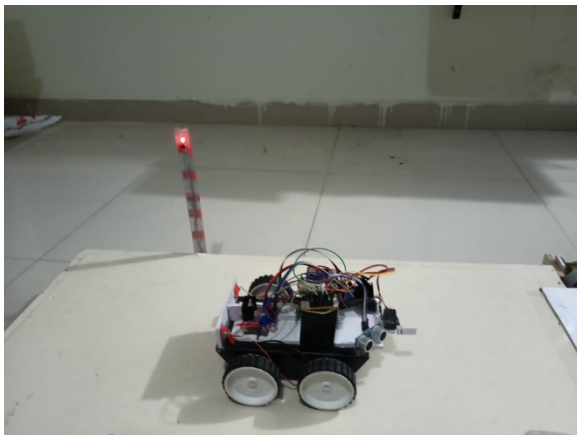
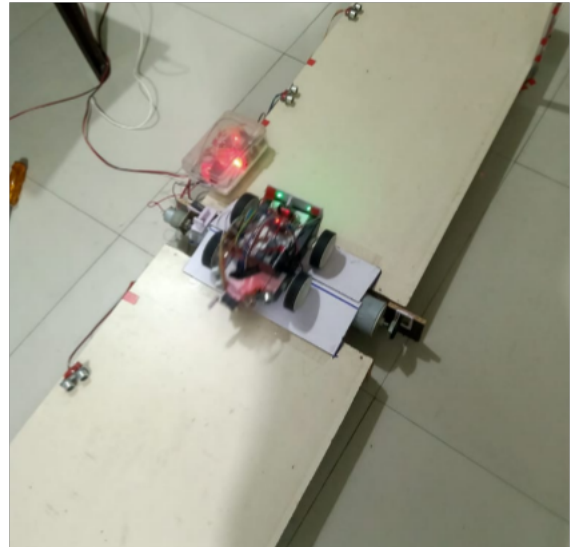
All the result of proposed system will be displayed on figure below.

### 1<sup>st</sup> result: Accident alert and location

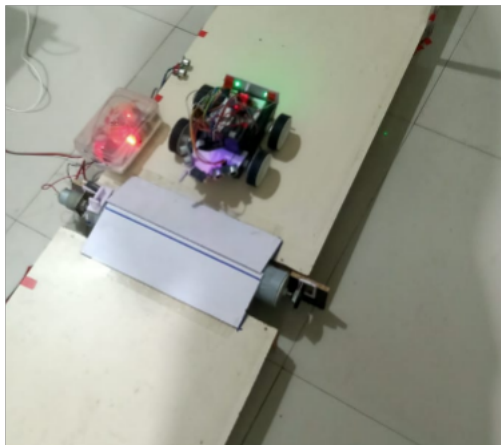




2<sup>nd</sup> Result: signal jumping



3<sup>rd</sup>: Over speeding



## 8. CONCLUSION:

We have proposed an intelligent vehicle system for accident prevention and making the world a much better and safe place to live. The outcome of the project is basically has three applications. One is to prevent and control the vehicle from the accidental situations due to various reasons. Second is to detect the accident occurred area, which is helpful to track and rescue. Third is to indicate the overtaking and signal jumping and also control over speeding on the road.

## 9. FUTURE WORK :

In the future, this system may be extended to other applications. Driver drowsiness can cause uncontrollability the car also leads to accidents. If the

driver feels drowsy it cannot control the car, when the driver wakes up. We can avoid this type of risk by using a braking system. Accidents can occur due to the driver's sleep is prevented from using the automatic break system using the eye blink sensor. Sleeping can be felt in the blink of an eye sensor and blink frequency measured. If the driver drowsy, then the system will issue a buzzer alert to the driver and the speed of the car decreases. Improving rescue assistance at the scene of an accident, photo processing can be used effectively to determine the environmental feature with a specific location using GPS. This gives latitude and longitude car information about GSM. Vibration the sensors are also adjusted to measure vehicle damage. Based on frequency figures, the damage status of the car is rated. If a car encounters an accident, it vibrates the sensor provides a signal to the system and the image is sent to hospital server. Based on this rescue ambulance will be sent in a specified location.

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