e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com

SMART VEHICLE USING IOT

A. Navya*1, U. Sindhuja*2, R. Rakesh*3, Y. Pradeep*4

*1,2,3Student, Electronics And Communication Engineering, ACE Engineering College, Hyderabad, Telangana, India.

*4Professor, Department of Electronics And Communication Engineering, ACE Engineering College, Hyderabad, Telangana, India.

ABSTRACT

The smart car or intelligent vehicle equipped with electronic driver assist controls can provide many special features. In this regard, here in this project work, few intelligent concepts are like automatic control of head lights, close running vehicle alarm at front and rear sides, seat belt sensor, gas leak detector, etc are incorporated. In addition to this, an important feature of Vehicle tracking system is also included such that the vehicle position over the globe can be monitored using IOT technology. The main motive of this project work is to free the driver from many ordinary tasks associated with driving because these are automated by which driver involvement is not required to make driving more pleasant.

The main processing unit is constructed with Arduino Uno board and above said circuits along with their suitable sensors is interfaced with this board. LDR is used to sense the natural light & when natural light disappears automatically head lights will be energized and are switched off automatically by sensing the natural light. IR sensors are used to detect the close running vehicle at both front and rear end such that alarm will be energized automatically. Smoke sensor is used to detect the smoke inside the car, this feature is added to detect the fire tracings in the car, in such case alarm will be energized and information will be displayed through an LCD. MEMS (Deviation sensor) is used to detect the accident.

Seat belt sensor designed with Hall Effect sensor will not allow the driver to start the car unless he put on the belt. Having seat belt can send a safe signal to the processor, after that by activating the start key, the motor will be energized. Hear to simulate the engine, dc motor is used. The car tracking system designed with GPS module can acquire the data of latitude & longitude values from satellites and this information will be up-loaded to the internet through Wi Fi module.

Keywords: Smoke Sensor, LDR Light Sensor, IR Sensors, Main Processing Unit Built With Arduino Uno Board, Head Lights Designed With LED Modules, LCD, ESP8266 Wi Fi Module, GPS Module, Hall Effect Sensor, Buzzer, IC567.

I. INTRODUCTION

Major deaths occur due to the road accidents in all over the world. According to the recent Surveys it is stated that these can be reduced by proper implementation of the IOT systems and based on notification systems also. It can only reduce the deaths after accidents but we cannot manage the behaviors of the drivers such as alcohol driving and drug addicted persons drive etc. these behaviors cannot be controlled. Automatic detection of crashes is largely applied in various automobile industries such as tesla one of the leading example. The core principle of the project is to reduce the number deaths which caused due to lack of proper treatment at the right time.

The system is currently in an unpolished level. That is the complete end product has to be made only with the help of industries. In order to make these we need to reduce the dimensions of the system and also the cost with which it is implemented. Furthermore advancement can also be made using ultrasonic sensors and cameras. According to the study conducted by the Ministry of Transport and Highways, large numbers of accidents are driver-caused road accidents are attributed to over speeding or due to alcohol or drug consumption. These clearly bring to light the gravity of the situation and the enormous responsibility of vehicle drivers towards causing road accidents. The prevention part involves, switching off automobile if the driver does not wears seat belt or in case of alcohol consumption and also tracks the condition of road using Accelerometer. The detection part involves, when a vehicle faces accident, immediately vibration sensor will detect the signal and Microcontroller connected which is further connected to android app installed on smartphone sends the alert message through the GSM modem including the location of vehicle tracked by GPS

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com

and to near-by hospital, police station, mechanic and relatives of victim. Smoke sensor and Seat Belt sensor is used for accident prevention. Smoke sensor senses the gas leakage in car and Seat Belt Sensor detects whether driver is wearing the seat belt or not. If the seal belt sensor conditions matches then the motor will start resulting in the engine of vehicle to start else the motor doesn't start. Vibration sensor is used for accident detection. Vibration sensor detects the vibration then the vehicle was accident detected.

Hardware unit is connected to mobile applications via Bluetooth. Accelerometer is used to detect the bumps and potholes present on the road. Through Wi-Fi all the data is sent to server.

II. LITERATURE REVIEW

Major deaths occur due to the road accidents in all over the world. According to the recent Surveys from IIHS it is stated that these can be reduced by proper implementation of the IOT systems and based on notification system also. It can only reduce the deaths after accidents but we cannot manage the behavior of the drivers such as alcohol driving and drug addicted persons drive etc. This behavior cannot be controlled. Automatic detection of crashes is largely applied in various automobile industries such as tesla one of the leading example. The core principle of the project is to reduce the number deaths which caused due to lack of proper treatment at the right time. The system is currently in an unpolished level. That is the complete end product has to be made only with the help of industries. In order to make these we need to reduce the dimensions of the system and also the cost with which it is implemented. Furthermore advancement can also be make using ultrasonic sensors and cameras.

The main aim of this project is to construct a smart vehicle system with minimizing the limitations of existing methods and also enhancing the security of vehicles and human beings and also reduces the accidental injuries. Smart vehicle system will entail a speed and other parameters of vehicle sensing mechanism which automatically messages to personal contacts with the details of vehicle position when an accident occurs using the GSM/GPRS system. The system also contains fire sensor and an eye blink sensor. A fire sensor, eye blink sensor which senses various parameters of the vehicle is connected to a microcontroller which detects when the abnormal conditions occur or any accidents occur then sends text message, using GSM technology, to the driver's private contacts. The text send to various authorities contains the details of the vehicle and its position. If any ignition occurs in the vehicle, then the fire sensor sends text to the driver's selected contacts. The accidents and the accident injuries in the world is increasing in our day today life so there must be good and efficient control for the safety of human life violation of traffic rules drunk driving, careless driving are some causes of road accidents as we know we cannot stop the accidents but we can reduce the accidents by some precautionary measures. Road accident is most unwanted thing to happen to a road user, though they happen quite often. The most unfortunate thing is that we don't learn from our mistakes on road. Most of the road users are quite well aware of the general rules and safety measures while using roads but it is only the laxity on part of road users, which cause accidents and crashes. Most of the fatal accidents occur due to over speeding. It is a natural psyche of humans to excel. But when we are sharing the road with other users we will always want to take a control. Increase in speed multiplies the risk of accident and severity of injury during accident. A vehicle moving on high speed will have greater impact during the crash and hence will cause more injuries. some deaths also happen due to the lack of immediate first aid. Another problem is that the lack of information about the vehicle position. So, in our project we have used GSM/GPRS modem to locate the exact position of the vehicle.

III. METHODOLOGY

The main processing unit constructed with Arduino Uno board is programmed to display the distance between the target & the vehicle. The sensor arranged at the front side of the vehicle edge is intended to measure the distance in centimeters. Since it is a prototype module, long distance is not considered because the vehicle moves at low speed. Here the system can measure up to 30 centimeters and accordingly the processor is programmed. With the help of a start button interfaced with Arduino and whenever the start button is activated, the vehicle starts moving in forward direction. This start button is connected to A0 pin of Arduino processor. While the vehicle is in moving condition, if it finds an obstacle on its way, the vehicle speed will be reduced automatically and the distance of the obstacle will be displayed through LCD. As the vehicle moves slowly, the distance will be reduced gradually and accordingly the display shows variable measurable distance

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com

linearly. The idea of providing this facility is to prove the concept practically weather the system is able to measure the variable distance or not in vehicle moving condition.

In our trail runs we found that the system is working properly but since it is a prototype module, the measured distance may not be accurate, little error may be there.

To reduce the motor speed, current limiting resistor is used and it is connected in series with the motor positive terminal. During normal condition, by activating the start key, the motor runs at its normal speed. In this condition, the current limiting resistor will be by passed by which maximum voltage will be applied to the motor from the battery. Whenever the system detects obstacle, the relay will be energized by which the current limiting resistor will be connected in series with the supply source through relay contact. Here 100ohms 3watts resistor is used by which some voltage will be dropped across the resistor. Refer ohms laws for calculating the value of resistor & its wattage.

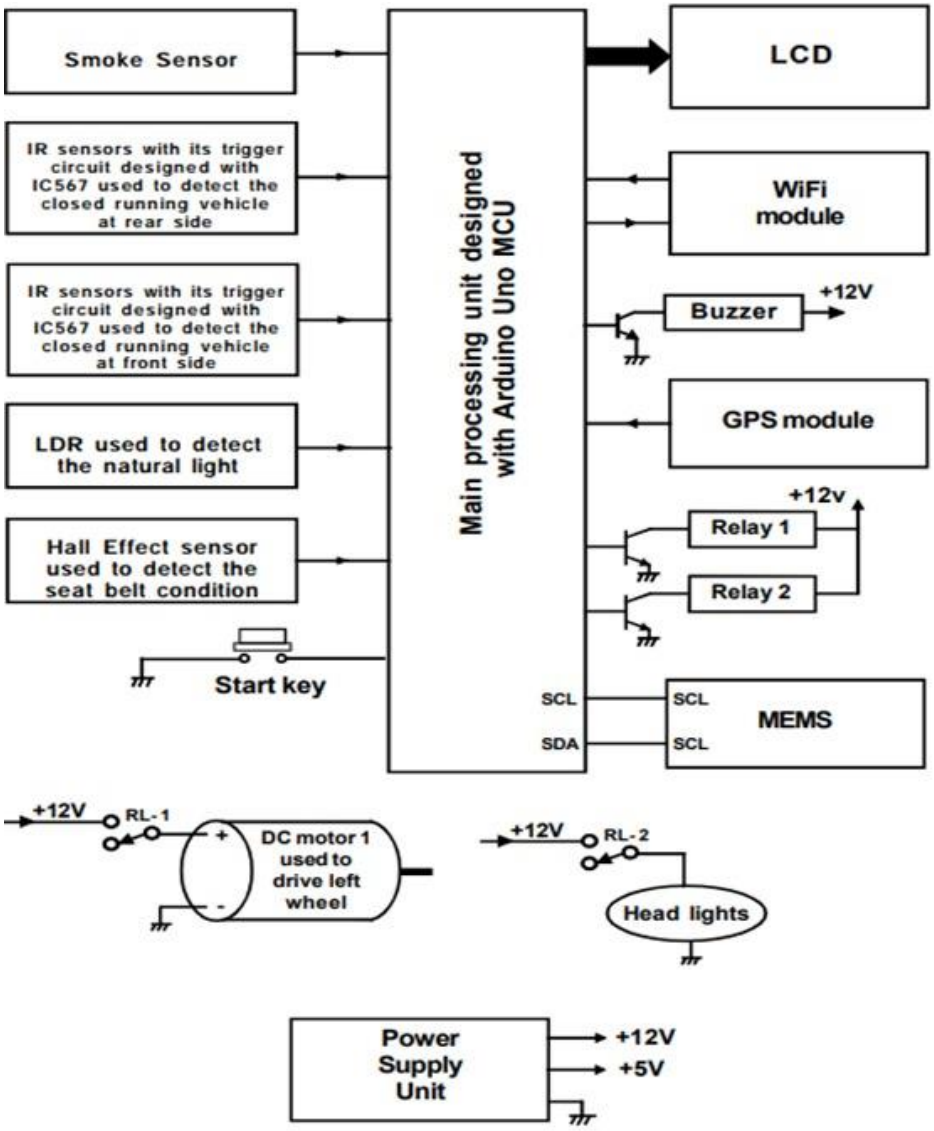

Figure 1: Block Diagram Of Smaret Vehicle Using Iot

IV. THE HARDWARE

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming (ICSP) header, and a reset button. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software,

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com

or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. This is a screenshot of the Arduino IDE. Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

Figure 2: ARDUINO UNO

SMOKE SNESOR

The smoke sensor detects whether or not there is smoke in the environment, as well as the concentration of smoke, such as sensing intense smoke during a fire. When the smoke probe comes into contact with smoke or another gas, its internal resistance changes, and an analog value is created to regulate it. To provide the corresponding analog signal of the smoke concentration to the host, the smoke sensor exploits the idea that the concentration of smoke (primarily combustible particles) affects the resistance value of the smoke-sensitive element.

Figure 3: SMOKE SNESOR

IR SENSOR

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called a passive IR sensor. The IR sensor or infrared sensor is one kind of electronic component, used to detect specific characteristics in its surroundings through emitting or detecting IR radiation. These sensors can also be used to detect or measure the heat of a target and its motion. In many electronic devices, the IR sensor circuit is a very essential module. This kind of sensor is similar to human's visionary senses to detect obstacles. The sensor which simply measures IR radiation instead of emitting is called PIR or passive infrared. Generally in the IR spectrum, the radiation of all the targets radiation and some kind of thermal radiation are not visible to the eyes but can be sensed through IR sensors.

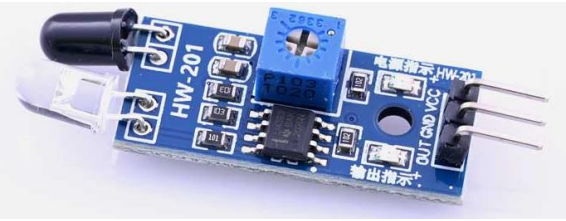

Figure 4: IR SENSOR

HALL EFFECT SENSOR

The Hall Effect sensor used here is intended to detect the respiration rate. A Hall Effect sensor is a device that is used to measure the magnitude of a magnetic field. Its output voltage is directly proportional to the magnetic

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com

field strength through it. Hall Effect sensors are used for proximity sensing, positioning, speed detection applications. Frequently, a Hall sensor is combined with threshold detection so that it acts as and is called a switch. Commonly seen in industrial applications, they are also used in consumer equipment.

In a Hall Effect sensor, a thin strip of metal has a current applied along it. In the presence of a magnetic field, the electrons in the metal strip are deflected toward one edge, producing a voltage gradient across the short side of the strip (perpendicular to the feed current). Hall Effect sensors have an advantage over inductive sensors in that, while inductive sensors respond to a changing magnetic field which induces current in a coil of wire and produces voltage at its output, Hall Effect sensors can detect static (non-changing) magnetic fields.

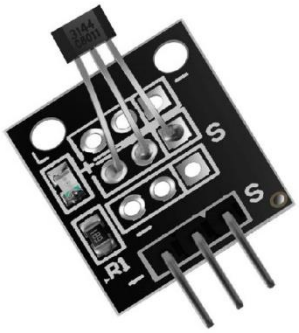

Figure 5: HALL EFFECT SENSOR

DC MOTOR

DC motors are widely used, inexpensive, small and powerful for their size. They are most easy to control. One DC motor requires only two signals for its operation. DC motors take direct current voltages as input and convert it into rotation movement. DC motors usually have two wires and can be powered directly from battery or DC power supply. DC motor can also be powered through driver's circuit that can regulate the speed and direction of the motor. The usual voltage of DC motors used in robotics is 6V and 12V motor. The gear shaft contains inside the power window motor will definitely increase the torque of the motor.

Figure 6: DC MOTOR

LDR

DC motors are widely used, inexpensive, small and powerful for their size. They are most easy to control. One DC motor requires only two signals for its operation. DC motors take direct current voltages as input and convert it into rotation movement. DC motors usually have two wires and can be powered directly from battery or DC power supply. DC motor can also be powered through driver's circuit that can regulate the speed and direction of the motor. The usual voltage of DC motors used in robotics is 6V and 12V motor. The gear shaft contains inside the power window motor will definitely increase the torque of the motor.

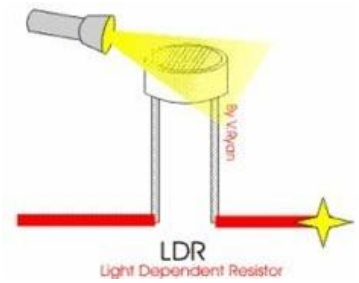

Figure 7: LDR

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com

16X2 LCD

In Arduino based embedded system design, the Liquid Crystal Display modules play a very important role. Hence it is very important to learn about how to interface LCD with an Arduino of 16×2 in embedded system design. The display units are very important in communication between the human world and the machine world. The display unit work on the same principle, it does not depend on the size of the display it may be big or the small. We are working with the simple displays like 16×1 and 16×2 units. The 16×1 display unit has the 16 characters which present in one line and 16×2 display units have 32 characters which are present in the 2 line. We should know that to display the each character there are 5×10 pixels. Thus to display one character all the 50 pixels should be together. In the display, there is a controller Built in with panel which is HD44780 it is used to control the pixels of characters to display.

Figure 8: 16x2 LCD

GPS MODULE

Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense. GPS was originally intended for military applications, but in the 1980s, the government made the system available for civilian use. GPS works in any weather conditions, anywhere in the world, 24 hours a day. There are no subscription fees or setup charges to use GPS.

GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now, with distance measurements from a few more satellites, the receiver can determine the user's position and display it on the unit's electronic map.

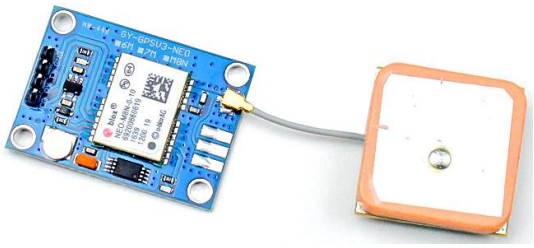

Figure 9: GPS MODULE

BUZZER

A buzzer or beeper is an audio signaling device,[1] which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

Figure 10: BUZZER

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com

V. SOFTWARE

ARDUINO IDE SOFTWARE

It's free software that allows us to develop and upload code to Arduino devices. This software can be run on many operating systems or platforms such as windows, Linux, and Mac OS. C and C++ have supported programming languages. This software combines standard inventor tools into a single user interface for creating apps for several operating systems. It is very similar to C Language and it is based on a hardware programming language named processing. An Arduino IDE is required for uploading the sketch on the board.

VI. RESULTS AND DISCUSSION

The main processing unit is constructed with Arduino Uno board and above said circuits along with their Suitable sensors is interfaced with this board. LDR is used to sense the natural light & when natural light disappears automatically head lights will be energized and are switched off automatically by sensing the natural light. IR sensors are used to detect the close running vehicle at both front and rear end such that alarm will be energized automatically. Smoke sensor is used to detect the smoke inside the car, this feature is added to detect the fire tracings in the car, in such case alarm will be energized and information will be displayed through an LCD. MEMS (Deviation sensor) is used to detect the accident. Seat belt sensor designed with Hall Effect sensor will not allow the driver to start the car unless he put on the belt. Having seat belt can send a safe signal to the processor, after that by activating the start key, the motor will be energized. Hear to simulate the engine, dc motor is used. The car tracking system designed with GPS module can acquire the data of latitude & longitude values from satellites and this information will be up-loaded to the internet through Wi-Fi module.

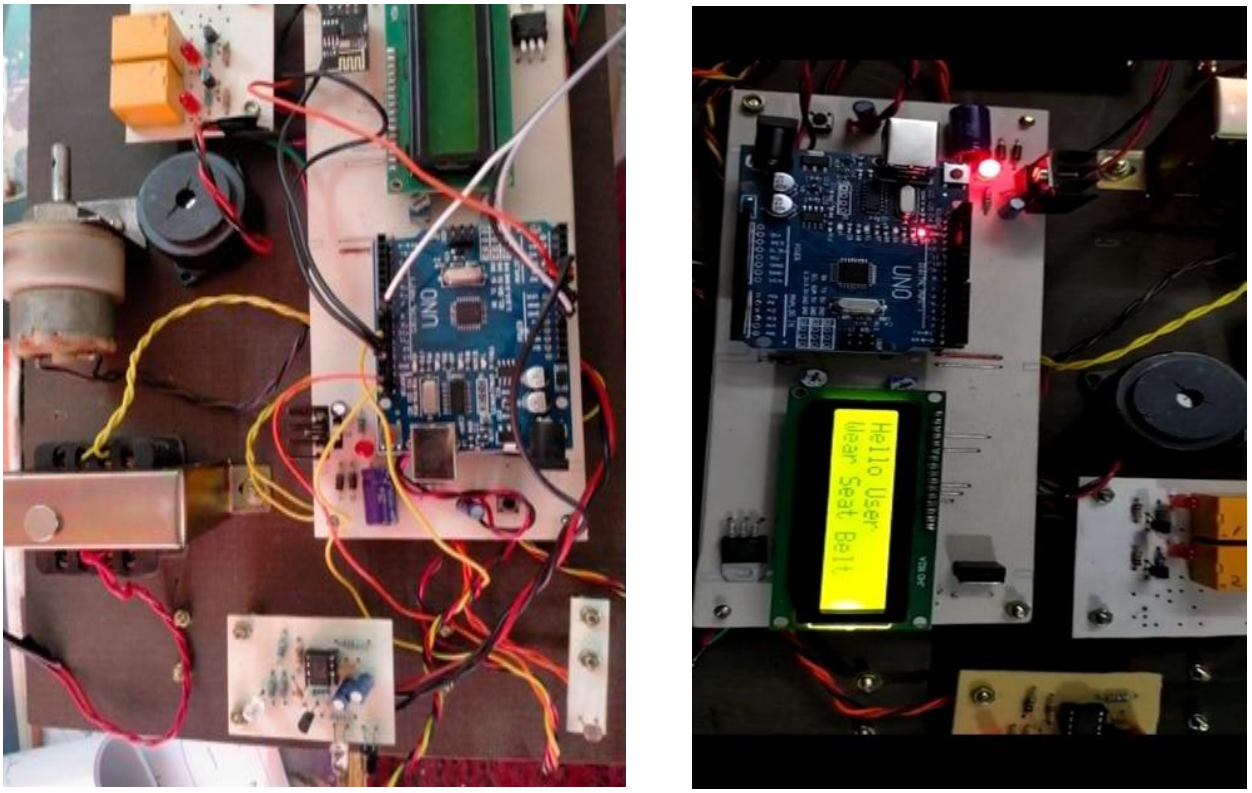

Figure 11: RESULT

The pictures above are the screenshots of android application which is developed using ANDROID STUDIO. In the first picture all routes are in off state which means not even one device is activated. In the second picture the route named LOCATION is activated so it is denoted with green color, remaining all are in deactivate state so they all are in red color.

VII. CONCLUSION

This project presents smart vehicle monitoring system with notification to the mobile numbers. The proposed smart vehicle monitoring system can track geographical information automatically and sends an alert SMS

regarding accident. Experimental work has been carried out carefully. The system is more accurate and efficient. This made the project more user-friendly and reliable. The proposed method is verified to be highly beneficial for the automotive industry.

LDRs are very low-cost devices. LDRs are very smaller in sizes.

- LDR is a simple device.
- It provides secured communication due to line of sight or point-to-point mode of communication.
- Gas sensors are used to detect toxic or explosive gasses and measure gas concentration.
- It holds the occupant in the seat and prevents them from throwing out of the vehicle due to force and hitting the dashboard, windshield which can cause serious head injuries or even worse.

ACKNOWLEDGEMENTS

We would like to thank our guide Mr. Y. Pradeep sir for his continuous support and guidance. Because of his guidance, we completed our project successfully. We are extremely grateful to Dr. P. Satish Kumar, Head of the Department of Electronics and Communication Engineering, Ace Engineering College for his support and encouragement.

VIII. REFERENCES

[1] Hammadi, Khaleefa & Ismaeel, Mohammed & Faisal, Tarig. (2016). Intelligent car safety system. 319-322. 10.1109/IEACON.2016.8067398.

[2] G. Srikanth1,U.Ramakrishna2 1Communication & Signal Processing M. Tech, 2Assistant professor ECE Department R.V.R& J.C College OF Engineering, Ganrur, Andhra Pradesh (522019), India

[3] Claire Swedberg. IoT Solution to Bring Location Awareness for Half a Million Cars

[4] VITALY PETROV;ANDREY SAMUYLOV ; VYACHESLAV BEGISHEV ; VEHICLE-BASED RELAY ASSISTANCE FOR OPPORTUNISTIC CROWDSENSING OVER NARROWBAND IOT (NB-IOT) [5] Ruhi Kiran Bajaj , Madhuri Rao , Himanshu Agrawal Internet Of Things

[5] D. B. Tushara and P. A. H. Vardhini, "Wireless vehicle alert and collision prevention system design using Atmel microcontroller," 2016 International Conference on Electrical, E lectronics, and Optimization Techniques (ICEEOT), Chennai,2016.

[6] S. Lee, G Tewolde and J.Kwon, "Design and implementation of vehice tracking system using GPS/GSM/GPRS technology and smartphone application." 2014 IEEE World Forum on Internet of Thing(WF-IoT), Seoul, 2014.

[7] Salas K Jose.,X. Anitha Mary., Namitha Mathew "Arm 7 Based Accident Alert and Vehicle Tracking System", International Journal of Innovation Technology and Exploring Engineerin (IJITEE)

[8] Jorge Z., Carlos T., Juan C. and Pietro M., "Providing Accident Dectection in Vecicular Networks through OBD-II Devices and android-based Smartphones", Proceedings of the IEEE 36TH Conference on Local Computer networks.