AN IOT BASED SYSTEM FOR ACCIDENT DETECTION AND PREVENTION

[1] McWin Prince M, [2] Selvan S, [3] Arun Kumar B, [4] Sathya Priya,

[1,2,3] Student, [4] Supervisor, Department of Computer Science and Engineering,

Loyola-ICAM College of Engineering and Technology (LICET), Chennai, India.

ABSTRACT

As with the increase in population growth the demand for vehicles has also increased which also leads to increase in many accidents. The primary cause of many accidents is due to drivers not following the government traffic rules. About 20 accidents occur every hour. Some people tend to lose their lives either. The main reasons are feeling drowsy, alcohol consumption, driving without license like the people below 18 driving cars and bike, Rash driving etc.

The system we provide detects accidents by use of sensors such as GSR sensor to predict the driver related issues like prediction of heart attack , Stress and drowsy. The system also watches the traffic light with the help of transmitter and receiver and displays it to the driver. If the driver fails to stop for red lights, the system will automatically stop the vehicle. Similarly in case of speed limits that are to be maintained in particular areas such as school zone, hill areas the system automatically detects and reduces the speed of the car. So in this paper we analyse the various models used for preventing the road accidents, *highlighting their strengths in their prevention, and challenges that are used to ensure road safety and save valuable lives.*

Index Terms: GSR sensor, Transmitter and receiver for communication of alert, Accident detection, IOT.

1. INTRODUCTION

Due to increased usage of vehicles, accident occurrence has also increased. According to a global report by World Health Organisation stating that nearly in 170 countries, number of death by road accidents are nearly 1.45 million. There can be multiple causes of road accident some of them are drowsiness, intoxicated, over speeding. Road crashes can be seen as collision between any two vehicles or over an obstacle.

In most cases of road accidents the injuries are minor and later after few medical treatments the life of the victim can be rescued but in few cases people life is lost. Thus the main goal is to identify or prevent accident occurrence and send an alert to the driver so that he can take actions or steps to prevent the

accident by reducing the speed or applying the brake.

The Internet of Things (IOT) is the interconnection of uniquely identifiable embedded computing device within the existing Internet infrastructure, which can help using integrating various components of the system coherently. This method has several advantages like user friendly and high performance. The following shows the Statics of death occurred in 2020, 2019, 2018.
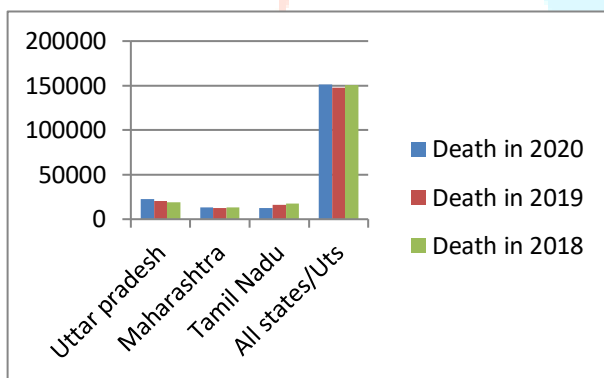

Fig1: Statics report of deaths.

2. GOALS AND OBJECTIVES

❖ Designing a device to increase the safety level of the driver as well as others.

❖ To learn and understand the working principle of sensors and technology which will help implementing this project

❖ Various sensors such as GSR , Speed control etc will be used in this project, hence understanding each one of them is

very critical from the development point of view

❖ To monitor whether there is any sign board that tells about any speed limit in the particular zone.

❖ After understanding the requirements and specification of all the modules we will finally start the design of the system.

3.   MOTIVATION   BEHIND   THIS STUDY

❖ According to the WHO and NDTV report nearly 1.35 million people died in road accidents, making road traffic injuries the eight leading cause of death globally. Most injuries incurred by accidents are not serious but some may lead to death. However consequence of road accidents are not just constrained to the loss of human lives yet, also incorporate the destruction of property, traffic blockage.

❖ Night Driving in some cases causes drowsy driving.

❖ Thus automatic accident detection systems are the need of time, which can reduce the accidents.

❖ This paper features existing mechanisms to detect accidents, limitation and methodologies.

4. LITERATURE SURVEY

o "Design of RF based speed control system for vehicles," by Ankita Mishra and Jyoti Solanki. The main goal is to create a smart display controller that can regulate the vehicle's speed and track speed zones with speed limits, as well as work with an embedded device. Volume.1, No 8, 2012

o "Automatic Vehicle Speed Reduction System Using Rf Technology," by Deepa B Chavan and Abdul Rahim Makandar.The system's main goal is to automatically control the vehicle's speed as it approaches a limit or a specific speed zone. Volume.4, No.4, 2014.

o "Smart Zone Based Vehicle Speed Control Using RF and Obstacle Detection and Accident Prevention," by Vinod Rao, Saketh Kumar, Anil Kumar,Saleem Yusuf .The system's main goal is when a vehicle reaches a speed limit zone, the vehicle's speed is regulated by the receipt of a signal, which means that the vehicle's speed is reduced to a cutoff value and held steady until the vehicle exits the speed limiting zone, at which point the vehicle's speed is automatically accelerated. Volume.4, No.3, 2014.

o "Traffic Light Control System for Emergency Vehicles Using Radio Frequency," by N.M.Z.Hashim, A.S.Jaafar, N.A.Ali.This system was programmed to work when it received radio frequency (RF) transmission signals from emergency vehicles and used the Programmable Integrated Circuit (PIC) 16F877A microcontroller to return the sequence to normal until the emergency mode was activated.

o "A Stress Sensor supported Galvanic Skin Response (GSR) Controll by ZigBee" by María Viqueira Villarejo, Begona Garcia Zapirain, and Amaia Méndez Zorrilla. This system uses a GSR sensor that has two electrodes which are placed on the fingers and serve as two terminals with a single resistance, to detect differences in skin conductance when a person is stressed and when they are not.
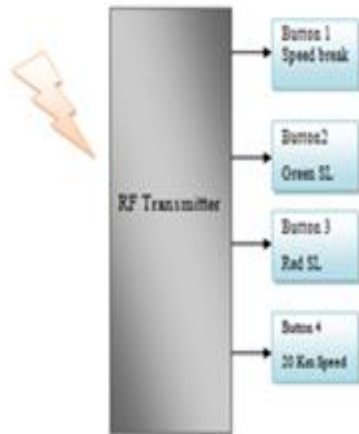
5. MODEL OF PROPOSED SYSTEM

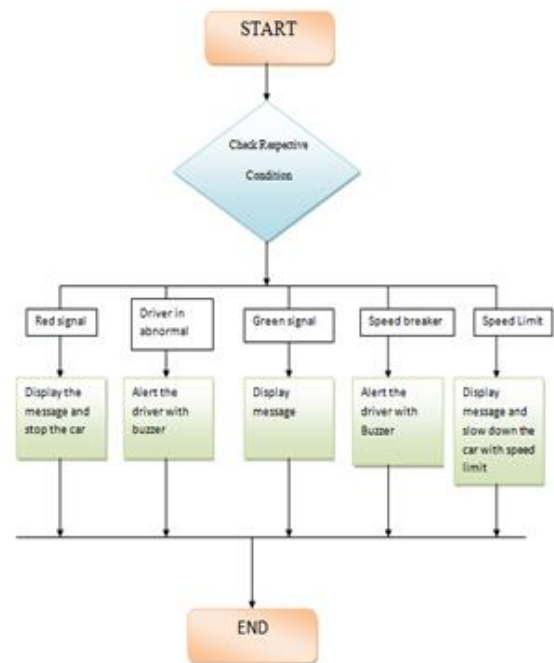*Fig2: Block diagram describing how various modules interface with each other*

6. WORKING OF PROPOSED SYSTEM

The System provides prevention and detection system that ultimately ensures safety and prevents loss of life by taking appropriate measures in right time of accident occurrence. This system uses red light traffic in which the vehicle is controlled on traffic signal, when the signal is red the vehicle is automatically stopped.

GSR sensor are used to check the Heart Activity of the driver, Mental emotions, etc. Transmitter and receiver are used to find speed control sign board to control speed in different areas. It also has a major objective of road discipline such as control speed in different areas across cities. Hence braking system will gradually reduce or even stop the speed of the vehicle in certain case. It will automatically cause deceleration.

Fig 3: Control flow of proposed system

1. The Red signal based detection plays a vital role in accident prevention because in India people rush at the time when the signal is Red. Hence we have come up with the first module preventing accident in this case. We detect the signal and if its Green or Yellow we allow the car and if the signal turns red the system automatically stops the car. Thus preventing accidents in traffic junction.

Fig 4: Traffic light detection

2. Using Transmitter and Receiver we identify the Sign board that are present in road sides as well as in highways showing the speed limit to be followed in the particular area. Transmitter are fitted to the Sign boards and when the vehicle comes to the zone of the transmitter the receiver gets the signal from the transmitter stating that the speed to be maintained is 20 KM. Hence the system alerts the driver in the LCD screen and if the driver failed to reduce the speed, the system itself reduces the speed to that particular sign board rules. Hence accident gets prevented by following the speed rules in certain areas. Hence the second module aims at maintaining the speed.

Fig 5: Sign board and Speed breaker detection

3. The Third module uses GSR sensors to monitor the activities of the Driver such as Stress Detection, Heart attack detection, Drowsy etc. This sensor is fitted to the handle

bar or steering of bike and car to detect the electronic impulse of the skin of the driver. Using the data produced by emotional arousal values of GSR which helps in defining each disorder and if the value goes above the defined value the system stops the vehicle. Hence the major outcome of the third module is well described as it prevents the major accidents.

Fig 6: Detects Emotional Arousal

7. ALGORITHM

1. Check whether the driver is abnormal, if true then display an alert message.

int gsr=analogRead(A0);
lcd.setCursor(11,0);
lcd.print("G:");lcd.print(gsr);
if(gsr>100)
{
lcd.setCursor(11, 0);lcd.print("Alert ");
}

2.Check whether the speed limit is imposed on certain areas, if true then display a message and slow down the car within the speed limit.

if(rf1==0)
{
lcd.setCursor(0, 1);lcd.print("20km Speed Limit ");
digitalWrite(6,1);delay(500);digitalWrite(6,0);delay(500);
digitalWrite(6,1);delay(100);digitalWrite(6,0);delay(100);

```
digitalWrite(6,1);delay(500);digitalWrite(6,0);delay(500);
digitalWrite(6,1);delay(100);digitalWrite(6,0);delay(100);
digitalWrite(6,1);delay(100);digitalWrite(6,0);delay(100);
digitalWrite(6,1);delay(500);digitalWrite(6,0);delay(500);
digitalWrite(6,1);delay(100);digitalWrite(6,0);delay(100);
}
```

3.Check whether the traffic signal is red, if true then display a message and stop the car by triggering the braking system.

```
if(rf2==0)
{
 lcd.setCursor(0, 1);lcd.print("Red signal "); delay(1000);
digitalWrite(6,1);delay(100);digitalWrite(6,0);delay(1000);
digitalWrite(6,1);delay(100);digitalWrite(6,0);delay(1000);
}
```

4.Check for speed breakers on the road, if true then display a message and alert the driver with a buzzer.

```
if(rf3==0)
{
lcd.setCursor(0, 1);lcd.print("Speed breaker "); delay(1000);
digitalWrite(7,1);delay(500);digitalWrite(7,0);delay(500);
}
```

5. Check whether the traffic signal is green, if true then display a message.

```
if(rf4==0)
{
lcd.setCursor(0, 1);lcd.print("greenSignal "); delay(1000);
}
```

8. CONCLUSION AND RESULT

The smart IOT based accident detection and prevention is proposed using technologies such as transmitter and receiver for getting information of sign boards or detection of speed breaker and GSR sensor to detect the driver's emotions. It is an efficient system for solving accidents.

From the above conducted examination and analysis, we conclude that our system has various sensors.

The system prevents accidents by monitoring various conditions such as red light detection, detection of emotions of driver and more. Implementing this system in your vehicle ensures that our loved ones are safe. It is efficient in terms of both the parameter as well as performance.
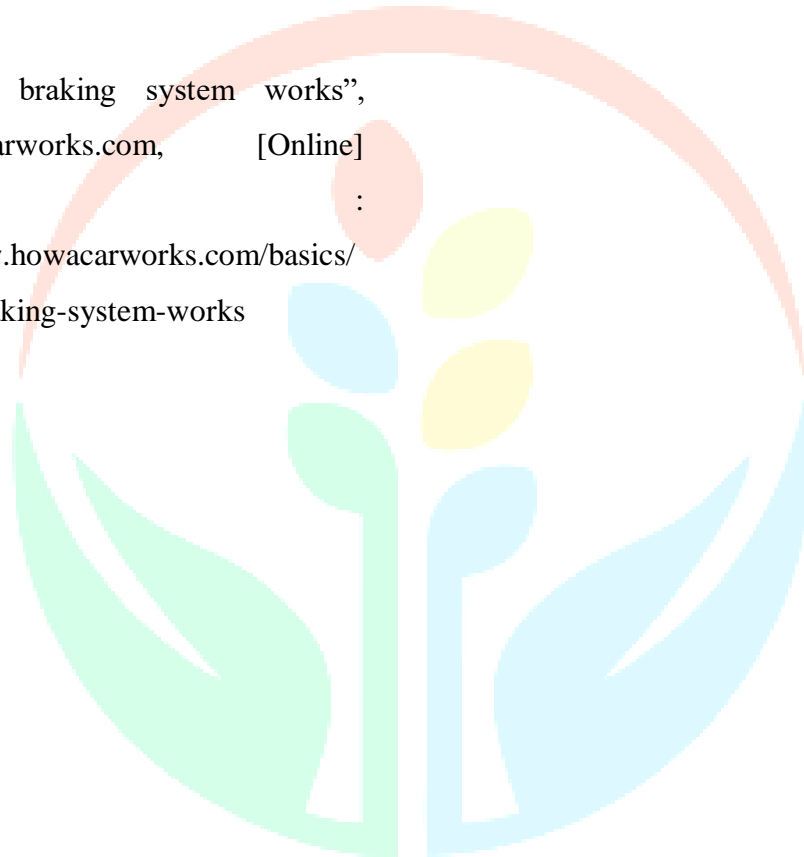
9. REFERENCES
JOURNAL REFERENCES:

[1] Sarasvathi, Nahalingham and Fong, Jason Zu XiN (2018) "Study and Implementation of Internet of Things (IoT) Based Vehicle Safety Alert and Tracking System" - INTI Journal, 1 (10). pp. 1-11. ISSN e2600-7920.

[2] Vijay Savania, Hardik Agravata and Dhrumil Patela "Alcohol Detection and Accident Prevention of Vehicle" - International Journal of Innovative and Emerging Research in Engineering Volume 2, Issue 3, 2015.

[3] Aishwarya S.R, AshishRai, Prasanth M.A, Savitha S.C "An IoT Based Accident Prevention &Tracking System For NightDrivers" ISSN 2320-9801 Vol.3, Issue, 4 April 2015.

WEBSITE REFERENCES:

[1]. "Road Traffic Injuries", World Health Organization (WHO), [Onine], Available : https://www.who.int/news-room/fact-sheets/detail/road-traffic-injuries

[2]. "How the braking system works", www.howcarworks.com, [Online] Availabe : https://www.howacarworks.com/basics/how-the-braking-system-works