

## Revolution In Travelling With Intelligent Road Safety System

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**Abstract::** Every year there are thousands of highway accidents and serious injuries due to "Run-Off-Road". In most of the cases crashes occurs either due to carelessness or due to lack of road safety awareness. Various modules can be installed inside vehicles, embedded with various features to improve the safety of road. The features that are proposed in the project are automatic collision notification, sign board notification system which notifies driver about controlling of speed in different zones, no honking notification, smart overtaking system for other vehicles specially on single lane roads and Alcohol detection system which detects drunk driving. This all are the features which together can give impetus to an efficient road safety system

**Keywords** –Android, App, Bluetooth, Controller, System, Ultrasonic, Road safety, Embedded System, Collision Notification, GSM (Global System for Mobile Communication), GPS (Global Positioning System).

### I Introduction

India is committed to reduce the number of road accidents and fatalities by 50 per cent by 2020. However, with one of the highest motorization growth rate in the world accompanied by rapid expansion in road network and urbanization over the years, country is faced with serious impacts on road safety levels. The total number of road accidents increased by 2.5 per cent 2014 to 2015. The total number of persons killed in road accidents increased by 4.6 per cent in 2014 to 2015. Road accident injuries have also increased by 1.4 per cent in 2014 to 2015. Drivers' fault has been revealed as the single most responsible factor for road accidents, killings and injuries on all roads in the country over a long period of time. Thus as we know that there are thousands of highway deaths and tens of thousands of serious injuries due to "Run-Off-Road" accidents each year. The major reason found for the Road Accidents and severe Injuries over the year are inattentiveness of the driver to drunk driving. During the calendar year 2015, in India the total number of hit and run cases was reported as 57,083, which is 11.4 per cent of the total road accidents as compared to 10.9 per cent in 2014. The number of persons killed due to hit and run cases were reported as 20,709 which is 14.2 per cent of total persons killed in total road accidents in 2015.

Currently Road safety systems are available in high end luxury cars such as Audi, Mercedes Benz etc. But the problem is normal average person cannot afford to buy such luxurious so the project makes the average car a smart car, having various safety features such as Automatic collision notification, Red light traffic notification, Alcohol detection, speed limit notification in various zone and smart overtaking. The project tackles some major causes of road accidents such as breaking traffic signals and drunken driving. It also has a major objective of exercising road discipline such as speed control in different areas and horn control in horn prohibited zones. The requirement of embedded systems is the need of the hour in developing countries & especially with the grim statistics of India, the need is imminent. Thus incorporation of these features should be mandatory in all cars in the near future without cutting into the customer or the manufacturer's pockets.

Due to various distractions and low visibility the sign boards in various zone can not be seen driver so in the vehicle Speed Control notification in Various Zone feature, the speed of the vehicle is notified in different areas such as flyovers, bridges, highways, schools, cities and internal areas via RF transmitter and receiver so driver can control speed accordingly. In Red Light Traffic notification feature the driver is notified on traffic signal, when signal is red the driver get notified even when signal is not visible due to various distraction or disturbance.

During worst accident cases driver and people inside the vehicle get seriously injured and many times they are not in consciousness to share their location which can be really dangerous for their life, so with the help of automatic collision notification feature in RITWIR system will send the location on accident to nearest police headquarter and relative.

Alcohol detection and key ignition Control is one of the best feature, alcohol sensor MQ-3 senses the alcohol working if the driver breathes into it and a significant quantity of alcohol is detected if alcohol is found RITWIR prevents the ignition key.

The last feature is smart overtaking, If you're on a single-lane highway or road, it can be a nightmare. Even though the truck is driving relatively slowly, you cannot overtake it due to its size, and because you cannot see what is happening in front of the truck. However, Samsung has developed a solution that may make this problem a thing of the past. The Safety Truck consists of a wireless camera attached to the front of the truck, which is connected to a video wall made out of four exterior monitors located on the back of the truck. The

monitors give drivers behind the truck a view of what is going on ahead, even in the dark of night. This allows drivers to have a better view when deciding whether it is safe to overtake. Another advantage of the Safety Truck is that it may reduce the risk of accidents caused by sudden braking or animals crossing the road so in RITWIRS tft and vga camera is used.

## II Litratue

embedded system in passenger car for road safety presented by amit Kumar tripathy in travalution paper [1]. The features which are proposed in that paper for road safety are , Automatic collision notification that gives notification to the victim’s relativs Red light traffic control makes sure vehicle doesn’t break signal, Speed control alters speed in different zones, Horn control prevents honking in horn prohibited zone,

In practical we can not give all the controls to the automatic system in case of many real life events, for example if there occurs some medical emergency so ambulance won't be able to speed up more than the speed limit specified to zone or can not break signals, so in Revolution in Travelling with Intelligent Road Safety (RTWIRS) System controls are not automated ,driver will only get notification of traffic signal and speed limits in various zone.

There are some more new innovative feature such as automatic collision detection and notification system in which relatives of the accident victim and police control room will notified via GSM about location of the accident.

other features represented in RTWIRS are prevention of key ignition while driver is under alcohol influence this feature is made by modifying idea of Road Traffic Safety Solution by Ovidiu Stan [3] which has an irritating/annoying sound warning system to drunk and drive , after modifying that, with irritating noise the key ignition also be prevented in RTWIRS.

An ultra-sonic sensor based blind spot accident prevention system (BSAP) which is represented by [4] R. P. Mahapatra it has blind spot detection device for protection against misshapeness such as automobiles collisions, and accident that leads to great loss of human lives and can have disastrous results.The technology presented in this paper works by detecting the other automobiles and obstacles. When no obstacle is detected, the device triggers a timer that delays the activation of alarm circuitry for a brief period of time. If the obstacle’s presence is still detected after the delay time, LED’s and audible alarms are triggered to alert the system operator of the dangerous situation. The alarms remain activated for a time period, allowing the operator to clear the hazard zone. [4]

last feature is for safety on one way road for overtaking vehicles. If you’re on a single-lane highway or road, it can be a nightmare. Even though the truck is driving relatively slowly, you cannot overtake it due to its size, and because you cannot see what is happening in front of the truck.However, Samsung has developed a solution that may make this problem a thing of the past.The Safety Truck consists of a wireless camera attached to the front of the truck, which is connected to a video wall made out of four exterior monitors located on the back of the truck. The monitors give drivers behind the truck a view of what is going on ahead, even in the dark of night. This allows drivers to have a better view when deciding whether it is safe to overtake. Another advantage of the Safety Truck is that it may reduce the risk of accidents caused by sudden braking or animals crossing the road so in RITWIRS tft and vga camera is used.

## III Block Diagram

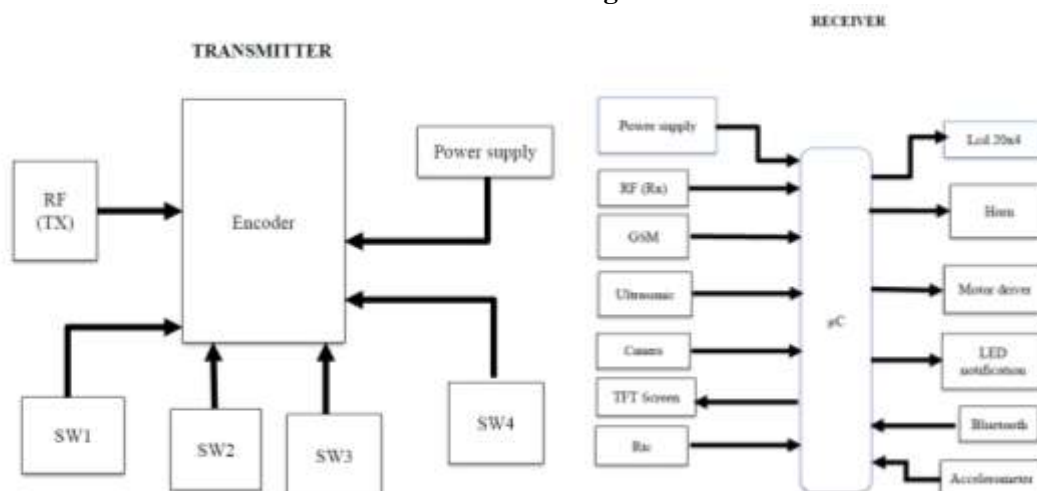


Figure 1(block diagram)

#### **IV Methodology**

This system consist of two part transmitter & receiver section. Sign Boards consists of RF transmitter for transmitting data coming through encoder in form of RF signals, for simplicity we are cascading various type of sign boards on a single transmitter encoder system. The transmitted signal is received by the RF receiver mounted on the vehicle which is further given to decoder to obtain the desired signal so as to indicate through led notification present inside the vehicle to alert the driver. There are other various application embedded such as Accelerometer is use to detect if the car has meet with an accident , if the coordinates is not as expected it sends SMS to the relative through Gsm model, Ultrasonic sensors is used to detect any obstacle present in the way of car, Alcohol sensor module is use to detect the presence of alcohol and prevent the ignition key from working, LCD display is used to displays real time, ultrasonic data, alcohol value; Camera is mounted in front of vehicle to display the front view at the backside of the vehicle by means of TFT Screen which might be useful for the another vehicle which wants to overtake.

#### **V Hardware Design**

##### **RF tx/rx module**

The transmitter/ receiver (Tx/Rx) pair operates at a frequency of 434 MHz. RF transmitter receives serial data and transmits to the receiver through an antenna which is connected to the 4th pin of the transmitter. When logic 0 applied to transmitter then there is no power supply in transmitter. When logic 1 is applied to transmitter then transmitter is ON and there is a high power supply in the range of 4.5mA with 3V voltage supply

##### **HT12E & H12D**

HT12E is an encoder integrated circuit of 212 series of encoders. They are paired with 212 series of decoders for use in remote control system applications. It is mainly used in interfacing RF and infrared circuits. The chosen pair of encoder/decoder should have same number of addresses and data format.

##### **Accelerometer**

The MPU6050 contains both a 3-Axis Gyroscope and a 3-Axis accelerometer allowing measurements of both independently, but all based around the same axes, thus eliminating the problems of cross-axis errors when using separate devices. Accelerometer ranges are:  $\pm 2$ ,  $\pm 4$ ,  $\pm 8$ ,  $\pm 16g$  , Gyroscope ranges are :  $\pm 250$ ,  $500$ ,  $1000$ ,  $2000$  °/s Voltage range: 3.3V - 5V (the module include a low drop-out voltage regulator)

##### **Alcohol sensor**

This module is made using Alcohol Gas Sensor MQ3. It is a low cost semiconductor sensor which can detect the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. The sensitive material used for this sensor is SnO<sub>2</sub>, whose conductivity is lower in clean air. It's conductivity increases as the concentration of alcohol gases increases

##### **Ultrasonic sensor**

ultrasonic sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm. Module includes an ultrasonic transmitter, a receiver and a control circuit. The module communicates with the microcontroller using two pins named Trigger and Echo.

##### **Bluetooth Module**

The HC-05 module is easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. This serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband

##### **Tft screen**

TFT stands for thin-film-transistor. Every pixel on a TFT LCD has its own transistor on the glass itself, which offers more control over the images and colors that it renders. Since the transistors in a TFT LCD screen are so small, the technology offers the added benefit of requiring less power.

##### **Vga camera**

The OV7670 CAMERACHIPTM is a low voltage CMOS image sensor that provides the full functionality of a single-chip VGA camera and image processor in a small footprint package. The OV7670 provides full-frame, sub-sampled or windowed 8-bit images in a wide range of formats, controlled through the Serial Camera Control Bus (SCCB) interface.

## **VI Software**

### **Arduino IDE**

arduino IDE, supports C and C++ programming languages using special codes. It comes with many library to support different arduino boards and hardware, we can insert any library compatible to the Arduino, AVR microcontrollers and manipulate hardwares, every arduino and compatible boards comes with special bootloader to support flash file from Arduino IDE.

## **VII Future Scope**

- DIP(Digital image processing) can be used instead of RF(Radio Frequency) to handle Feature related to Sign Boards
- The full self-driving system will utilize all side cameras, allowing it to find the optimal route to your destination. It can also navigate urban and rural streets, even ones without lane markings
- Autopilot hardware drive itself completely autonomously

## **VIII Conclusion**

With the RITWIRS project, a cost effective embedded system has been successfully implemented which helps in the field of road safety and road discipline. The project tackles some major causes of road accidents such as breaking traffic signals and drunken driving. It also has a major objective of exercising road discipline such as speed control in different areas and horn control in horn prohibited zones.

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