

# INTELLIGENT VEHICLE WITH ACCIDENT PREVENTION

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**Abstract**—The density of vehicles are increasing as the population and life standards of people increases. Many of the accident victims die on the spot or on their way to hospitals. Timely intervention by paramedics and relatives may help save their lives. The objective of this system is to provide a solution for helping these accident victims. A System is designed to work automatically without any human interference. This will especially useful in cases when an accident occurs in a remote place or at night. This can also be helpful at time of emergencies like heart attack, getting lost, etc., where the driver or co-passenger can inform others about their location for help .This project aims to automatically locate the site of accident and alert concerned people. This system includes three modules: security enabling module, speed control module, accident detection and information sending module. Automatic speed control module includes RF transmitter placed in specific location such as school zones, college zones etc and RF receiver in the vehicle. Accident detection and information sending module includes GSM and GPS technology. Security enabling module includes sensory units which ensures the condition of the driver. This module includes alcohol sensor and eye sensor and smoke sensor. . Then the data regarding the location of the motor cycle is acquired using GPS module .And then this information is send to some previously set phone numbers using GSM modem[2].

**Index Terms**— accident system; sensors; GPS; GSM.

## I.INTRODUCTION

Vehicle accident are mainly caused by over speed of vehicles. Many lives could have been saved if emergency service could get accident information and reach in time to the accident spot without much delay[11]. Our lives has made more easy with the rapid growth of technology and infrastructure.

Because of the poor emergency facilities, huge loss of life and property occurs due to the road accidents take place frequently. The growth of technology has increased traffic hazards a lot[6]. Our system will provide an optimum solution to this draw back by using sensors, GPS GSM,RF transmitter and receiver. This project aims to automatically locate the site of accident and alert concerned people and also to prevent accident with speed control and security enabling techniques. Transmitting of alert message should be done automatically as the person involved in the accident may not be in a state to send the information.

## II.OVERVIEW OF THE SYSTEM

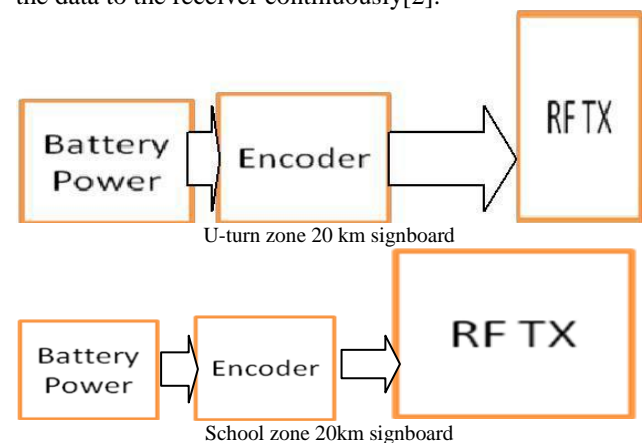
In this design process, three modules were used: automatic speed control module, accident detection module and security enabling module. In automatic speed control module the RF transmitter and RF receiver are to be used. The RF transmitter is placed in a specific location and RF receiver is placed in vehicle..When the vehicle reaches the zone like school zone or U turn, it will automatically reduce the speed. In information sending module GSM, GPS and sensors are used. In this system, piezoelectric sensor, GPS and GSM is placed in the vehicle If any accident occurs , the accident information system will get activated. Message will be transmitted.

Security enabling module includes eye sensor, alcohol sensor and smoke detector which will ensure the security condition of the driver. The main cause of accident is due to the driver drowsy and tired condition, which will be noticed by the help of eye blink sensor which will continuously monitor the condition of the driver and buzzer sounds when the driver falls asleep[2].

## III. PROPOSED METHOD

### A .TRANSMITTER DESIGN

Transmitter module is placed in the specific zone. Transmitter and receiver both operate at a frequency of 430 MHZ. transmitter receives data serially and sends the data to the receiver continuously[2].



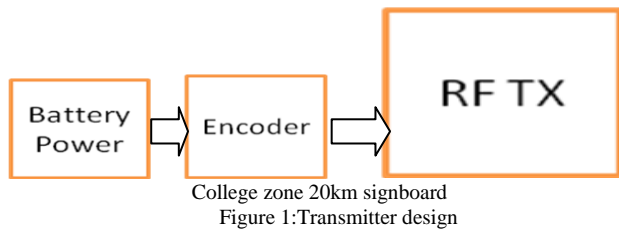


Figure 1:Transmitter design

### B.RECEIVER DESIGN[PROTOTYPE]

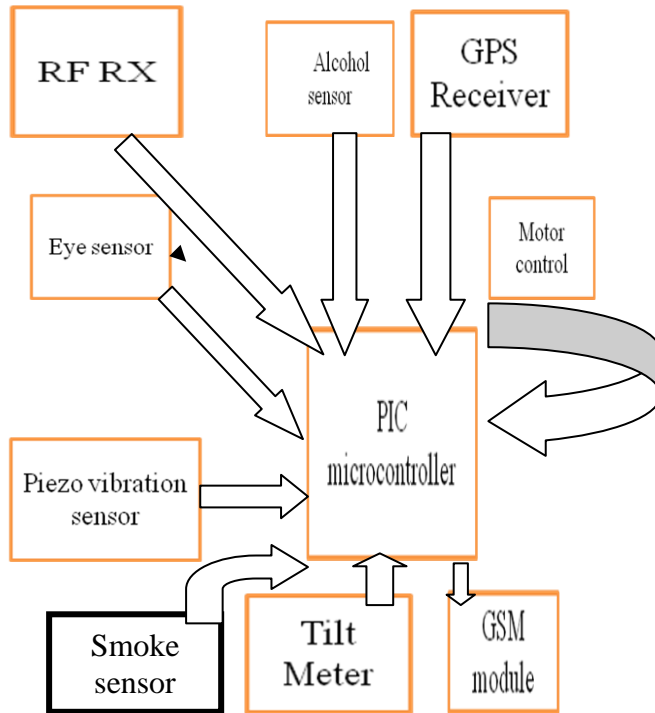


Fig 2: Receiver Design

Fig. 2 shows the receiver prototypic design. The Radio Frequency(RF) module consists of RF transmitter and RF receiver. The RF module has an encoder in transmitter and decoder in the receiver. The encoder is used for encoding the parallel data for transmission while the reception is decoded by decoder in the receiver. The RF receiver is connected with PIC microcontroller. The RF receiver will be always in listening state, if it receives any signal of same frequency as of receiver, it will automatically indicate the micro controller which in turn reduces or limits the speed of the vehicle until the vehicle leaves that particular zone. From this, the accident in school and college zone will get reduced. The three main steps are identifying the accident, locating the position and transmitting the information for help. There are certain parameters that change during accidents which can be detected using sensors that measure these changing parameters .The position of the accident is located using GPS data as it is freely available with the help of satellites, and this information about the location of the vehicle is sent through the GSM network.[2] Accidents in motor cycle include head-on collision, collision on the sides or from the back, and losing control after skidding. Usually the rider is thrown from the seat and the vehicle falls down. Keeping in mind all these possibilities, we

decide the parameters that should be measured to confirm the occurrence of an accident. If an accident has occurred the tilt sensor will sense the tilt occurred if value is greater than ten or lesser than ten of the normal value to the ADC. If a collision has occurred then piezo vibration sensor will produce an analog voltage which is directly given to the microcontroller, it indicates the occurrence of an accident. At the same time, when accident happens, with GPS the latitude and longitude of that particular location is obtained. And with that the exact location of the accident site is determined. And here, GSM modem SIM900 is interfaced with microcontroller. So that, when accident happens, the SMS will be sending automatically to the particular numbers which would be entered in the database. So with this system rescue operation can be made faster. The SMS will have the latitude and longitude of the place where the accident has occurred and hence the alert obtained people including relatives, ambulance services, police control room members can reach the spot soon when every golden second counts[7] .In recent days most of the accident occurs due to drunken driver and drowsy condition of the driver. Before the vehicle starts the driver will be checked by the alcohol Sensor. Also if the driver is in drowsy condition ,it will provides alarm with the help of buzzer[2].

### IV.WORKING OF THE SYSTEM

Whenever a person sits in driver seat of a vehicle, the system checks for following parameters with the driver. The alcohol sensor - checks if the person has consumed alcohol or not. The eye sensor ensures that the person in driver seat does not fall asleep. When the vehicle reaches the zone, it will reduce the speed. If an accident has occurred ,the piezoelectric sensor provides a high value and it indicates the occurrence of an accident. Location of motor cycle is acquired using a GPS system. This information along with the details of the vehicle is send[2].

#### A. Alcohol Sensor

MQ3 sensor can be used for alcohol detection. Sensitive material of MQ3 alcohol sensor is SnO<sub>2</sub> which has lower conductivity in clean air .When the target alcohol gas exist, the conductivity of sensor gets higher value. When a driver is drunk and tries to sit on the driver seat of a vehicle, then the MQ3 alcohol sensor detects the presence of alcohol and the car wouldn't ignite until the alcoholic person is replaced by a normal person[3]

#### B. Eye Sensor

IR sensor is used for drowsiness detection. It measures and controls the eye blink .The Infra Red (IR) transmitter is used to transmit the infrared rays in our eye. The reflected infrared rays of the eye is received by IR receiver. If the eye is closed, output of IR receiver is high ,otherwise the output is low. If continuous high output is obtained and after a certain delay, then the controller will understand that driver suffers from drowsiness. This is to know the condition of the driver's eye. This output is given to logic circuit to indicate the alarm[3].

### C. Smoke Detector

The MQ-2 smoke sensor is sensitive to smoke and to inflammable gases such as LPG, Butane, Propane, methane, alcohol, and hydrogen. The voltage of the sensor outputs changes accordingly to the smoke that exists in the atmosphere. The sensor outputs a voltage that is proportional to the concentration of smoke. The greater the concentration, greater the output voltage and if the concentration is less, lesser the output voltage.

### D. Speed control

Speed control is with the help of RF transmitter and RF receiver. RF transmitter is placed in specific zones such as school zone, college zone, U turn etc and RF receiver is placed in the vehicle. RF receivers are placed just near and before to the zone. When the vehicle reach this zone, the driver gets the alert and if he doesn't reduce the speed then automatically speed will be reduced to 20km/hr.

### E. The Information Detection Module

GY-axl 335 is the accelerometer sensor used here. For most applications, a single 0.1µF capacitor, CDC, placed close to the ADXL335 supply pins adequately decouples the accelerometer from noise on the power supply. The ADXL335 is a small, thin, low power, accelerometer with signal conditioned voltage as outputs. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, and vibration. The ADXL335 is a small, thin, low power and complete 3-axis accelerometer with signal conditioned voltage outputs[13].

### F. GPS Location Module

The SkyNav SKG17A1 is a complete GPS engine module that has features such as super sensitivity, ultra low power and small form factor. The GPS signal is applied to the antenna input of module, complete serial data message with position, velocity and time information is presented at the serial interface with Universal Asynchronous Receiver Transmitter (UART) protocol[14].

### G. Message Transmission Modem

The SIM900 is a complete Quad-band GSM solution in a Surface Mount Technology (SMT) module which can be embedded in the customer applications. Featuring an industry-standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form factor. The power consumption of SIM 900 is very low [15].

## V. SOFTWARES USED

Mainly I used three softwares for the implementation of my project.

- A. mikroC
- B. Proteus
- C. OrCAD

### A. mikroC

*mikroC PRO for PIC* is a full-featured ANSI C compiler for PIC devices from Microchip. It is the best solution for developing code for Peripheral Interface Controller devices. It features intuitive Integrated Development Environment (IDE), powerful compiler with advanced optimizations, lots of hardware and software libraries, and additional tools. Compiler comes with comprehensive Help file and lots of ready-to-use examples designed to get you started in no time. Compiler is designed to be smart and efficient, so we can rely on it to do the hard work. It features four levels of optimizations that can reduce our code size up to 20% [12].

### B. Proteus

Proteus is a Virtual System Modeling and circuit simulation application. The suite combines mixed mode Simulation Program with Integrated Circuit Emphasis (SPICE) circuit simulation, animated components and microprocessor models to facilitate co-simulation of complete microcontroller based designs in it. Proteus also has the ability to simulate the interaction between software running on a microcontroller and any analog or digital electronics connected to it. It simulates Input / Output ports, interrupts, timers, USARTs and all other peripherals present on each supported processor. In proteus software, there is a series of procedures to be followed such as movement and orientation, zooming and snapping, wiring up and loading the hex file.

### C. OrCAD

OrCAD is a software tool used for electronic design automation (EDA). It is used to create electronic schematics and electronic prints for manufacturing printed circuit boards. OrCAD PCB designer consists of various automation features for PCB design, board-level analysis and design rule checks [16].

## VI. DESIGN PROCESS

The RF transmitter is used for the transmission of data at the rate of 1 to 10 kbps. It will operate at a frequency range of 430 MHz. RF transmitter is placed in specific zone and RF receiver is placed in the vehicle. The RF receiver also works with same frequency. The transmitted data which is sent by RF transmitter is received by the receiver and is validated. Piezoelectric sensor (vibration sensor) is connected to the port A, which will provide analog value to the ADC port of controller. The GSM is interfaced to PIC microcontroller. PIC controller used here

is PIC16f877A. The GSM will communicate via the UART communication through RS232 standard[2].

## VII. CONCLUSION

Accidents are the major cause of death nowadays. Most of the accident victims die on the spot or on their way to hospitals. Accidents which occur in remote place at night and other emergency condition can be solved by using this system. This study solves the issues like automatic speed control mechanism, accident detection and information sending. From this we conclude that this system will reduce the accidents and save the human lives. On the whole this system proves to be very cost effective and efficient. The experimentations and results prove that the system is easily implementable in real time. Location of the place is achieved using GPS and the message is sent to some previously set phone numbers of relatives, police control room, ambulance services etc. So time for arrival of aid will decrease and many lives can be saved[7].

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