# LONG RANGE COMMUNICATION OF MECHATRONICS ARCHITECTURE IN SOLS TECHNOLOGY USING IOT

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## ABSTRACT

**Now a day's DLRC (Dedicated long range communication) plays a vital role in safety applications, commercial vehicle applications, emergency warning systems for vehicle. It is one way or two way long range to medium range communication. DLRC adopts codes such as IOT. The codes are used to achieve dc-balance and signal reliability. This codes seriously limits the potential. The similarity oriented logic simplification technique (sols) is used here to overcome the limitation and also used to improve the hardware utilization rate. By using this two code power, delay, and area can be reduced. The proposed architecture will have less delay area as compared to existing architecture. Accidents became common in these days, particularly for large vehicles due to prolonged driving periods. Fatigue, drowsiness and sleepiness are major causes of accidents. The critical factor for driving safety is fatigue. Accidents might be due to any obstacles Collision or due to Road humps etc. So to avoid this, many research works are going. Hence to over come this problem, the proposed methodology is going to develop SOLS technique so that many lives can be saved. The system consists of sensors and processor. Where an ultrasonic sensor is used to sense obstacles collision and accelerometer is used to sense the variation of the vehicle's position and also detect the jerks. The condition of the vehicle can be monitored and controlled through IOT.**

**Keywords: Ultrasonic sensor, Accelerometer, Arduino, temperature sensor, IOT board**

## I. INTRODUCTION

Each day, hundreds of highway passage accident take place from corner to corner of the country. In fact, statistics show that there are more than 10 motor vehicle-related deaths per day in state alone, many of which are preventable. Road accidents occur for a variety of reasons. Over and over again, drivers are sidetracked although in the wake of the wheel, intriguing their focal point missing from the road. Sometimes, accidents transpire for a amalgamation of reasons, commencing bad visibility to perilous road design, or supplementary drivers be deficient in caution. While the causes of accidents can vary, the consequences are often the same, resulting in everything from vehicular and property damage to serious injuries. Some of the major reason for a road crashes are as follows

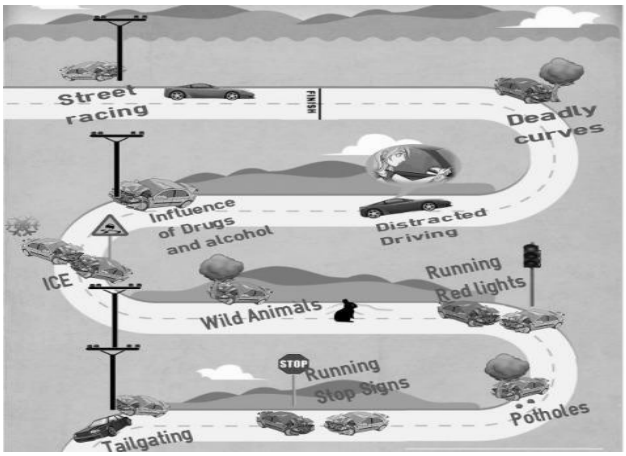


**Figure 1: Causes of road accidents**

Now day's the rate of road accident have been increasing day by day. Virtually 1.25 million people die in road crashes each year, on average 3,287 deaths a day in world. In many such cases, the cause for the accident is driver distraction and failure to react in time, over

speeding. Commonly a car footbrake system operated by hand as the driver set in motion the brake bar. Therefore, to overcome this problem, a smart braking and monitoring system will be implemented to avoid such accident[9].

There are many researches for the obstacle detection using various sensors in intelligent vehicle systems, since the obstacle detection is an important issue in vehicle field. An barrier prevention vehicle is an intelligent device, which can automatically sense and overcome obstacles on its path. Barrier prevention is a mechanized order with the objective of moving vehicles on the basis of the sensory information. The use of these methods front to typical methods (path preparation) is a natural substitute when the situation is dynamic with an unpredictable behavior. In these cases, the surroundings do not remain invariable, and thus the sensory information is used to detect the changes consequently adapting moving. The critical factor for driving safety is fatigue. This main aim in our project is to control the vehicle speed automatically by using sensors and monitoring the vehicles, controlling the vehicles in remote locations[3].

This project includes the system which is going to control the accidents on time due to sensors. The system mainly consists of sensors and processor[6]. The main objective is to avoid the accidents so the ultrasonic sensor is fixed to vehicles so that it can detect continuously the obstacles and road humps. Accelerometer will detect the variation of the vehicle's position and also detect if any jerks happens.

## II. METHODOLOGY

### A. Block Diagram

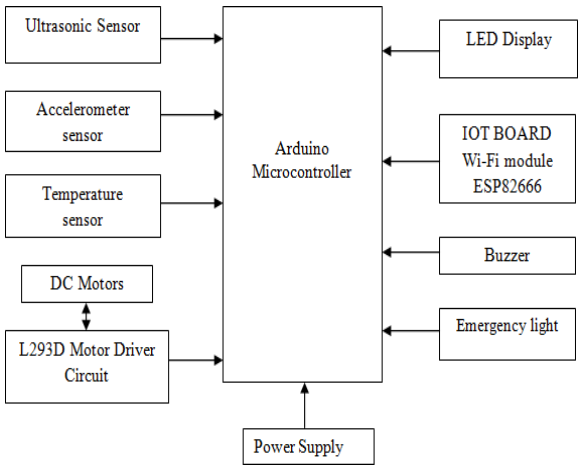


**Figure 2: Block Diagram of Project**

The accidents will happen not only because of drivers but also due to obstacles comes to vehicle and unknowing the presence of humps. So to overcome this, ultrasonic sensor and accelerometer are used in this project. Ultrasonic senor will be fixed to the vehicle. So that it will continuously monitor any obstacles comes to vehicle. Ultrasonic sensor senses the obstacles up to some distance[2][4]. Then the signal passes to controller and immediate message or signal is passed to driver and also automatically speed will be reduces and stop the vehicle so that one can avoid the accident[1]. Similarly, accelerometer is fixed so that it can detect the driver position continuously. If any variation in position due to accidents or due to some jerks, it will detect by this accelerometer and immediate signal can be passed to driver and automatically reduces the speed of wheels. If any hump is on road, drivers cannot know it before and suddenly they can't apply break so there might have a chance of accident. So to avoid this, ultrasonic sensor is going to fix. This ultrasonic sensor will detect the height of the road continuously[2][4]. It detects in straight path. If any difference in height, it will automatically detect that there is hump on road and send it to the controller. Controller sends signal to the driver through buzzer or any display on LED.

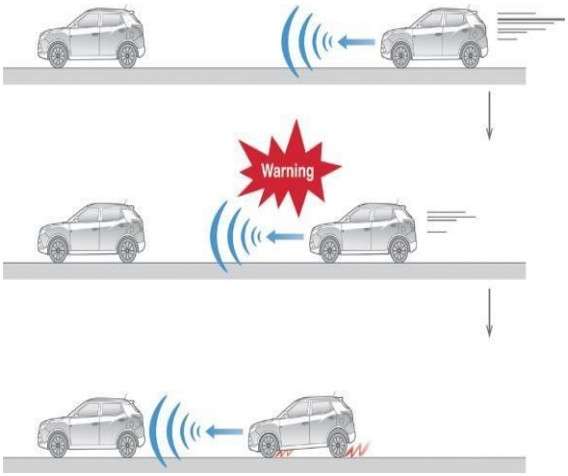


**Figure 3: Working principal of the project**

## B. Flow Chart

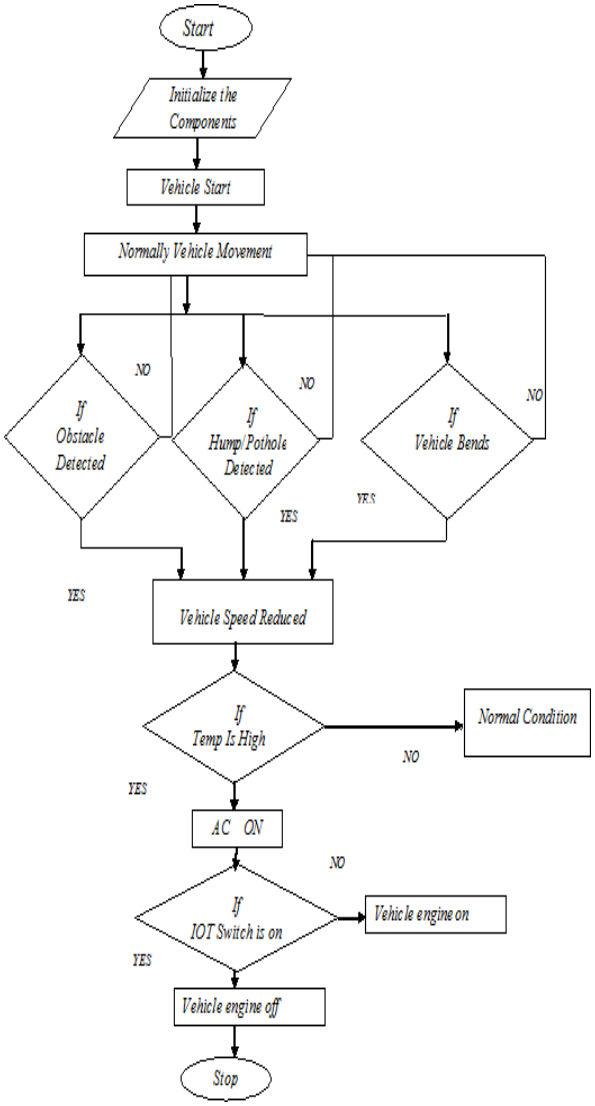


**Figure 4: Flow chart of the Project**

- In the initial conditions both the transmitter and receiver can be connected and gives the power to Microcontroller. Both the Sides power is ON then start the functions.
- When the power is ON, the system is initializing the components then it ready to perform the specific tasks. It checks the condition and vehicle gets started.
- At Normal conditions vehicle starts and it moves in normally vehicle movements.
- The system sensors continuously monitors the vehicular movement if any variation occurs in the vehicular movements then signals get transmitted through by corresponding sensors, and then the controller checks the some threshold conditions and intimates the driver through by Signal or LED display.
- Firstly Ultrasonic sensor checks the condition of obstacle detection by continuously monitoring the vehicular movements and distance, if the obstacle detected within the surveillance then first it sends the warning signal to driver through sensor and controller and simultaneously it reduces the speed of the vehicle.
- Normal the system is consciously monitors the vehicular movement if any pothole or hump are detected in road then the speed of the vehicle is reduce, if not vehicle movement with normal speed
- Similarly it checks for the vehicle bend condition or tilt angle condition due to some jerks and skids of the wheels the system here continuously monitors the position of driver if any variation in the position of drive the automatically reduces the speed of the vehicle if not the vehicle movement carried out normally
- If humidity inside the vehicle is increased it automatically switch on the air conditioner, if not it remains in the normal condition.
- The system checks for the IOT switch condition ,if it is ON then vehicle engine is On and it start the vehicular movement and vehicle start moving ,if not then engine is off and its stop the movement of vehicle.

This describes the overall functions of the system, number of applications can be added in the SOLS technology because it is a user friendly for all applications[5].

## III. HARDWAREREQUIRED

A. Arduino Unoboard:

Arduino consists of both a physical programmable circuit board and a piece of software, or IDE (Integrated Development Environment) that runs on computer, used to write and upload computer code to the physical board.

B. Ultrasonic sensor:

Ultrasonic sensors are used to measure the distance of an object using ultrasonic sound waves. It is used for the detection of obstacle in front of vehicle

C. Temperature sensor:

Temperature sensors are used to measure the temperature inside a vehicle.

D. 3-Axis accelero meter sensor:

A 3-axis accelerometer is used to measure the angle of inclination of the wheel in order to provide the data about when the car is static and when the car is in motion.

E. DC motor and motor driving circuit:

DC motors are used for the movement of wheels in our prototype. DC motor is one type of motor that uses the DC current to convert from electrical energy into mechanical energy.

A motor driver is an integrated circuit chip which is usually used to control motor. Motor driver acts as an interface between arduino and motors.

F. LEDdisplay:

LED display is commonly used to display the data in devices.

G. Wi-Fi module:

Wi-Fi ESP8266 module is low cost standalone wireless transceiver that can be used for end-point IOT developments.

H. IOT board:

An IOT microcontroller unit (MCU) or development board is a prototyping solution that features low-power processors which support various programming environments, collect sensor data using firmware and transfer it to an on-premises or cloud- based server.

I. Chassis and connecting wires

• Expression for Distance measurement:

We know that

S=VT

Where, S=Total distance(2d)

V=Velocity of the sound wave in Sensor=340m/s T=time

So equation becomes

2d=VT

d=VT/2

• Graphs:

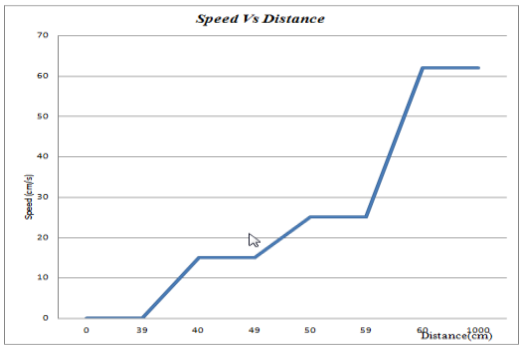


**Figure 5: Measured speed Vs distance data**

## IV. SOFTWAREREQUIRED

IDE Software to program the ARDUINO:

The Arduino have its own relevance software that enables the programmer to download and upload programs and supplementary functionalities such as debugging. This software uses C language seeing that the indoctrination language for the Arduino as shown in figure 6.


Figure 6: Arduino IDE Software

## V. RESULTS AND ANALYSIS

Assembling the various components, the whole experimental setup is as shown in the following figure.

Figure 7: Experimental Set up (Output model)


Figure 8: Output in serial Monitor

## VI. CONCLUSION

In this paper we proposed and implement the accident avoidance system due to some reason such as obstacle collision, potholes and hump collision and due to variation of vehicle position. Using this prototypewe can avoid many accidents and also we can avoid vehicular damage. The system comprise, very low cost components such as ultrasonic sensor, Accelerometer sensor, temperature sensor, IOT board, LED. Hence by this we can reduce the accidents by controlling the Speed of vehicle and theft control of vehicle through remotely can bedone.

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