

Accident avoiding system using the IoT

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Abstract: According to the survey from the road safety department the accidents are more due to long vehicle, fatigue, tiredness of the driver while driving. The existing systems are able to detect the accident using face detection, blinking rate of eyes etc but its hard to predict that the accidents will happens only by these means. Hence we are proposing a method which uses the accelerometer, IoT. The accelerometer is used to detect the co-ordinates change of the vehicle. IoT is used to transfer the information of the accident to their guardian using the internet. The proposed method similarity oriented logic simplification technique (sols) provides the efficient solution in saving the life during accidents.

Keywords: Accident, IoT, SOLS, collusion detection and alerting system.

I. Introduction

The DLRC is a protocol simplex or duplex range communication in the modern automotive industry. The DLRC mainly used for intelligent transportation systems. It can be briefly classified as vehicle to vehicle and vehicle to road-side communications. The DLRC can provide an inter communication between automobiles and road-sides for safety issues and public information announcement. These safety message include blind-spot, collision-alarm, inter cars distance etc

Now a day, the use of autonomous vehicles is growing in various applications such as manufacturing, hazardous materials handling, surveillance, etc. An autonomous vehicle (driverless vehicle, self-driving vehicle, robotic vehicle) is a vehicle that is capable of sensing its environment and navigating without human input. Autonomous vehicles are machines that are capable of reaching the target with autonomy or performing a job or set of jobs with intelligence. An autonomous vehicle needs to be developed to allow the vehicle to reach the desired destination using tracking and obstacle detection schemes. The ultrasonic sensor is mainly used for detecting obstacles and measuring distance between robot and objects.

To make daily life more easy and effortless, we have to take the help of technology may be autonomous or manual. But life of human being can be smoother if the technology becomes hands free. If human can control machines totally by their voice, gestures and other activities, then interactions will be easier. There are many high tech bots which can do these things but still normal people are still far away from that types of technology mainly due to high price of that products. Our target is to make low cost smart products which can easily be bought. Not only that but also it will be easier to operate that types of machines. Our dream is to make such kind of bots which will make have wires and circuits but acts like personal assistant in more realistic way.

The work which are carried upon from the researchers are as follows,

The paper [1], proposed a method used for Micro-controller Based obstacle avoidance System using ultrasonic sensor. It detects the obstacle in front of vehicles and indicates but in this proposed system we are implementing if any obstacle is detected automatically vehicle speed will reduced. But it won't stops; it keeps on moving with lower speed. So if it detects any obstacle in front of the vehicle, sends the data to the micro-controller and encodes that data.

In Paper [3], proposed a system to detect obstacle avoidance robot using Arduino and detect abnormal behavior. The Sensors are installed vehicles for monitoring using Wi-Fi. The data are also pre-processed in

the system. Self driving is another governing factor which is attributed with the ultrasonic sensor that helps the machine to measure the differences of distance between the obstacle and itself. Another striking of the project is, it can recognize the command of the user. In other words it's a voice controlled robot.

In paper [6], proposed Antitheft security system utilizes an embedded system design with Dual Tone Multi Frequency (DTMF) and a GSM to monitor and safeguard a car. It secures the car against theft. Upon activation, it automatically demobilizes the car by disconnecting the ignition key supply from the car battery. This now makes it impossible for anybody so starts the car, let alone moving with it. In an attempt of theft through the car doors or boot, the system sends text message to the car owner and at the same time starts up an alarm. This design popped out due to the increasing rate at which packed cars are stolen especially in our country, but with this design this packed car is being monitored irrespective of where it is packed, provided there is GSM network coverage.

In paper [2], proposed Intelligent Accident Identification System Using GPS, GSM Modem. This technique eliminates GSM here in this project IOT systems are used to monitor and controlling the vehicles in remote location. GPS will able to track the location of the vehicle and send that information to the concerned person. This project includes the system which is going to control the accidents on time due to sensors. The system mainly consists of sensors, accelerometer and GPS. 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. The GPS will track the vehicle. So one can get the information through these sensors, it controls automatically and can take some remedies to avoid accidents so that one can save their lives.

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The main reason for the accidents are the curvy roads with lesser curvature of bend as shown in the below figure.



Figure 1.1 : Accidents occurrence.

Every day, hundreds of road traffic accidents occur across 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. Often, drivers are distracted while behind the wheel, taking their focus away from the road. Sometimes, accidents occur for a combination of reasons, from bad visibility to

unsafe road design, or other drivers lack 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 as shown in figure 1.1.

The advantages of the proposed system are

- Easy to implement.
- Reliable.
- Low cost, less complexity.
- Drive less vehicles running along beams.

The proposed system can be applied in the field of ,

1. **Marine engineering:** the application areas are gas explosion and landslip as shown in the below figure.



Figure 1.2 Mining application

2. **Marine:** Guiding the accurate path without collision as shown in the below figure.



Figure 1.3: Marine Guidance system

3. **Railways:** To detect the obstacle/ breakage of rails. The illustration is as shown below

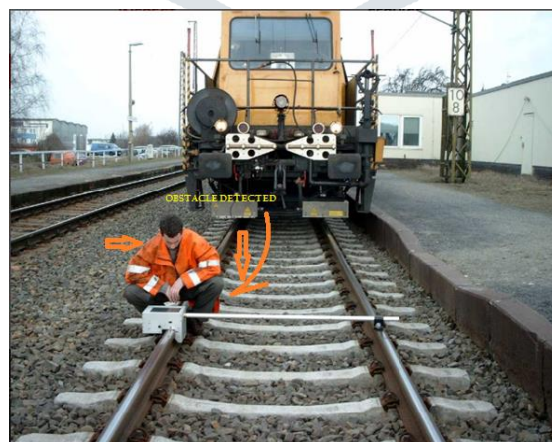


Figure 1.4: Obstacle detection

II System Flow

In this sub-section we are going to provide the information about the proposed system in block diagram level. The block diagram is as shown in the below figure,

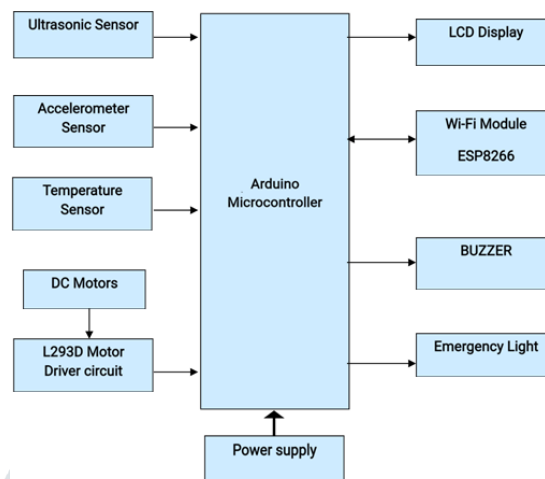


Figure2.1: Block Diagram of Proposed System.

To avoid the accidents this system is going to develop. The critical factor for driving safety is fatigue. So to avoid this, many researches are going. Some of them are face detection, vision detection etc. but in these detentions, only characteristics can be detect. 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 sensor 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. 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. 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. 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 LCD. Inside the car temperature is high, automatically AC will ON. In future, one can also track and controlling the vehicle by fixing GPS. If any theft happens, then one can track their vehicle through GPS. GPS will track the vehicle and one get to know about their vehicles.

III System Design

In this sub-section we are going to see the mathematical model for the proposed system.

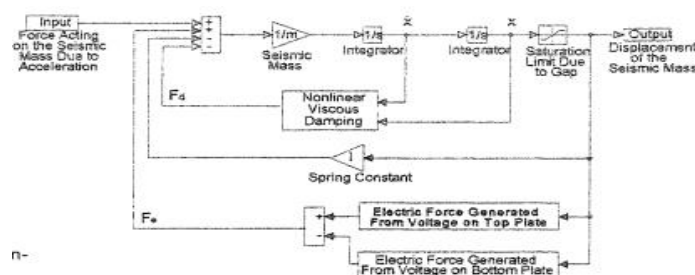


Figure 3.1 Mathematical model of the micro-machine accelerometer.

A conventional transducer will exhibit the second order transfer function of a mass, spring and damper system. To increase the sensitivity of accelerometer the gap between the plates is necessarily small. The damping force F_d is given by

$$F_d = k\mu A^2 \left[\frac{1}{(d+x)^3} + \frac{1}{(d-x)^3} \right] \dot{x} \quad \dots (1)$$

Where k is a constant depending on the geometry of the sensing element, d is the gap between the electrodes, A the area of the mass.

The non-linear effect of the equation 1 is given by

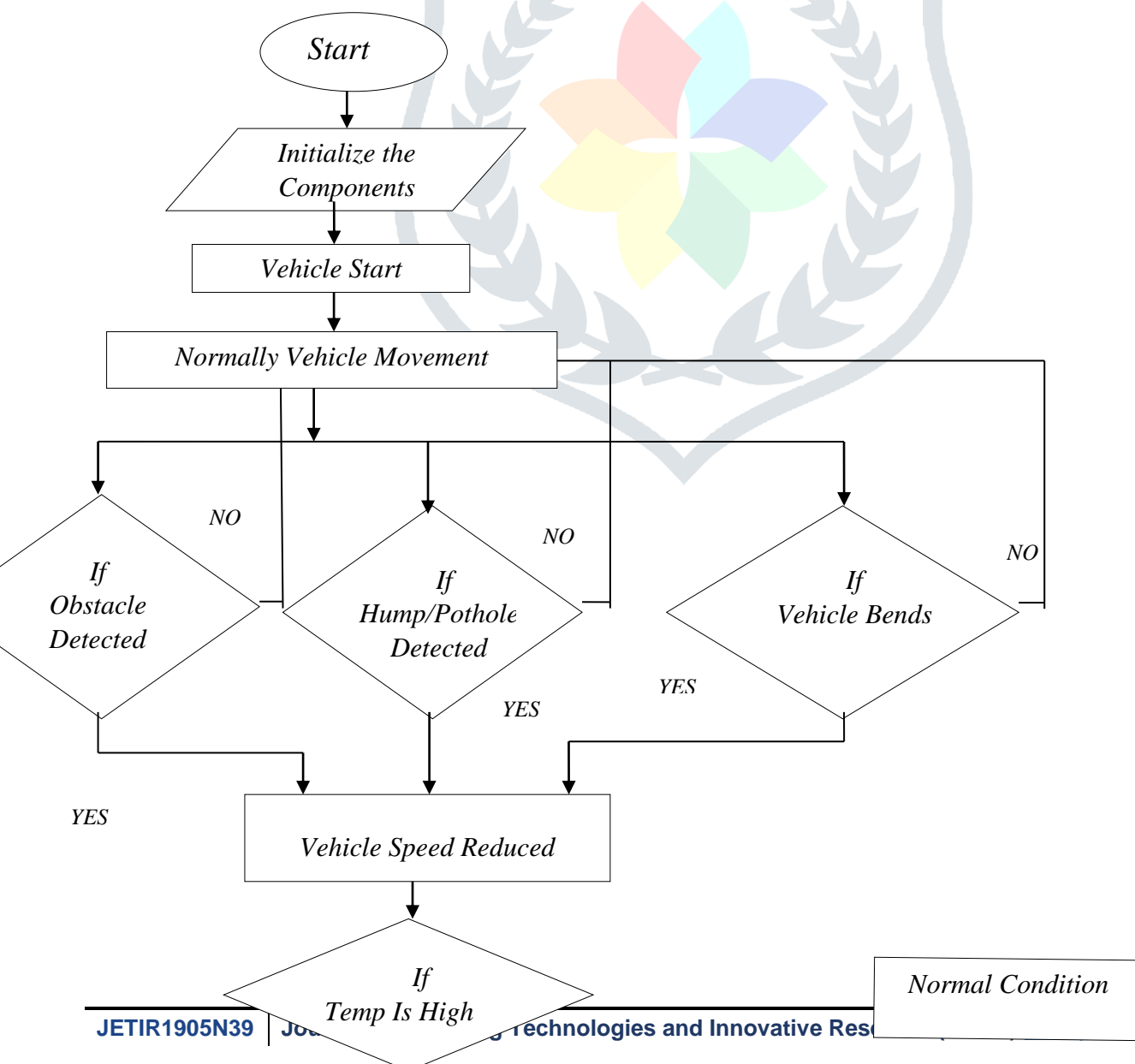
$$F_d = f(x)\dot{x} \quad \dots (2)$$

Where, $f(x)$ is referred to as damping co-efficient. The above equation can be approximated to

$$f \approx 0.42\mu \frac{A^2}{d^3} \quad \dots (3)$$

The another parameter for determining the force is given by the below equation.

$$F_e = \frac{\epsilon_0 A}{2} \left(\frac{V_1^2}{(d-x)^2} - \frac{V_2^2}{(d+x)^2} \right) \quad \dots (4)$$



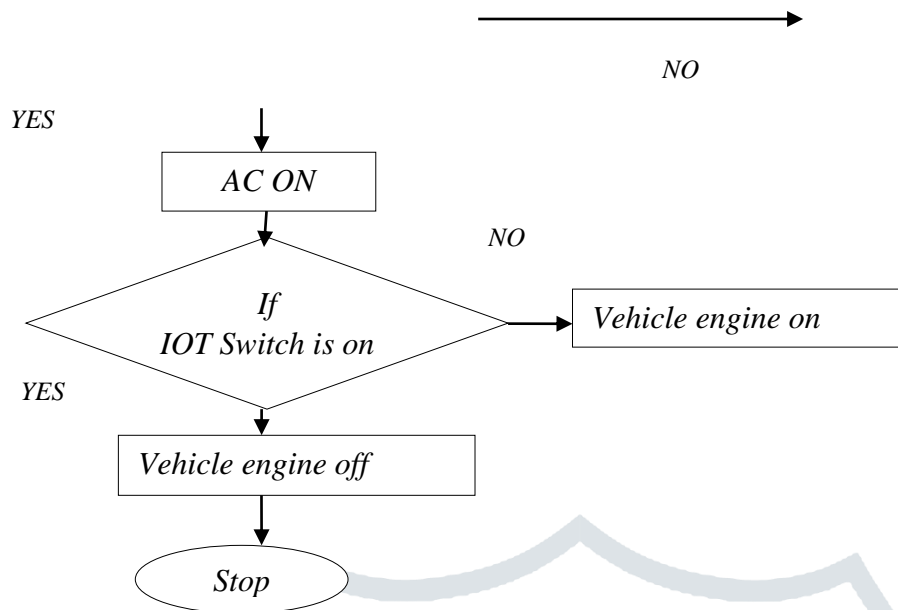


Figure 3.2: Flow Chart

The procedure to follow the checking outputs of this project is shown in below flow chart. It shows the complete working of the system.

IV Result and Discussion

In this subsection we are going to discuss about the results which are obtained during the experimental phase.

The experiment setup contains wifi module, temperature sensor, accelerometer. The whole experimental setup is as shown in the following figure.

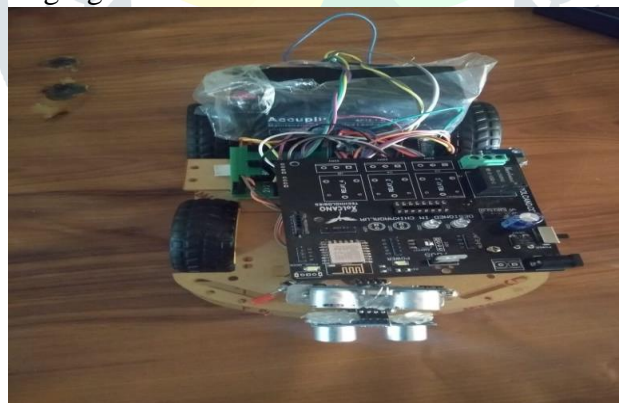


Figure 4.1: Experimental Set Up

The illustration of the Obstacle avoidance which reduces the speed is as shown in the below figure,



Figure: 4.2 : Speed Reduced due to obstacle.

The car environment can be controlled using the temperature sensor and it is shown in the below figure.



Figure 4.3 : Controlling the environment of car

V Conclusion

By discussing the above results we can conclude that, the accidents becomes rare if the proper precaution is taken using the sensors. The sensors information are properly sensed and sent to the server for the safe guarding the life of the persons inside the car.

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