

# EMBEDDED BASED ACCIDENTAL DAMAGE REDUCTION SYSTEM

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## ABSTRACT

*In today's world vehicle accident is a major problem. Now-a-days around the world, a large percentage of people die from traffic accident injuries. So, to avoid this we have developed an embedded based accidental reduction system in our project. The main objective of this project is to reduce the time lag which takes place medical authorities to reach the accident damage area and save the lives of people. The detection of accident is done with the help of Accelerometer (G sensor), IR sensors and for notifying the authorities GSM is used to send an emergency short message to the medical personnel.*

**Keywords:** Accelerometer, GSM, IR sensors, RF receiver, RF transmitter.

## I. INTRODUCTION

India is the creating nation. India is a thickly populated nation with the vehicle utilization being truly different. While the accessible assets which are utilized to run the vehicles like street quality and new advancements in vehicles are being produced to maintain a strategic distance from being damage. The number of individuals expired during vehicle accident is exceptionally huge when contrasted with alternate reasons for death. Despite the fact that there are diverse reasons for mischance however appropriate innovation of slowing mechanism and innovation to diminish the harm amid mishap ought to be produced. Henceforth there is need of Impact Reduction framework to keep the damage and also the driver and also to provide the medical system at that spot. To accomplish this objective, we plan this embedded system based accidental damage reduction. This is achieved with the help of accident detection techniques and notifying the medical authorities to provide the facilities within time. Our project mainly aims at reducing the time for the medical personnel to reach the location of the accident. This is achieved with the help of the sensors used for accident detection and sending the emergency text message along with the GPS coordinates of the location with the help of GSM to the help centre.

## II. OBJECTIVE

The main objective of this project is to reduce the time lag which takes place for the medical authorities to reach the accident affected area and save the lives of people. This is achieved with the help of accident detection techniques and notifying the medical authorities to provide the facilities within time. The detection of accident is done with the help of Accelerometer (G sensor), IR sensors and for notifying the authorities GSM is used to

send an emergency short message to the medical personnel. The message will also contain the co-ordinates of the location where that accident would have occurred. This is achieved with the help of a GPS module which would give the coordinates of the required location. All the modules will work simultaneously with the help of a microcontroller and as soon as the vehicle will meet with an accident, an emergency message will be sent along with the GPS coordinates of the location to the medical authorities and help will be sent immediately. Therefore the time will be reduced for the medical authorities to reach the accident affected area and the victim life will be saved.

- To define the cases of Linear Sensor Arrays possible such that it provide confirmation of misalignment of structure of vehicle as a result of accident.
- To define the threshold values of G-sensor by undergoing repeated iterations to confirm the case of accident.
- Interfacing of G sensor, RF module, IR sensors, GSM module, GPS module, Camera and Buzzer with main microcontroller ATmega 16 by using Embedded C programming.
- Preparing a model for the demonstration of the complete project.

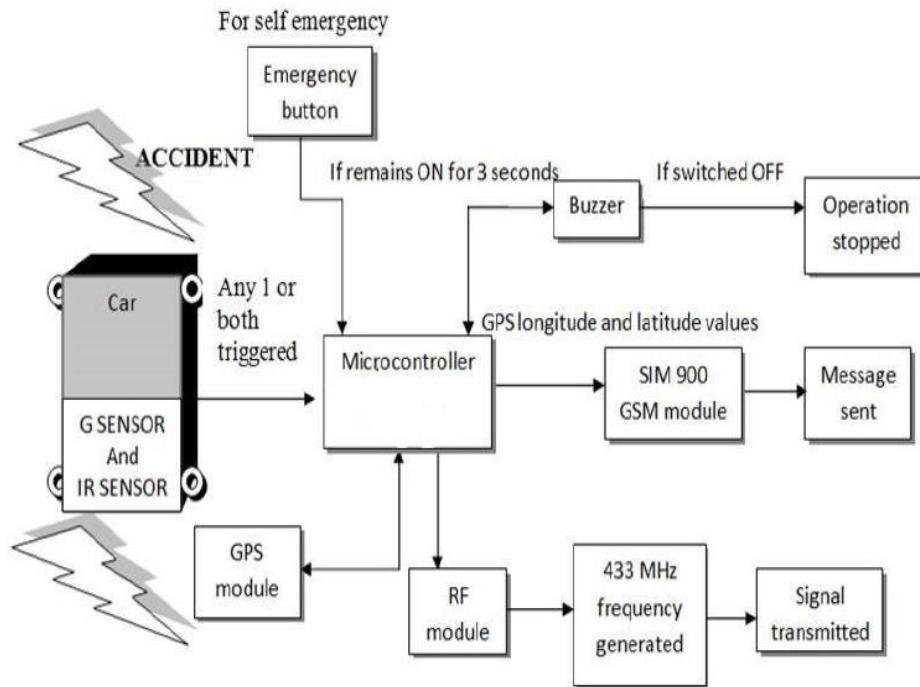
### **III. CONSTRUCTION AND WORKING**

A model has been prepared for the demonstration of our complete project. The model image is shown in the fig. The model can be considered as a prototype on which accelerometer is mounted at a reference position and IR sensors are placed linearly. When the model is tilted the reference value is changed and at a particular orientation the threshold value is exceeded, this would therefore detect the accident. On the other hand IR sensors are placed linearly with IR transmitters on one side and receiver on the opposite side. When any object comes in between the transmitter and receiver the transmitted wave will not be able to reach the receiver. This, therefore can be considered as the wreckage of the vehicle and hence accident can be detected. The GSM and GPS modules are also mounted on the model itself.

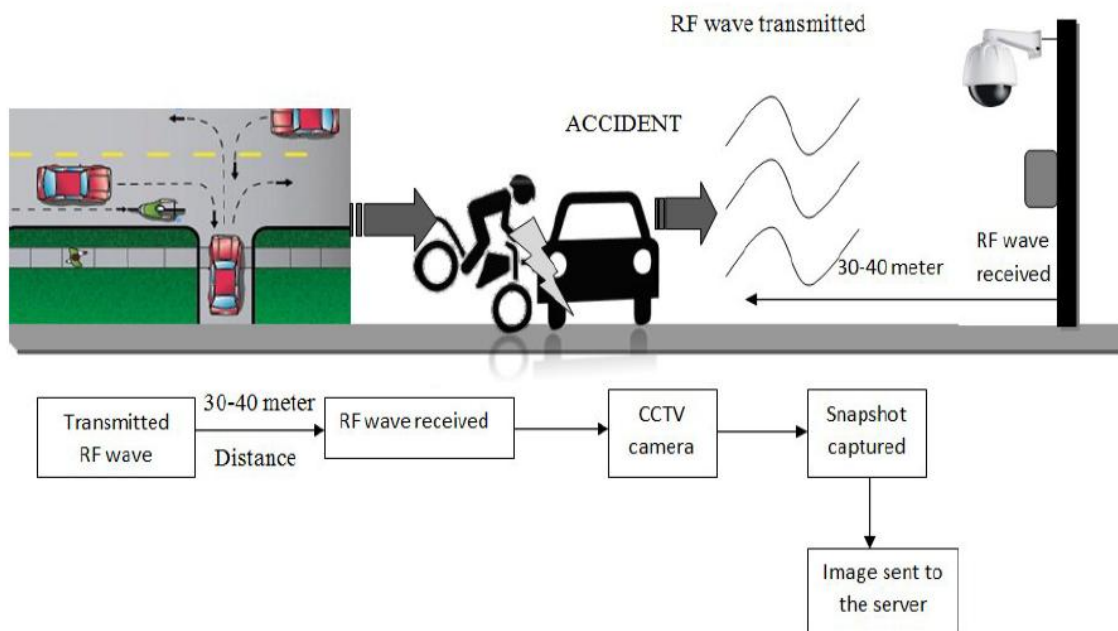


Figure 1: Operating model

### BLOCK DIAGRAM



- The car consists of G sensor and IR sensor for accident detection.
- In case of an impact either the misalignment of IR sensors occurs or the value of the G sensor exceeds its threshold value.
- In either case the microcontroller gets triggered and it gives a signal to the GPS module and the buzzer. The signal allows the GPS module to collect the coordinates of the location.
- The buzzer will beep for 5 seconds and if the victim is capable of turning the buzzer off then all the further operations gets cancelled and hence it can be concluded that the victim is safe. In case the buzzer is not turned off within 5 seconds the victim will be treated as injured and the following sequence of events will take place.
- The microcontroller will take the coordinates from the GPS module and it will trigger the GSM module and the RF module.
- The coordinates will be the latitude and longitude values of that location.
- With the help of GSM module the coordinates of the location will be sent to an emergency help centre.
- The RF module will transmit the RF wave and if the victim is in the vicinity of the pole containing the RF receiver along with the camera, snapshot of the location will be taken and will be sent to the medical personnel.
- There will also be an emergency button which will be used in case any other vehicle has met with an accident and is not able to get the treatment. This would allow the person to help other victim.



This block diagram is used for the description of RF module

- When accident occurs in the vicinity of the pole containing camera and RF receiver, the transmitted RF wave is received by the receiver.
- The received wave triggers the camera attached to the pole.
- The camera takes the snapshot of the scene and sends it to medical personnel.
- This allows the medical authorities to depict the severity of the accident and send the help accordingly.

#### IV. RESULTS

A linear array of IR sensor has been made by mounting all the component on PCB. The reference value of the accelerometer has been calculated by maintaining the accelerometer at the ground level and steady position which is as shown in figure below



Figure 2: Steady state ADC values of accelerometer

The threshold value of the accelerometer for accident detection has been calculated by tilting the model up to a specific angle till the model will no longer be able to reach its initial position and it will toggle to other side. That maximum tilt of the model after which the vehicle toggles gives us the threshold value of the accelerometer. The program for the working of all the modules is burnt in to the memory of the microcontroller. The RF module transmitter is fixed in the model. It emits a RF wave of 433MHz and it can be detected by the RF receiver in the range of 30 m to 40 m

- The RF receiver is fixed on a pole as shown in the figure below.
- When the pole is in the vicinity of the model containing the RF transmitter it receives the RF wave emitted by the transmitter.
- As a result of this phenomenon the camera is triggered and it takes a snapshot of the scene and it is stored in the server.



Figure 3:RF receiver pole



RF transmitter placed in model

## **V. CONCLUSION**

This project is based on the accident detection and reduction mechanism with the help of two sensors. The two sensors which are used are

- Accelerometer or G sensor
- A linear array of IR sensors

Along with these two sensors a Radio Frequency module is used for more precise accidental information to the medical authorities. The main objective of this project is to reduce the time which the medical authorities take to reach the accident affected areas and save the life of the victim. By the use of these two above mentioned sensors, accident detection mechanism has been made easier. As soon as the accident will occur one of the two sensors will perform its operation and detect the accident and will trigger the main microcontroller for the rest of the functioning. The microcontroller will then take the GPS coordinates of that location with the help of a GPS module and it will send an emergency text message along with the coordinates to the help centre. Hence the time between the occurrence of accident and the medical help to save the life of the victim is reduced to a great extent. As soon as the accident will occur the medical authorities are informed immediately. In this way our main aim of making this project has been achieved.



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