WIRELESS BLACK BOX USING MEMS ACCELEROMETER AND GPS TRACKING FOR VEHICLE ACCIDENT MONITORING

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Abstract —**The objective of this project is to quickly detect the type of accident from MEMS accelerometer signal using a threshold algorithm. With signals from an accelerometer, a severe accident can be recognized. According to this project when a vehicle meet with an accident immediately Vibration sensor will detect the signal or if a car rolls over and MEMS sensor will detects the signal and sends it to Arduino UNO. Our system uses the capability of GPS and GSM along with the android phone to provide a solution which can be used to precisely detect the accident spot and to send the emergency notification to the nearby hospital's ICU and to the victim's relatives. As there is a scope for improvement and as a future implementation we can add a wireless webcam for capturing the images which will help in providing driver's assistance.**

Keywords-GPS, GSM, MEM, ACCIDENT

I. INTRODUCTION

Security in travel is primary concern for everyone. This Project describes a design of effective car monitoring system in traveling. This project is designed to inform about an accident that is occurred to a vehicle to the family members of the traveling persons. This project uses a piezo-electric sensor which can detect the abrupt vibration when an accident is occurred. This sends a signal to Arduino. This Project presents an automatic vehicle accident detection system using GPS and GSM modems. The system can be interconnected with the car alarm system and alert the owner on his mobile phone. This detection and messaging system is composed of a GPS receiver, Arduino and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude. The Arduino processes this information and this processed information is sent to the user/owner using GSM modem. A GSM modem is interfaced to the Arduino. The GSM modem sends an SMS to the predefined mobile number and informs about this accident. This enable it to monitor the accident situations and it can immediately alerts the police/ambulance service with the locaion of accident

II. EXISTING SYSTEM

In existing system most of the people associate black boxes with airplanes but they are no longer just the key tool in investigation of airplane accidents. Presently tracking system is introduced in vehicles to avoid the accidents and save peoples life. But these systems are still installed in some of the high-end vehicles only because these systems are too expensive for most of the vehicle riders. The existing system aims to achieve accident analysis by objectively tracking what occurs in vehicles. The system also involves enhancement of security by preventing tampering of the Black Box data. In addition, the Black Box sends an alert message to a pre-stored mobile number via Short Message Service (SMS) in the case of occurrence of an accident. The proposed system makes use of 12 sensors to record the various driving data parameters. The Raspberry Pi controller (RI) and microcontrollers are used to regulate these sensors. Various sensors like

thermal and CO_2 sensors are mounted. The system uses external sensors such as camera and Global Positioning System (GPS) to collect video and location data.

III. DISADVANTAGES OF EXISTING SYSTEM

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IV. RELATED WORK

We have devised key feature after reviewing the problems from the existing system and some works related to accident happens which will provide the required solutions to these problems. An Arduino Mega is used to process and store real time signal from the 6-axis accelerometer and various sensors. A GPS and GSM modem is interfaced with Arduino for vehicular tracking system. All the information are stored in memory card for analysis of accident cause.

V. CIRCUIT DIAGRAM AND DESCRIPTION
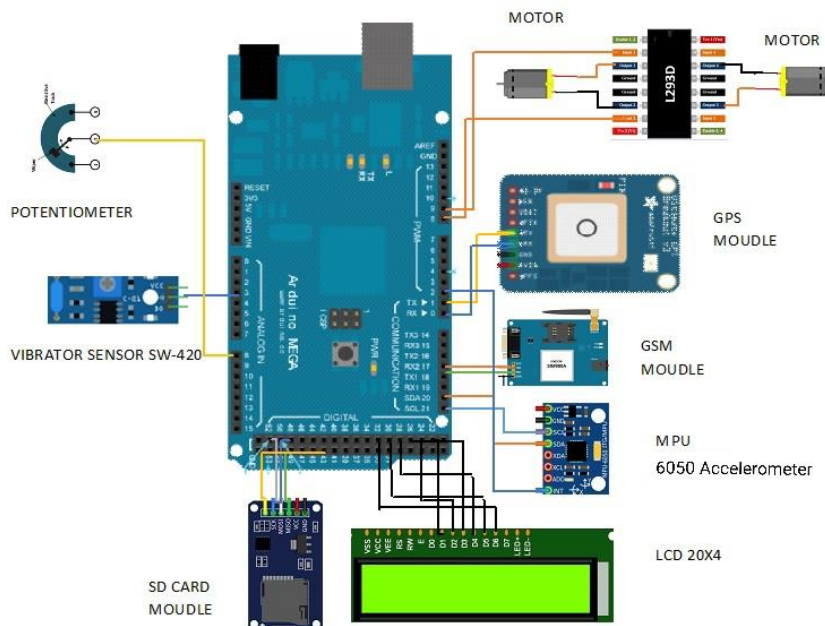
III MEMS TECHNOLOGY

Micro-Electro-Mechanical Systems, or MEMS, is a technology that in its most general form can be defined as miniaturized mechanical and electromechanical elements (i.e., devices and structures) that are made using the techniques of micro fabrication. The critical physical dimensions of MEMS devices can vary from well below one micron on the lower end of the dimensional spectrum, all the way to several millimeters.Likewise, the types of MEMS devices can vary from relatively simple structures having no moving elements, to extremely complex electromechanical systems with multiple moving elements under the control of integrated microelectronics. The one main criterion of MEMS is that there are at least some elements having some sort of mechanical functionality whether or not these elements can move. The term used to define MEMS varies in different parts of the world. In the United States they are predominantly called MEMS, while in some other parts of the world they are called "Microsystems Technology" or "micro machined devices". While the functional elements of MEMS are miniaturized structures, sensors, actuators, and microelectronics, the most notable (and perhaps most interesting) elements are the micro sensors and micro actuators. Micro sensors and micro actuators are appropriately categorized as "transducers", which are defined as devices that convert energy from one form to another. In the case of micro sensors, the device typically converts a measured mechanical signal into an electrical signal. Microelectronic integrated circuits can be thought of as the "brains" of a system and MEMS augments this decision-making capability with "eyes" and "arms", to allow micro systems to sense and control the environment. Sensors gather information from the environment through measuring mechanical, thermal, biological, chemical, optical, and magnetic phenomena.The electronics then process the information derived from the sensors and through some decision making capability direct the actuators to respond by moving, positioning, regulating, pumping, and filtering, thereby controlling the environment for some desired outcome or purpose. Because these devices are manufactured using batch fabrication techniques similar to those used for integrated circuits, unprecedented levels of functionality, reliability, and sophistication can be placed on a small silicon chip at a relatively low cost.

VI.RESULT DISCUSSION

The system wireless black box using MEMS accelerometer and GPS tracking has been developed for vehicular accidental monitoring. The system can detect the type of accident (linear and nonlinear fall) from accelerometer signal using threshold algorithm, posture after crashing of motorcycle and GPS ground speed. After accident is detected, short emergency message data (cause of accident and location of accident) will be sent via GSM network. Sensors (speed and vibration) work accordingly and gives the respective output. If the speed increases than the threshold level the motor stops automatically. Vibration and accelerometer are connected in and logic. Thus as the values of these sensors exceed the prescribed limits an accident is detected. The location of accident is sent along with the alert message

VII.APPLICATION

1. It can be used for company car or commercial cargo truck operator.

2. It is useful for personal car preventive maintenance programme.

3. It is useful for new car performance testing.

4. It can be useful to diagnose cause of accident if it happens

VIII.ADVANTAGES

1. This project helps in preventive maintenance of vehicle such that vehicle does not
get breakdown on road .
2. Project helps in tracking driving behaviour for fright ,cargo truck operator &amp;
company car operator.
3. It can be used to evaluate performance of new car.
4. Project helps in getting information about pre accident driving scenario.

5. The Accident Alert System aims to provide an efficient and cost-effective way to decrease the degradation in victim's health post-accident.

6. The GSM modem sends a distress message to the victim's relative and the Trauma Centre whose numbers are already saved.

7. The GPS System helps to track the site of accident and provide Immediate Medical Help to the victims.

IX.REFERENCES

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