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VEHICLE ACCIDENT ALERT SYSTEM USING GSM, GPS AND MEMS

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Abstract - *The fastest growth of technology has made our lifestyle Comfort. The technology also increased the traffic risks and the road accidents take place frequently which causes huge loss of life because inadequate of emergency facility our project will help this displacement. The project concludes when a vehicle meets with an accident, the Micro electro mechanical system (MEMS) sensor will analyze the signal and this signal to Arduino. The notification is sent through GSM module the location of the accident is gathered with the help of GPS module, to notify police control room or a rescue team. So, the police or rescue team can immediately trace the location through the GPS Module, after receiving the information. Then after confirming the location necessary action will be taken And Video of the accident can be live streamed or can be stored with the help of camera. The aim of this work is to automatically detect an accident and alert the rescue team or control station.*

1. Introduction

This system which can detect accidents in significantly less time and sends the notification to the rescue team or control station by covering geographical coordinates, where vehicle accident had occurred. This alert notification which containing emergency message along with location of prone zone is sent to rescue team with in a short time which helps in saving the person. The notification is sent through the GSM module and the location of the accident is detected with the help of the GPS module the information gathers from this system which converted in to notification which consist of location link and vehicle information with emergency alert. The accident can be detected precisely with the help of both Micro Electro Mechanical System (MEMS and vibration sensor. The angle of the tilt over of the car can also be known by the message through the MEMS sensor. This application provides the optimum solution where there is inadequate of emergency facilities provided to the road's accidents in the most feasible way.

1.1 Objectives

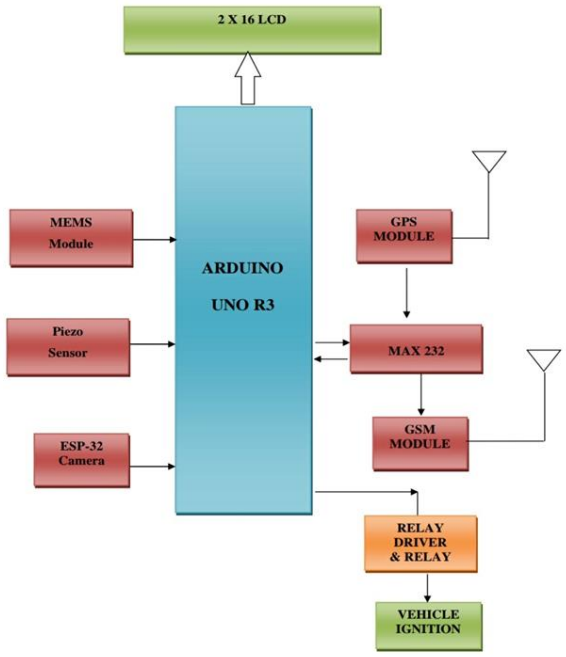
The Rapid increase of technology has made our lives easier. The creation of technology has also accelerated the traffic hazards and the road accidents take place frequently which causes huge loss of life because inadequate of emergencies. Our undertaking will provide an optimum solution to this draw back. According to this project, while a vehicle meets with a twist of fate, the Micro electro mechanical system (MEMS) sensor will hit upon the sign and this sign will be analyzed via way of means of Arduino. The Arduino sends the alert message thru the GSM Module including the location to police control room or a rescue team. So, the police can right away hint the vicinity thru trace the location through the GPS Module, after receiving the information. Then after confirming the location necessary action will be taken And Video of the accident can be live streamed or can be stored with the help of camera. The aim of this work is to automatically detect an accident and alert the rescue team or control station.

- Alert the rescue team on time
- Can save the life immediately
- Can be fixed for any vehicles
- Video stay streaming and may be saved in reminiscence card

1.2 Components used

- GSM
- GPS
- Arduino MEGA
- MEMS
- LCD display
- Piezo Sensor
- ESP-32 Camera

2. Methodology



Block Diagram

When a vehicle meets with an accident, the piezo sensor and Micro electro mechanical system (MEMS) sensor will detect the signal and convert it into digital. This sign will be analyzed through Arduino. The Arduino sends the alert message through the GSM Module and the location will be detected through GPS module. And live location can be streamed and stored with the help of ESP-32 camera. Furthermore, the gathered data and will be converted to text message which will be sent to control station.

2.1 Components Overview:

2.1.1 GSM – Global System for Mobile Communication

GSM is used as a media that's used to govern and screen the car or man or woman from everywhere through sending a message. It has its personal deterministic character. Thereby, right here GSM is used to screen and manage the car or man or woman through sending a message via GSM modem. Hence, it's miles taken into consideration as fairly green communique via the cell as a way to be beneficial in business controls, automobiles, and home equipment which could be managed from everywhere else. It is likewise fairly financial and much less expensive; consequently, GSM is desired maximum for this mode of controlling. A GSM modem is a specialized sort of modem which accepts a SIM card, and operates over a subscription to a cell operator, similar to a cell phone. From the cell operator perspective, a GSM modem appears similar to a cell phone. When a GSM modem is attached to a pc, this permits the pc to apply the GSM modem to talk over the cell network. While those GSM modems are maximum often used to offer cell net connectivity, lots of them also can be used for sending and receiving SMS and MMS messages.

Fig. 2.1.1: Global System for Mobile Communication

2.1.2 GPS - Global Positioning System

Global Positioning System (GPS) is a worldwide radio-navigation tool customary from the constellation of 24 satellites and their ground stations. GPS tracking is a method of working out exactly in which some thing is. A GPS tracking tool, for example, may be placed in a vehicle, on a mobileular phone, or on specific GPS devices, that could each be a hard and fast or portable unit. GPS works via presenting statistics on unique place. It can also song the movement of a vehicle or person. There are 24 satellites being used withinside America GPS tool the least bit times. These satellites orbit the earth in such a way that at any given time and place, at least four satellites are visible to a GPS driven device. Each satellite tv for pc television for laptop is prepared with a very accurate atomic clock so the satellite tv for pc television for laptop is continuously aware of the cutting-edge time on Earth at theline of longitude. The satellites are also aware of their very personal positions with the assist of ground stations that offer non-prevent updates. The 24 satellites orbit the earth transmitting their respective data. These quantities of facts are received via the antennas related to radio receivers internal a GPS device. As a GPS device starts off evolved off developed up, it ought to check its radio tuner for very faint GPS satellite tv for pc television for laptop signals. Once it has accumulated facts (the place of a satellite tv for pc television for laptop and the time the satellite tv for pc television for laptop despatcher the place) from at least three satellites, an area restore can be made.

Fig. 2.1.2: Global Positioning System

2.1.3 Arduino MEGA

The Arduino Mega 2560 is a microcontroller board primarily based totally at the ATmega2560 (datasheet). It has fifty-four virtual input/output pins (of which 14 may be used as PWM outputs), sixteen analog inputs, four UARTs (hardware serial ports), a sixteen MHz crystal oscillator, a USB connection, a strength jack, an ICSP header, and a reset button. It includes the entirety had to guide the microcontroller; surely join it to a laptop with a USB cable or strength it with a AC-to-DC adapter or battery to get started. The Mega is well suited with maximum shields designed for the Arduino Duemilanove or Diecimila.

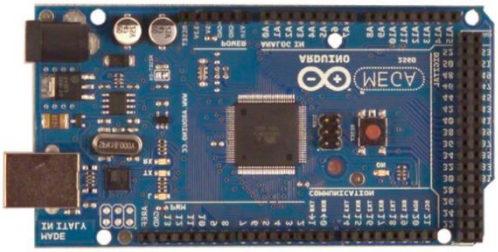


Fig.2.1.3 Arduino MEGA

2.1.4 MEMS Accelerometer

This Accelerometer module is primarily based totally at the famous ADXL335 three-axis analog accelerometer IC, which reads off the X, Y and Z axis acceleration as analog voltages. By measuring the quantity of acceleration because of gravity, an accelerometer can determine out the attitude it's miles tilted at with admire to the earth. By sensing the quantity of dynamic acceleration, the accelerometer can discover how speedy and in what route the tool is moving. Using those properties, you could make all types of cool projects, from musical instruments (consider gambling and having the lean linked to the distortion stage or the pitch-bend) to a pace screen to your car (or your children's car). The accelerometer may be very clean interface to an Arduino Micro-controller the usage of three analog enters pins, and may be used with maximum different micro controllers, consisting of the PIC or AVR.

ADX335 is three axis accelerometers with on board voltage regulator IC and sign conditioned Analog voltage output. The module is made from ADXL335 from Analog Devices. The product measures acceleration with a minimal full-scale variety of ±three g. It can degree the static acceleration of gravity in tilt-sensing applications, in addition to dynamic acceleration as a consequence of motion, shock, or vibration.

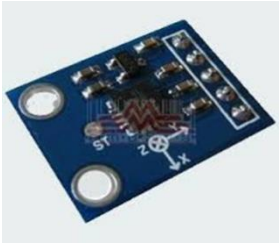


Fig.2.1.4 MEMS Accelerometer

2.1.5 Liquid Crystal Display

LCD is the show tool that is of 16x2 length and it has yellow Background light. This LCD is attached to microcontroller. To permit terminal latch of LCD excessive to low pulse is despatched and RS bit is enabled. Once the latch is enabled the information is transferred via the interfacing pins parallel and the LCD suggests the show on it. These LCD are clean to software and they're reasonably priced too. LCD interfacing with microcontroller could be very clean. Here in our car monitoring task LCD shows the output i.e., range and longitude of the car. The following discern 3. sixteen suggests the LCD show of range and longitude.


Fig.2.1.5 LCD Display

2.1.6 Piezoelectric Sensors

The phrase piezo comes from the Greek phrase piezo, that means to press or squeeze. Piezoelectricity refers back to the technology of power or to electric powered polarity in dielectric crystals while subjected to mechanical strain and conversely, the technology of strain in such crystals in reaction to an implemented in volt. In 1880, the Curie brothers observed that quartz modified its dimensions while subjected to an electrical discipline and generated electric rate while strain changed into pulse volt. Since that time, researchers have observed piezoelectric houses in loads of ceramic and plastic substances. Many piezoelectric substances additionally display electric outcomes because of temperature adjustments and radiation.

Fig.2.1.6 Piezo sensor

2.1.7 ESP-32 Camera

The ESP32-CAM is a small size, low energy intake digital digicam module primarily based totally on ESP32. It comes with an OV2640 digital digicam and gives onboard TF card slot. The ESP32-CAM may be broadly utilized in shrewd IoT packages which includes wi-fi video monitoring, Wi-Fi picture upload, QR identification, and so on.

Fig.2.1.7 ESP-32 Camera

3. Components and Cost Table

Table3.1 Components:

Sl.no	Components	Qty
1	GSM	1
2	GPS	1
3	Arduino MEGA	1
4	LCD display	1
5	MEMS	1
6	Piezo Sensor	1
7	ESP-32 Camera	1
8	Battery	1

Table3.2 Cost

Materials	6000
Labour	1500
Travel	2000
Report	3000
Miscellaneous	500
Total	**13000**

4. Future scope:

- We can reveal a few parameters of car like twist of fate area and most important damages.
- We can intimate pals or own circle of relative's man or woman if the car is going out of a certain/pre-determined tune with the assist of location.
- Video streaming enables to realize the precise twist of fate area and may be reached quickly to place.

5. Advantages

- Sim card can be changed at any time.
- Anybody and straight forward to operate.
- Inform to the control station or rescue team immediately.
- Enlightened protection and Simple in Design.
- In case of theft car ignition can switch off with the useful resource of the usage of GSM.
- Live video streaming helps to identify the accident place.

6. Disadvantages

- The mobile network may not be available and the notification to user may not be delivered in a timely manner.
- The GPS receiver's connections to the satellites may be hindered or time delay and the location information may not be accurate.

7. Outcomes

- Can alert the rescue team or authorized person immediately.
- Can easily fixed in any vehicles.
- Gradually reduces the accidents.
- Can save the life of person.

8. Conclusions

- Vehicle tracking both in case of personal as well as business purpose improves safety and security.
- Performance monitoring and increases productivity. So, in the coming year, it is going to play a major role in our day-to-day living.
- Main motto of the accident alert system project is to decrease the chances of losing life in such accident which we can't stop from occurring.
- Whenever accident is alerted, the paramedics are reached to the particular location to increase the chances of life.
- This device invention is much more useful for the

accidents occurred in deserted places and midnights.

- This vehicle tracking and accident alert feature plays much more important role in day-to-day life in future.

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