Accident Detection using MEMS and GPS

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Abstract:

For accident monitoring of vehicle we are using Micro Electro Mechanical system (MEMS). The system comprises of Micro Electro Mechanical System (MEMS) accelerometer, microcontroller unit and Global System for Mobile (GSM) module. MEMS is a high responsive sensor and ready to identify the tilts. In the event of mishap, Global System for Mobile (GSM) module will communicate to concerned number about the accident with latitude and longitude values of the accident occurred place.

Keywords: MEMS sensor, GSM Module, Vehicle monitoring.

INTRODUCTION

Accidents become the open issue in every one of the nations. Despite the fact that number of awareness programs is led, this issue is as yet rising step by step because of rash driving, alcoholic and driving and so on without wearing helmet and without enough rest. The number of deaths is very high because of late intimation to the people about the accident person. Based on these things many motor cycle companies have created number of wellbeing devices in the vehicle to protect riders from mishaps. To give great security gadget for bike is hard to introduce and over the expensive. On the other hand, number of gadgets has been implemented to track vehicles and furthermore to advise the mishap to and also to notify the accident to the concerned person immediately. At present these tracking systems is only arranged for some high end motorcycle companies as they are too costly for many bike or car riders.

As a result, Accident detection systems for vehicles become more popular in recent years because these systems are very much helpful for the riders who met with accident by helping them to get treatment in time.

In this work, black box utilizing MEMS accelerometer and GPS following system is created for accident checking. Each time mishap happens a message will be sent to the concerned individual demonstrating the area of vehicle by GPS. It will send an alert to the nearest hospitals so that the people will be alert and they can provide ambulance and prepare for the treatment. This system consists of MEMS, controller unit, GPS and GSM modules for location and sending message.

MEMS are applied to detect the accident. It will give the speed and threshold algorithm which decides an accident is occurred. A message will be sent indicating location of the place by GPS when any accident is occurred. Message will contain latitude and longitude values. This design is implemented so it safe and robust from water sprays and dust in environment. This device is to be installed under the vehicle seat. A 16 bit microcontroller is used for the process and to save the signals coming from the MEMS sensor.

Existing system:

In existing systems we cannot expect the mishap occur or not because we don't have such type of expertise to detect the accident and sending the information to the concerned persons.

Disadvantages:

- The location cannot be monitored from anywhere remotely.
- If vehicle is lost we cannot track the vehicle.
- Accidents cannot be known.

Proposed system:

In the proposed system MEMS sensor is used to recognize the mishap. Whenever it detects it will send an information to the concerned number and to the nearest clinics about the mishap occurred and the location using GPS module. LCD is utilized to show the information. APR9600 is a speaker module which is used to alert the people nearby.
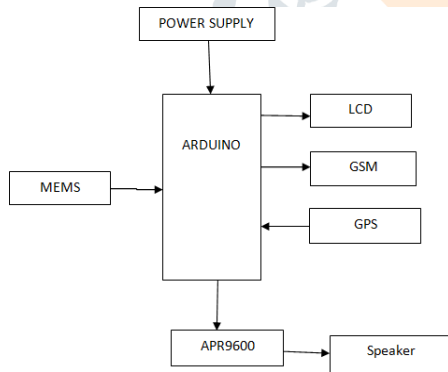
BLOCK DIAGRAM:

Fig1: Block diagram

HARDWARE REQUIREMENTS

ARDUINO:

Arduino is an open source platform microcontroller board which has 6 analog pins, 14 digital pins, one serial port, one power jack and one USB jack.
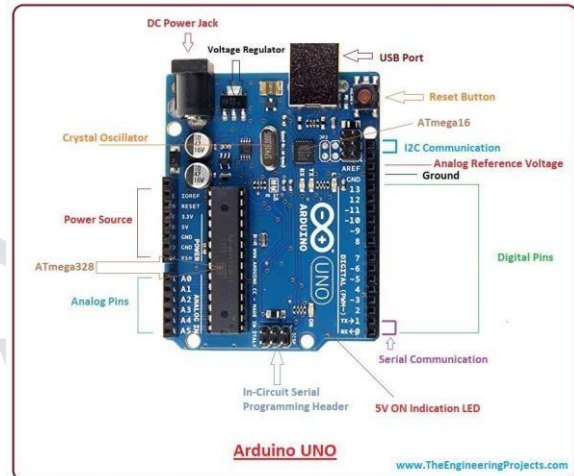

Fig2: Arduino

LCD (Liquid Crystal Display):

16×2 LCD is named so because; it has sixteen Columns and two lines. There is a lot of combination available like, 8×1, 8×2, 10×2, 16×1, etc. But the most used one is the 16*2 LCD; hence we are using it here.
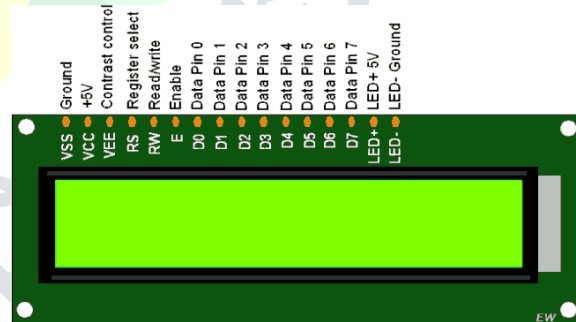

Fig3: 16X2 LCD

MEMS SENSOR:

Accelerometer is an electromechanical device that measures the force of acceleration due to gravity in g unit. It can be utilized in applications where tilt sensing is required. The ADXL335 measures acceleration along X, Y and Z axes and gives analog voltage output proportional to the acceleration along these 3 axes. Microcontrollers can process these voltages by converting them to digital signals using ADC. For more information about ADXL335 accelerometer and how to use it, refer the topic ADXL335 Accelerometer Module in the sensors and modules section.
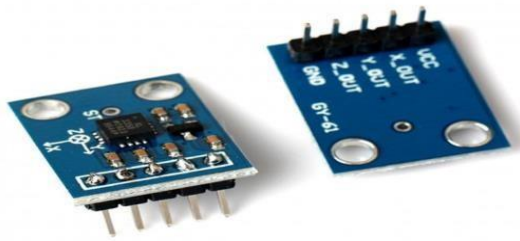

Fig4: MEMS sensor

The APR9600:

The APR9600 gadget offers authentic single-chip voice recording and Playback limit with respect to 40 to 60 seconds. It underpins arbitrary and successive access. The example rates are client characterized enabling a client to make own designs of one of a kind quality and capacity time needs.

Integrated amplifier and AGC circuits extremely improve system plan. The gadget is perfect for use in transferable voice recorders, toys, and numerous other customer and mechanical application. APLUS integrated accomplishes these high amounts of capacity ability by utilizing its exclusive simple/staggered capacity innovation actualize in a propelled Flash non-volatile memory process, where each memory cell can store 256 voltage levels. This advancement engages the APR9600 contraption to rehash voice motions in their ordinary structure. It takes out the prerequisite for encoding and pressure, which often it introduce distortion.

Fig5: APR9600

GSM Module:

GSM speaks to Global System for Mobile Communications. It is a standard set made by the European Telecommunications Standards Institute (ETSI) to depict traditions for second time (2G) automated cell frameworks used by PDAs.

A Modem is a gadget which modulates and demodulates signals as per communication requirements. It converts an analogue carrier signal to digital signal and also converts such a carrier signal to required information.
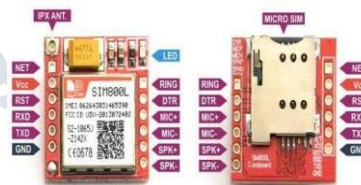

Fig6: GSM

GPS Module:

GPS refers to Global Position System, Which tracks current latitude and longitude values. This module consists of three pins are Transmitter, Receiver, GND. When we use GPS module for tracking any location, we only need coordinates and we can find this in $GPGGA string.
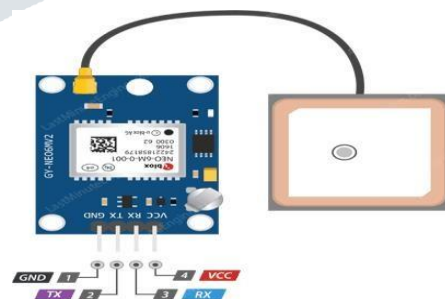

Fig7: GPS

SOFTWARE REQUIREMENTS

Arduino IDE:

The Arduino integrated development environment (IDE) is a cross-arrange application (for Windows, MACOS, and Linux) that is written in the programming language Java. The Arduino IDE supplies a programming library from the Wiring adventure, which gives various customary input and output.

Embedded C:

Implanted C utilizes KEIL IDE programming. The framework program written In Implanted C will be put away in microcontroller. The accompanying is a portion of the real explanations behind composing programs In C rather than get together. It is less demanding and less tedious to write in C then gathering. C is less demanding to change and refresh. You can utilize code accessible in capacity libraries. C code is compact to different microcontrollers with next to zero alteration. Genuine, Installed C programming need nonstandard expansions to the C driver so as to bolster fascinating components, for example, settled point number catching, numerous unmistakable memory banks, and fundamental I/O operations.

Advantages:
- Power consumption is less.
- Robust
- More compatible
- More secured

Applications:
- Reduces number of life risks after accidents
- Useful in tracing vehicle.
- Useful in monitoring the vehicle.

Conclusion

This project gives a plan which has numerous advantages like small size, portability etc. this system makes use of Arduino with MEMS, GPS and GSM and APR9600 speaker module to send location accurately and to alert surrounding people. It overcomes the problem of existing systems. As a result, the time for detecting the site is reduced and the person can be treated as soon as possible which will save many lives.

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