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ARDUINO NANO BASED AUTOMOBILE ACCIDENT ALERT SYSTEM USING GPS, GSM AND MEMS ACCELEROMETER

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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 sends the signal to Arduino nano. 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. The aim of this work is to automatically detect an accident and alert the rescue team or control station and the near dear ones.

1.   INTRODUCTION:

India has a gigantic population, with the increase in populaces there is an issue of cars expanding, it has likewise expanded traffic risks and the street mishaps, because of the thick populace and absence of mindfulness on traffic rules, the number of accidents are increasing every day.

This model shows the plan and usage of the accident caution framework that is dependent on remote organization interchanges, which depend on Arduino, GPS and GSM.

The government decision supports to built into smartphone application that analyzes the incoming data from the sensors and makes a decision based on the set of rules. A programmed notice model is used for vehicle accidents is presented in this venture.

The proposed system is based on a accelerometer sensor that calculates acceleration of any body or object.

It can be also be used to measure the inclination of the motor cycle and then transmits the notification to the concerned people through SMS. The mishap revelation is measure and sends a firm warning message to the emergency contact members demonstrating the particular territory of the spot of the mishap.

1.1 Objectives

Our lives have been made simpler by the rapid advancement of technology. The advancement of technology has also increased traffic risks and the frequency with which road accidents occur, resulting in significant loss of life due to a lack of emergency preparedness. Our project will give the best answer to this problem.

According to this project, when a vehicle encounters a misfortune, the Micro electro mechanical system (MEMS) sensor will detect the sign, which will then be examined using Arduino. The Arduino sends an alarm message to a police control centre or a rescue squad through the GSM Module, which includes the location. So, after obtaining the information, the police may immediately indicate the area by tracing the position using the GPS Module. Then, once the location has been confirmed, the required steps will be done.The goal of this project is to identify an accident automatically and notify the rescue team or control centre.

2. LITERATURE REVIEW

GOWSHIKA. B, MADHU MITHA. G, JAYASHREE. S, S. MUTHARASU et.al:

Arduino Based Vehicle Accident Alert System using GPS, GSM and Accelerometer. Accelerometer detects the sudden change in the axes of vehicle and GSM module send the alert message on your Mobile Phone with the location of the accident. The advancing technology has made our day to day lives easier. Since every coin has two sides similarly technology has its benefits as well as its disadvantages. The rise in technology has increased the rate of road accidents which causes huge loss of life. The poor emergency facilities available in our country just add to this problem. Our project is going to provide a solution to this problem.

Nicky kattukkara, Arun George et.al: Road accidents rates are very high nowadays, especially two wheelers. Timely medical aid can help in saving lives. This system aims to alert the nearby medical center about the accident to provide immediate medical aid. The attached accelerometer in the vehicle senses the tilt of the vehicle and the heartbeat sensor on the user's body senses the abnormality of the heartbeat to understand the seriousness of the accident. Thus the systems will make the decision and sends the information to the smartphone, connected to the accelerometer and heartbeat sensor, through Bluetooth. The Android application in the mobile phone will sent text message to the nearest medical center and friends. Application also shares the exact location of the accident that can save the time.

Asad Ali, Mohammad Eid, syed abdul et.al: Major accidents on highways, freeways and local roads can lead to huge social and economic impacts. Minor accidents may be resolved by the passengers themselves and do not require escorting to hospitals whereas major accidents where airbags are deployed require immediate attention of authorities. Automatic Smart Accident Detection (ASAD) is an auto-detection unit system that immediately notifies an Emergency Contact through a text message when an instant change in acceleration, rotation and an impact force in an end of the vehicle is detected by the system, detailing the location and time of the accident. The idea is that as soon as an accident is detected by the system, the authorities should immediately be notified to prevent further car congestion as well as allow the passengers to be escorted to the hospital in a timely fashion. The system involves the use of fuzzy logic as a decision support built into the smartphone application that analyzes the incoming data from the

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sensors and makes a decision based on a set of rules. The simulated results show a 98.67% accuracy of the system with failures resulting from the "gray regions" of the variable values.

The previously proposed a framework that recognizes the RFID tag of a vehicle. Which has a

few impediments resembles a RFID (Radio- frequency identification)perused can check a tag as long all things considered inside recurrence range . RFID likewise raises some security issues.
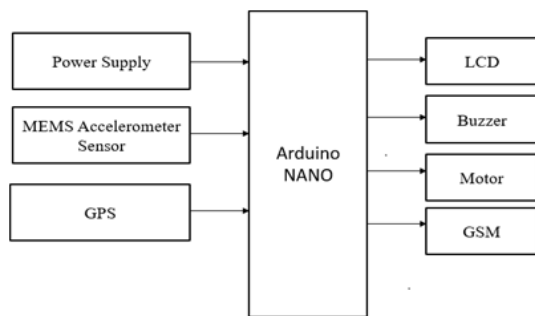
3. METHODOLOGY

Fig 1 : Block Diagram of the accident alert system

and MEMS sensor detect the signal and convert it to digital. Arduino Nano will be used to examine this signal. The Arduino nano uses the GSM Module to deliver the alarm message, and the GPS Module to determine the position. In addition, the collected data will be translated into a text message and delivered to the control station and rescue team.

Components Overview:

GSM – Global System for Mobile Communication

GSM is a kind of media that is used to regulate and screen an automobile, a man, or a lady from anywhere by sending a message. It has its own deterministic personality. As a result, GSM is used to screen and control the automobile, as well

as the man or woman, by sending a message through GSM modem. As a result, it's miles regarded as a really green method of communicating through cell phone in order to be useful in enterprise controls, vehicles, and domestic equipment that might be operated from wherever. It is also reasonably priced and significantly less costly; as a result, GSM is the preferred form of control for this manner of control. A GSM modem is a customised modem that takes a SIM card and functions on a mobile operator's subscription, much like a cell phone. A GSM modem resembles a mobile phone from the standpoint of a cell operator. When a GSM modem is connected to a computer, the computer may use the GSM modem to communicate over the

mobile network. While GSM modems are most often used to provide mobile network access, many of them may also be used to send and receive SMS and MMS messages.

Fig 2 : GSM Module

GPS - Global Positioning System

The Global Positioning System (GPS) is a global radionavigation system based on a constellation of 24 satellites and ground stations. GPS tracking is a means of determining the precise location of

anything. A GPS tracking device, for example, might be installed in a car, on a mobile phone, or on particular GPS devices, all of which could be fixed or portable. GPS works by displaying data about a certain location. It may also play music in response to the movement of a vehicle or a person. Within America's GPS equipment, there are 24 satellites that are employed at all times. These satellites circle the planet in such a manner that a GPS-enabled device may see at least four satellites at any one time and location. Each satellite tv for pc television for laptop is equipped with a very precise atomic clock, ensuring that the satellite tv for pc television for laptop is always aware of the current time on Earth at the longitude line. With the help of ground stations that provide non-prevent updates, the satellites are also aware of their own particular places. The 24 satellites orbit the planet and relay data to each other. The antennas connected to the radio receivers within a GPS gadget receive these large amounts of data. When a GPS device is just getting started, it should scan its radio tuner for weak GPS satellite tv for pc television for laptop signals. An area restoration may be produced after it has gathered data (the location of a satellite tv for pc television for laptop and the time the satellite tv for pc television for laptop despatcher the location) from at least three satellites.

Fig 3 : GPS Module

Arduino Nano

When the power supply is given to the entire circuit then the controller (ATmega328P) reads the given by the sensor and applied to the ADC pin of ARDUINO microcontroller. The analog value is changed to digital by the microcontroller internally. The Arduino Nano has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328P provide UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the chip and USB connection to the computer (but not for serial communication onpins 0 and 1. A Software Serial library allows for serial communication on any of the NANO digital pins. The ATmega328P also support I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus.
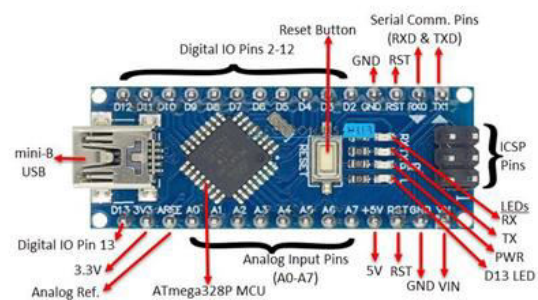

Fig 4 : Arduino NANO

This Accelerometer module is based entirely on the well-known ADXL335 three-axis analogue accelerometer IC, which outputs analogue voltages for the X, Y, and Z axis accelerations. An

accelerometer can measure the angle it's miles inclined at with regard to the ground by monitoring the amount of acceleration caused by gravity. The accelerometer can determine how fast and in what direction the tool is moving by measuring the amount of dynamic acceleration. You could construct a variety of fun projects using those qualities, ranging from musical instruments (think gambling and linking the lean to the distortion stage or the pitch-bend) to a pacing screen for your automobile (or your kids' car). The accelerometer has a simple interface to an Arduino Microcontroller, requiring just three analogue input pins, and may be used with a wide range of microcontrollers, including PIC and AVR. The ADX335 is a three-axis accelerometer with a voltage regulator IC on board and a sign-conditioned analogue voltage output. Analog Devices' ADXL335 is used to construct the module. The product monitors acceleration with a full-scale variation of three g as a minimum. It can measure gravity's static acceleration in tilt-sensing applications, as well as dynamic acceleration caused by motion, shock, or vibration.
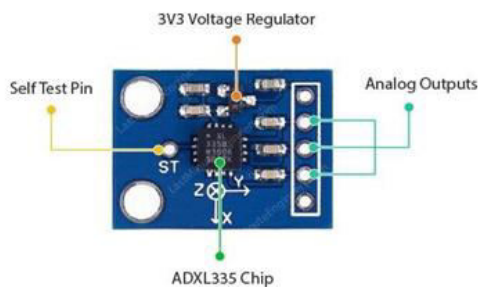

Fig 5 : MEMS Accelerometer

Liquid Crystal Display:

The LCD is a display gadget with a 16x2 length and a yellow background light. The microcontroller is connected to this LCD.

To allow the LCD's terminal latch, an excessive to low pulse is sent and the RS bit is activated. When the latch is activated, data is sent in parallel through the interface pins, and the LCD proposes a show to watch. These LCDs are easy to programme and are also competitively priced. The interface between the LCD and the microcontroller might be quite clean. In our automobile monitoring duty, the LCD displays the output, which is the car's range and longitude. The LCD display of range and longitude is suggested by the following distinguish 3. sixteen.
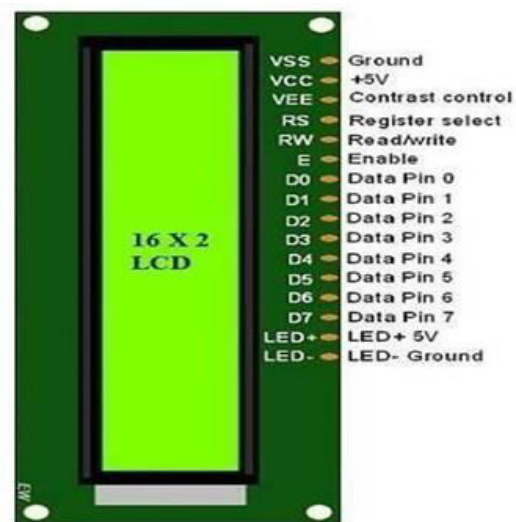

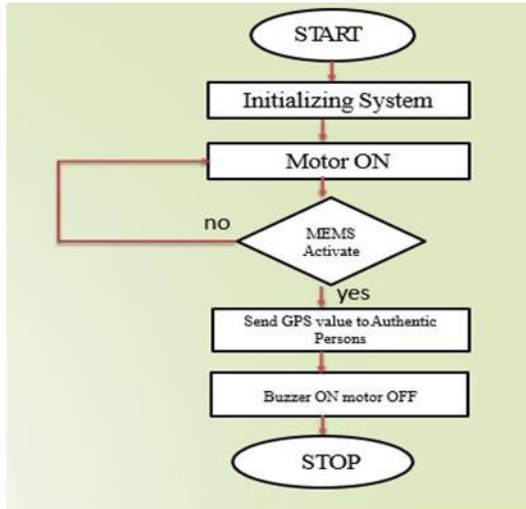Fig 6 : LCD Display

Fig 7 : LCD Pin Diagram

FLOWCHART

Fig 8 : Flow chart of the proposed module

WORKING PRINCIPLE

When a vehicle meets with an accident MEMS accelerator sensor will detect the signal and convert it into digital data form. This data will be analyzed through Arduino Nano. The Arduino sends the alert message through the GSM Module and the location will be detected through GPS module. The vehicle stops ,when buzzer is indicating.
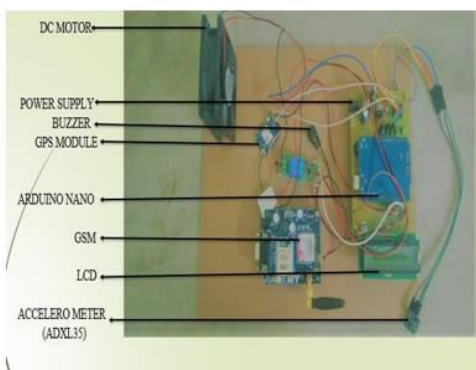
INTERFACING ARDUINO NANO

Fig 9 : Hardware Model of Accident Alert System

RESULTS

The output is displayed on the LCD screen and the beep sound through the buzzer.

The output is detected when the accident happens through the MEMS Accelerometer and the engine stops.

The results are as following pictures:

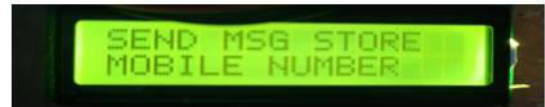Fig 10 : when the prototype is on

Fig 11 : Indication to register the mobile number
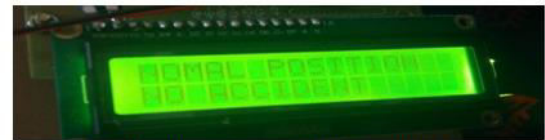

Fig 12 : when no mishap happened

Fig 13 : when the accident is detected

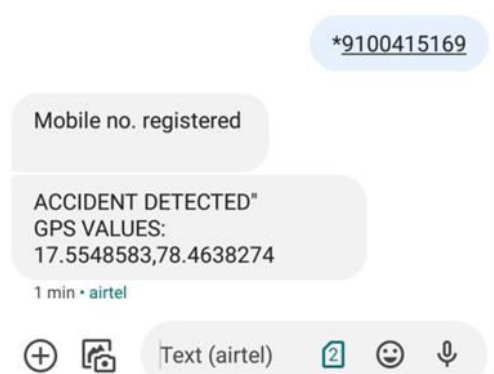Fig 14 : The display of the GPS Values sent to the registered numbers

Fig 15 : the message received to the registered number

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.

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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