

Accident Alert and Vehicle Tracking System using GPS and GSM

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ABSTRACT

Nowadays, street injuries are extraordinarily high. On time remedy can facilitate in saving lives. Integrated engineering can be a contemporary fashion to remedy issues. To be capable of fashion a product exploitation an included generation are beneficial to any engineering troubles and an substantial contribution to the community. a essential indicator of survival charges while an coincidence is that the time among the coincidence and while emergency clinical employees are despatched to the coincidence location. By doing away with the time among while an coincidence takes place and while the number one responders are dispatched to the scene decreases mortality and can store lives. One technique to doing away with the postpone among coincidence prevalence AND 1st respondent dispatch is to apply in automobile automated coincidence detection and notification systems. conjointly following a automobile simply in case of any thieving has emerge as a intricate job. this approach ambitions to alert the near and expensive ones of the character in the automobile concerning the coincidence to deliver on the spot clinical aid. at some stage in this System as soon as a automobile meets with an coincidence now Impact sensor, small electro system (mems) can detects the sign and sends it to Arduino (Atmega328P). now microcontroller sends the sign to GPS module to provide the perfect fee of the geographical coordinates that carries the really well worth of longitude, range and altitude. in a while the microcontroller sends the alert message via the GSM module to the near and expensive ones. conjointly simply in case of any thieving our mission enables the proprietor to induce his automobile's function in phrases of Latitude and meridian and a hyperlink directional to the google maps as soon as the proprietor sends a SMS to the SIM applied withinside the system.

Keywords: Accident alert, Vehicle tracking, MEMS, SMS, GSM, GPS, Arduino UNO.

1. Introduction

Accidents on the road very high these days. In mean Time medical facilitate can save lives. Embedded engineering is that the latest trend for downside solving. having the ability to style a product victimisation integrated technology can profit all the technical problems and build an enormous contribution to the community. a very important indicator of crash survival is the time from the time of an accident to once paramedics are sent to the scene of the accident. By eliminating the time between when an accident happens and when the primary responders are dispatched to the scene decreases rate and may save lives. One approach to eliminating the delay between accident incidence AND initial communicator dispatch is to use in vehicle automatic accident detection and

notification systems. conjointly pursuit a vehicle just in case of any felony has become a tricky job. this technique aims to alert the close to and pricey ones of the person within the vehicle concerning the accident to supply immediate medical aid. during this System once a vehicle meets with an accident now Impact sensor, small electro system and can detects the signal and sends it to Arduino (Atmega328P). Then Immediately, the microcontroller sends the symptom to the GPS module to supply correct values for geographic coordinates, as well as great circle, latitude, and altitude values. The microcontroller then sends a warning message to relatives via the GSM module. In addition, in our project, if the owner is stolen, the situation of the vehicle in latitude and longitude and a link to Google Maps if the owner sends an SMS to the SIM card utilized in the system. is obtained.

2. Embedded Block Units

2.1 The Main Control Module

In this layout we've got selected a microcontroller board known as Arduino uno that's an open supply microcontroller board primarily based totally on the Microchip ATmega328P microcontroller and advanced with the aid of using Arduino.cc. The ATmega328P Microcontroller is a excessive overall performance eight-bit Pico supply, automated voltage regulator (AVR), RISC primarily based totally microcontroller incorporating 32 KB ISP Flash reminiscence with read-write capability, 102, B EEPROM, 2 KB SRAM, 23 I General Line/O motive, 32 trendy motive running registers, 3 bendy counters/timers with examine modes, inner and outside interrupts, serial with Programmable USART, Byte-directed two-cord serial interface, SPI serial port, 6-channel 10-bit A/D Converter (eight channels in TQFP and QFN/MLF package), Timer Programmable with oscillator and 5 software program-selectable power-saving modes. The tool operates among 1.85 five volts. The Arduino uno board is geared up with units of virtual and analog input/output (I/O) pins that may be interfaced with diverse enlargement boards (shields) and different circuits [1]. The board has 1 digital I/O pins (six with PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (included improvement environment), through a USB TypeC cable. The Arduino Uno has numerous functions for speaking with a pc, any other Arduino board, or any other microcontroller. The ATmega328 offers UARTTTL

(5V) and serial verbal exchange to be had on virtual pins zero (RX) and 1 (TX). The

ATmega16U2 integrates serial verbal exchange through USB and looks as a software program digital COM port to your pc. The 16U2 firmware makes use of general USB COM drivers and calls for no outside drivers. However, on Windows, you want an .inf file. The Arduino software program (IDE) consists of a serial reveal that may ship and obtain plaintext facts to and from the board. The integrated RX and TX LEDs will blink while facts is transferred to the pc through the USB chip and the USB connection (however now no longer for the serial verbal exchange of pins zero and 1). The software program `serial library allows serial verbal exchange on any virtual Uno pin.

2.2 GPS Modem

The exact location on earth may be familiar GPS latitude, great circle info. The GPS system can be a house-based mostly radio navigation system which consist of a constellation of satellites and a network of ground stations

used for observation and control. It is operated and maintained by the Department of Defense (DOD). It is a constellation of satellites in orbit around the Earth that transmit their positions in space likewise because of the precise time. it's the receiver that collects information from the satellites and computes its location anyplace within the world-supported information it gets from the satellites. the guts of the GPS electronic equipment within the system is a NEO-6M GPS chip from u-blox. It will track up to twenty-two satellites on fifty channels level of sensitivity i.e. -161 dB tracking, whereas intense only 45mA offer current. one in every of the simplest options the chip provides is Power Save Mode (PSM). It permits a discount in system power consumption by selection shift elements of the receiver ON and OFF. This dramatically reduces the power consumption of the module to merely 11mA creating it appropriate for power-sensitive applications like GPS wristwatches. This includes pins needed for communication with a microcontroller over UART. The module supports information measures from 4800bps to 230400bps with a default band of 9600.

2.3 GSM Modem

GSM electronics are devices used in mobile devices or modems that processors can use to create laptops and communicate over networks. For operation, a SIM card is required for operation within the network coverage signed by the network operator. You can connect to your computer using a serial, USB, or Bluetooth connection. GSM modems combine various GPRS applications for group operation of terminals to provide chain management, security applications, meteorological stations, and remote information recording. The GSM modem used in the system is a high-resolution dual-band GSM / GPRS dual-band SIM900A module that can be integrated into client applications for a compact and cost-effective solution. In addition to the industry standard interface, the SIM900A provides 900 /

1800MHz GSM / GPRS performance for voice, SMS, data, and fax with a small form factor and low power consumption.

The SIM900A measures 2mm x 2 mm x 3 mm, allowing for a particularly slim and compact design.

3. System Features and their Working

3.1 Architecture of the Proposed System

The proposed system includes an accident detection and warning system and a vehicle tracking system. The collision detection system continuously monitors the vehicle and detects whether the vehicle is in the normal driving position, has fallen, or has collided with the vehicle. When various connected sensors detect a vehicle collision, the system uses the GPS module connected to the system to incorrectly save the contact number specified in the program. It is saved in the microcontroller (Atmega 328P). Get immediate notification of your location. In case of theft, the owner will send an SMS to the SIM card used in the system. This tag contains the word Song. B. When tracking a vehicle, the system sends an alert message to the owner indicating the location of the vehicle. Figures 1 and 2 show the general architecture of the system.

3.2 Accident Detection and Alerting System

This system detects whether the vehicle has fallen down . This module consists of three sensors namely, transducer, MEMS, and Smoke sensor. Once the vehicle accident is detected the information is sent to the second part of the system. The second part consists of an Arduino UNO, GSM module, and GPS module. When any of the three sensors get activated based on the level of impact then the micro-controller Atmega in the Arduino fetches the location from the GPS receiver and sends the corresponding information to the contact number mentioned in the which Is dumbbed in the Arduino i.e., to near and dear ones via SMS.

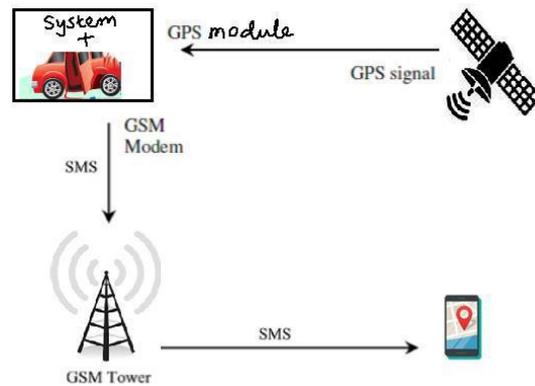


Fig.1. High level architecture of Accident detection and alerting system

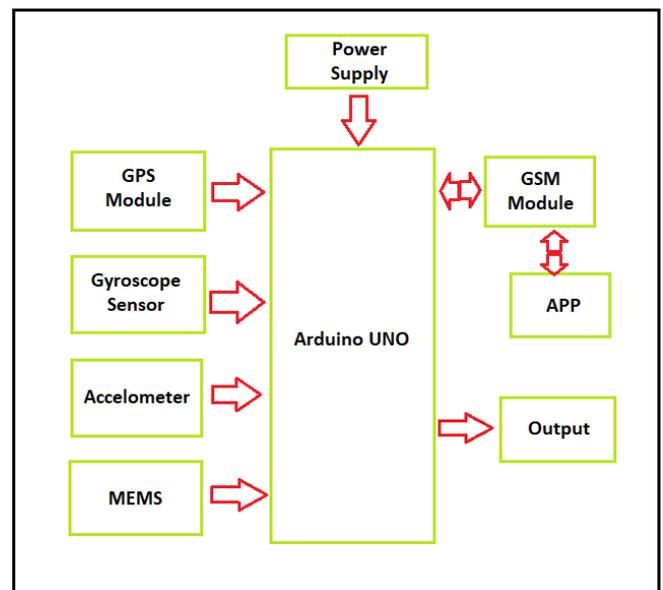


Fig.2. Block Diagram of the System

4. Algorithm for Different Processes in the System

The flowchart describing the operation of the proposed system is as shown in the figure 3.

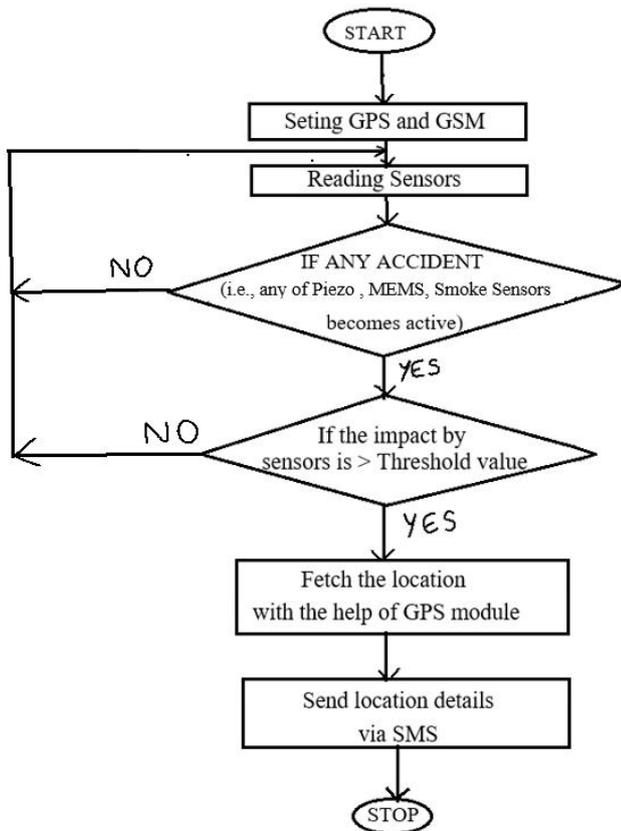


Fig.3. Flow chart of the Accident Detection and Alert System

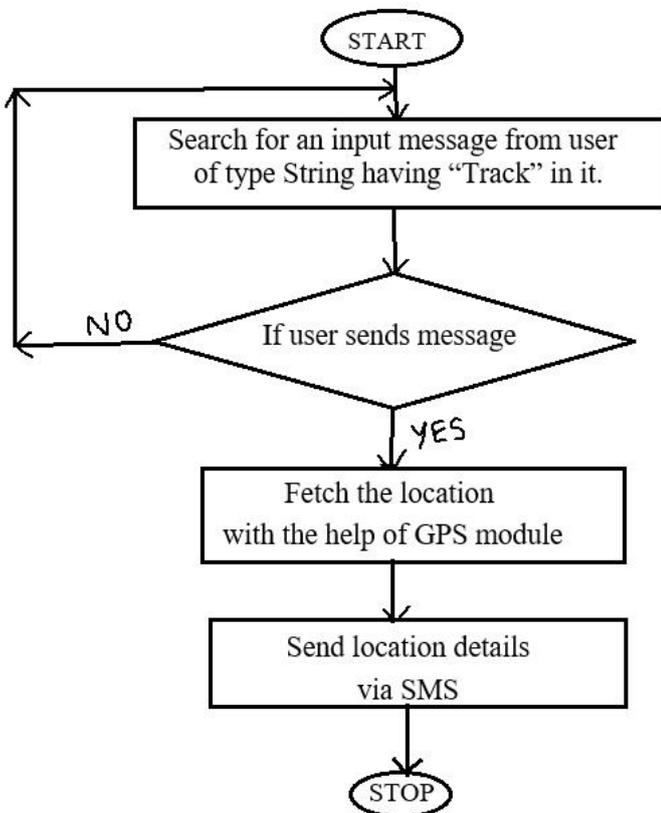


Fig.4. Flow chart of the Accident Detection and Alert System

The flowchart describing the operation of the proposed system is as shown in the figure 4.

5. Debugging and Results

A. After interfacing sensors, GSM, GPS module the system is dumped in with a program with the help of Arduino IDE (1.8.12) after debugging successfully



```

    #include <TinyGPS++>
    #include <SoftwareSerial.h>
    #include <LiquidCrystal.h>
    int Contrast=135;
    LiquidCrystal lcd(12, 11, 7, 8, 9, 10);

    static const int RXPin = 4, TXPin = 3;
    static const uint32_t GPSBaud = 9600;
    // The TinyGPS++ object
    TinyGPSPlus gps;
    int temp=0.1;
    // The serial connection to the GPS device
    SoftwareSerial ss(RXPin, TXPin);
    String stringVal = "";
    int mem=0;
    int mem2=0;

    int smoke=A1;
    int vibrate=A2;
    void setup() {
      Serial.begin(9600);
      ss.begin(GPSBaud);
      lcd.begin(16, 21);
      analogWrite(6, Contrast);
      pinMode(13, OUTPUT);
      digitalWrite(13, LOW);
      lcd.print("Vehicle Tracking");
      lcd.setCursor(0, 1);
      lcd.print(" System ");
      delay(2000);
      //gsm_init();
  
```

Fig.5. Executing program using Arduino IDE (1.8.12)

B. Message alert when accident occurred

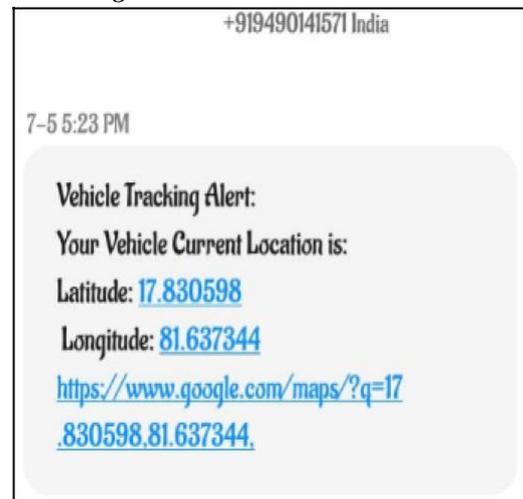


Fig.6. SMS to mobile in case of accident

6. Conclusion

Each and every human life is precious and worth saving. Life should be not end on road waiting for help in accident by vehicle. This projects shouts out for help where we are unable to shout for help. The system can detect the accident and then alert the victim's near and dear ones to provide medical aid to

accident victim. GPS, gyroscope, magnetometer sensors, MEMS are used to determine whether an accident had occurred. The communications between the system and the responder or owner is done by GSM. We have observed the performance and data of accident detection and alerting via SMSs using GPS, GSM and sensors, which is achieved by Web App where the whole Database can be seen. It helps not only in finding the location of vehicle but also it is helpful in saving the lives of victims by finding where an accident has happened.

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