Iot based automatic accident detection and rescue management system

A Project report submitted in partial fulfilment
of the requirements for the degree of B. Tech in Electrical Engineering

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Place:

Date:

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CERTIFICATE
To whom it may concern

This is to certify that the project work entitled **IOT Based Automatic Accident Detection And Rescue Management System Based on Arduino** is the bona fide work carried out by **Rohan Mahanti(EE 2018/031), Koushik Biswas(EE 2018/030), Gourav Mallick(EE 2018/032), Anay Sarkar(EE 2018/024)**, a student of B.Tech in the Dept. of Electrical Engineering, RCC Institute of Information Technology (RCCIIT), Canal South Road, Beliaghata, Kolkata-700015, affiliated to Maulana Abul Kalam Azad University of Technology (MAKAUT), West Bengal, India, during the academic year 2021-22, in partial fulfilment of the requirements for the degree of Bachelor of Technology in Electrical Engineering and this project has not submitted previously for the award of any other degree, diploma and fellowship.

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Signature of the HOD, EE
Name: D. Mondal
Designation Professor

Signature of the External Examiner
Name:
Designation:

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List of Acronyms:

1. A.I – Analog Input
2. SDA – Serial Data
3. SCL – Serial Clock
4. D.I – Digital Input
5. GND – Ground
6. RX – Receiving Pin
7. TX – Transmitting Pin
8. ST – Self Test Pin
9. VCC - 5V Power Supply
10. X – X Axis Analog Output Pin
11. Y – Y Axis Analog Output Pin
12. Z – Z Axis Analog Output Pin
13. VEE – Contrast Control
14. RS – Register Select
15. RW – Read/Write
16. E - Enable

List of Figures:

Abstract:

This paper deals with the concept which can detect accidents without any human assistance and also can monitor vital information of a patient in an ambulance. Detection of accidents is done automatically by using a simple setup that will be embedded in the vehicle. Once the vehicle met with an accident the accident detection setup will sense the accident and immediately sends the location of the accident to an ambulance. After receiving the coordinates to the accident spot the ambulance will be rushed to the same. Once the victim is collected into the ambulance the patient will then be attached to another setup which will continuously monitor his vital information such as pulse, temperature, and blood pressure.

Chapter-1: Introduction

1.1 Overview -

In urban areas accidents are most common phenomena where many of such accidents can be taken care easily but some accidents occur during night time when the visibility is quite low, during such cases it will be difficult for an ambulance driver to identify the accident spot with the help of phone calls made by the citizens. If the driving force knows the precise spot of the accident the time period between the spot and the hospital is going to be significantly reduced. The main objective of this paper is to help reduce the time factor in case of accidents. There are many cases where an accident occurs during the night and the person met with the accident is unconscious then it would take hours for someone to find out and inform the authorities about it. So saving such precious time will indeed save lives. In connection with this concept, an experimental setup is constructed that can detect accidents automatically without any human help. After the accident detection, the same setup will send accident coordinates to the ambulance to help to find the location easily. Once the victim is transferred into the ambulance a second setup is connected to the patient which will continuously monitor the vital information of the patient to keep him stable.

1.2 Literature Survey –

Chunxiao Liao, et. al proposed a "Shrewd Traffic Accident Detection System Based on Mobile Edge Computing" in the year 2017. This paper proposes a savvy car crash location framework dependent on Mobile Edge Computing with vicinity, low idleness and processing, and vehicle recognizable proof. Our framework uses basic cell phones to get increasing speed and speed anddistinguishes pictures indicating mishap scenes primarily at servers if there should arise an occurrence of bogus positives, acknowledging computerization of mishap identification and advising environmental factors and divisions like clinics and branches of transportation progressively. Sanjana. K.R, et. al proposed "An Approach on Automated Rescue System with Intelligent Traffic Lights for Emergency Service" in the year 2015. They proposed a framework which will naturally identify street mishaps utilizing sensors, advise them to close by crisis administrations and family members through GSM. It is completely computerized, finds the mishap spot utilizing Google guide, and controls the traffic lights, assisting with arriving at the emergency clinic in time. This framework can be viably executed in high populated nations like India. Bankar Sanket Anil, Kale Aniket Vilas, Prof. S. R. Jagtap proposed an" Intelligent System for Vehicular Accident Detection and Notification" in the year 2014. This paper presents a system which gives an idea about what can be done to provide medical help and other facilities after the accident as soon as possible. A flex sensor and accelerometer can be used to detect an accident, while the location of the accident will be told to desired persons, such as the nearest hospital, police, and owner of the vehicle through SMS sent using GSM modem containing coordinates obtained from GPS along with the time of the accident and vehicle number. The camera located inside the vehicle will transmit real-time video to see the current situation of passengers inside the vehicle. Thus this paper emphasizes the post-accident system for detecting and informing about it. Simulation result on the hyper terminal is also presented in this paper. NajiTaaib Said Al Wadhahi, et. al proposed "Mishaps Detection and Prevention System to decrease Traffic Hazards utilizing IR Sensors" in the year 2018. This paper is utilizing IR sensors and Arduino Uno innovation. The framework has two stages Accident Detection and Accident Prevention. The recognition eliminate is conveyed utilizing IR sensors that could recognize and alarm the individuals by sending SMS utilizing GSM module that contains predefined numbers and mishap area utilizing GPS

module. Second Phase, Accident counteraction is done utilizing IR sensors by notice the driver about the neighboring vehicles when the separation between them is past the edge esteem. Reenactment results and Prototype is introduced in this paper. Nicky Kattukkaran et. al proposed an " Intelligent Accident Detection and Alert System for Emergency Medical Assistance" in the year 2017. This system aims to alert the nearby centre about the accident to supply immediate medical care. The attached accelerometer within the vehicle senses the lean of the vehicle and therefore the heartbeat sensor on the user's body senses the abnormality of the heartbeat to know the seriousness of the accident. Thus the systems will make the choice and send the knowledge to the smartphone, connected to the accelerometer and heartbeat sensor, through Bluetooth. The Android application on the mobile phone will be sent a text message to the nearest medical center and friends. The application also shares the exact location of the accident that can save time. Arif Shaik et. al proposed "Keen Car: An IoT Based Accident Detection System" in the year 2018. This paper portrays the plausibility of furnishing a vehicle with innovation which will recognize a mishap and promptly ready crisis staff. When there is an auto collision somebody needs to effectively look for help, for example, calling 911 for crisis administrations. There is no programmed warning to the police, emergency vehicle, companions, or family. The Internet of Things (IoT) are frequently wont to deliver a programmed notice and reaction to the scene. A sign from an accelerometer and a GPS sensor is consequently sent to the cloud and from that point, an alarm message will be gotten by whoever is bought in to that vehicle. The sign will show the seriousness of the mishap and the GPS area. The rescue vehicle will utilize the GPS directions to get to the scene rapidly.

Chapter-2 : Theory

2.1 Basic Theory and Operation –

In urban areas accidents are most common phenomena where many of such accidents can be taken care easily but some accidents occur during night time when the visibility is quite low, during such cases it will be difficult for an ambulance driver to identify the accident spot with the help of phone calls made by the citizens. If the driving force knows the precise spot of the accident the time period between the spot and the hospital is going to be significantly reduced. The main objective of this paper is to help reduce the time factor in case of accidents. There are many cases where an accident occurs during the night and the person met with the accident is unconscious then it would take hours for someone to find out and inform the authorities about it. So saving such precious time will indeed save lives. In connection with this concept, an experimental setup is constructed that can detect accidents automatically without any human help. After the accident detection, the same setup will send accident coordinates to the ambulance to help to find the location easily. Once the victim is transferred into the ambulance a second setup is connected to the patient which will continuously monitor the vital information of the patient to keep him stable.

2.2 Block Diagram of the System-

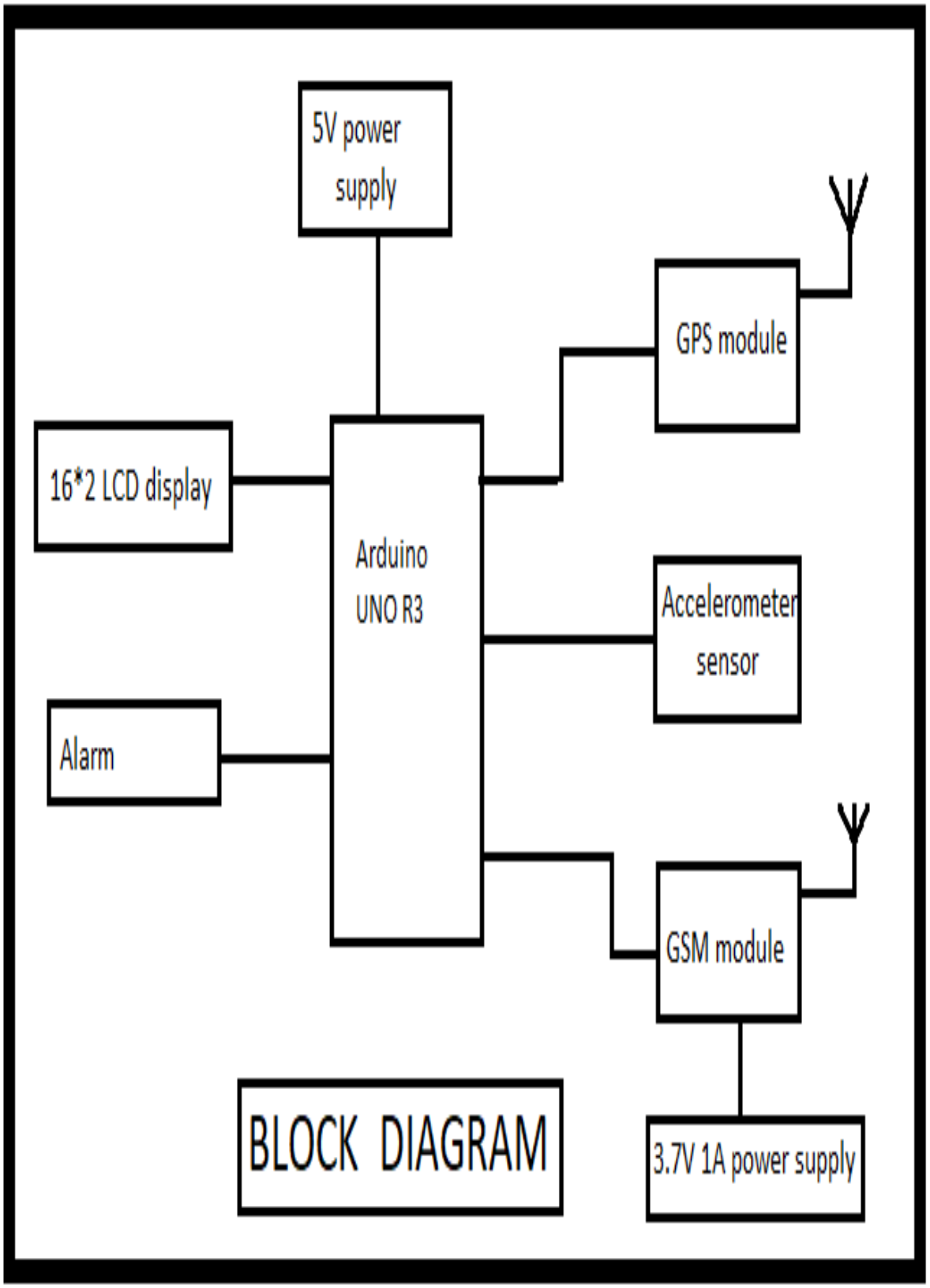

Figure 1: Block Diagram

2.3 Advantages of Proposed System –

- Fast recovery and quick process.
- Monitor all hazards and threats in both
- network coverage and no network areas.
- Wireless monitoring and user friendly

Chapter – 3: Proposed System and Hardware Architecture

3.1 Features of Proposed system –

The main principle of the project is the detection and rescue management. The system is on and initialization. If vehicle is normal, no messages has been sent to rescue team. And the temperature level of the driver is monitored in all the time, if it reaches the threshold level then the action has been taken automatically. Whenever accident occurred, the MEMS sensor, tilt sensor and fire sensor detects the accident happened with vehicle. The controller get the input from sensors and send the accident alert information to road side unit and then message is send to the rescue team and also WIFI and GPS finds location of the vehicle and that also send to the rescue team. It will facilitate connectivity to the nearest hospital and provide medical help through IOT technology.

3.2 Proposed Hardware Architecture –

It contains NodeMCU ESP8266, GPS receiver, tilt sensor, buzzer, and switch. If any accident occurs then the car may be tilted in XYZ directions and the buzzer starts beep sound and by using the wifi module NodeMCU esp8266 and GPS module will send the location to the nearest ambulance by using the Blynk app. By this ambulance can reach the accident location and can save a life by taking the victim to the nearest hospital. If there is any minor accident by using the kill switch it can stop the entire rescue operation.

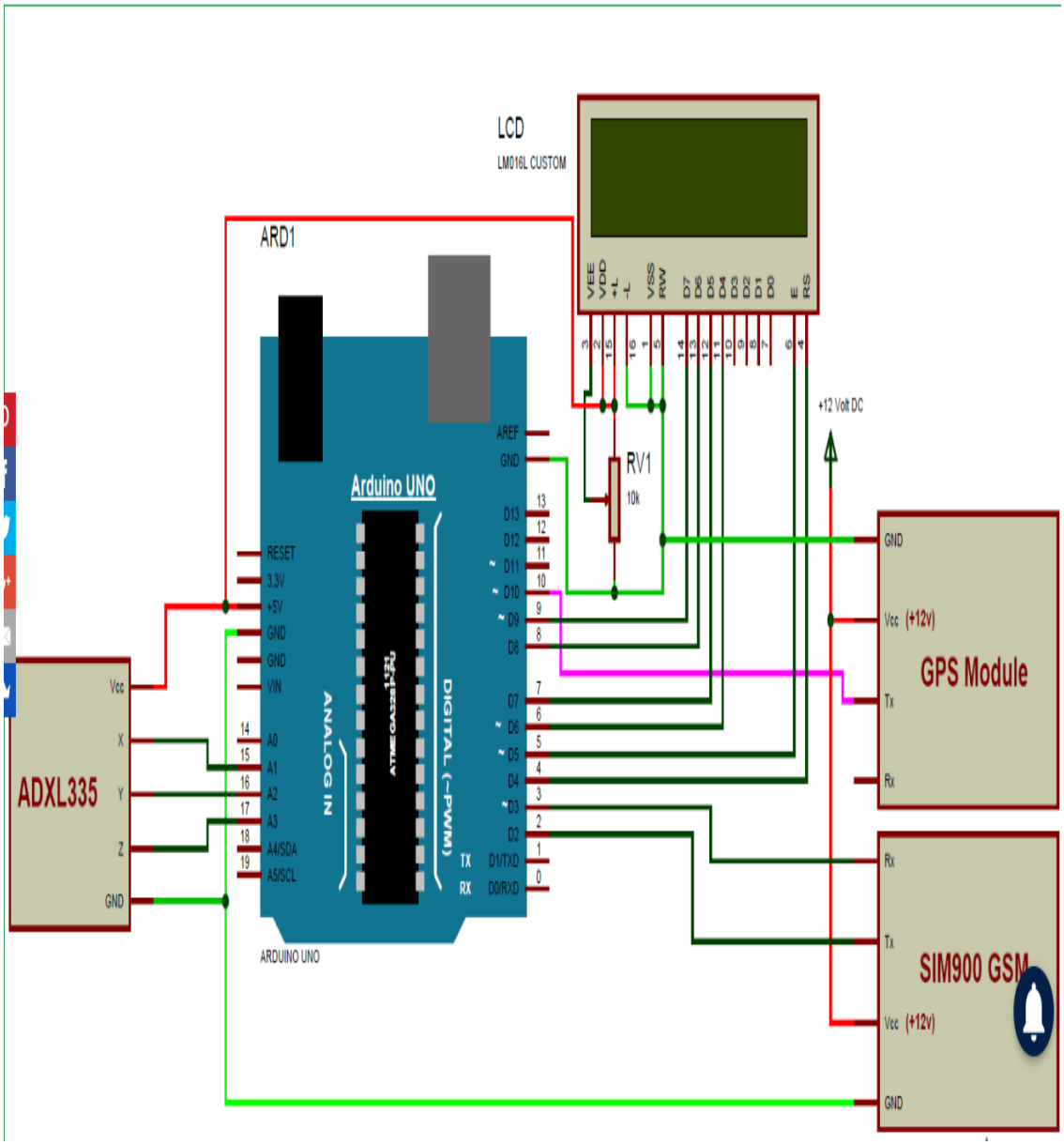

Figure 2: Hardware Architecture

3.3 List of Required Hardware Components –

Serial No.	Name of the components	Est. Cost
1.	Accelerometer Sensor (ADXL-335)	400
2.	Arduino UNO	400
3.	GSM Module (GSM 800L)	700
4.	GPS Module	600
5.	16*2 LCD Display	150
6.	4056 Charging Module	50
7.	3.7 V Li ion battery	50

3.4 Details of Hardware Components –

3.4.1Accelerometer Sensor(ADXL 335) –

An accelerometer is an electromechanical device that will measure acceleration force. It shows acceleration, only due to cause of gravity i.e. g force. It measures acceleration in g unit. On the earth, 1g means acceleration of 9.8 m/s2 is present. On moon, it is 1/6th of earth and on mars it is 1/3rd of earth.

Accelerometer can be used for tilt-sensing applications as well as dynamic acceleration resulting from motion, shock, or vibration.

The ADXL335 gives complete 3-axis acceleration measurement.

This module measures acceleration within range ±3 g in the x, y and z axis.

The output signals of this module are analog voltages that are proportional to the acceleration.

It contains a polysilicon surface-micro machined sensor and signal conditioning circuitry.

Accelerometer ADXL335 Pinout Configuration –

Pin Name	**Description**
VCC	The Vcc pin powers the module, typically with +5V
GND	Power Supply Ground
X	X-axis Analog Output Pin
Y	Y-axis Analog Output Pin
Z	Z-axis Analog Output Pin
ST	Self-Test Pin. This pin controls the Self-Test feature.

Accelerometer Module Features & Technical Specifications

- Operating Voltage: 3V to 6V DC
- Operating Current: 350µA
- Sensing Range: ±3g
- 3-axis sensing
- High Sensitivity for small movements
- Needs no external components
- Easy to use with Microcontrollers or even with normal Digital/Analog IC
- Small, cheap and easily available

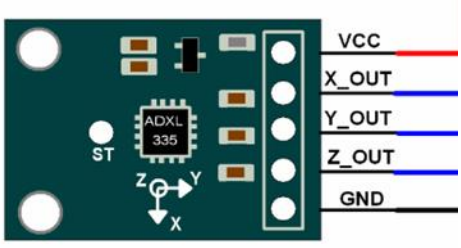

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Figure 3: ADXL 335

3.4.2 Arduino UNO –

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your Uno without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again."Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino .

Arduino Uno Pinout Configuration

Pin Category	**Pin Name**	**Details**
Power	Vin, 3.3V, 5V, GND	Vin: Input voltage to Arduino when using an external power source. 5V: Regulated power supply used to power microcontroller and other components on the board. 3.3V: 3.3V supply generated by on-board voltage regulator. Maximum current draw is 50mA. GND: ground pins.
Reset	Reset	Resets the microcontroller.
Analog Pins	A0 – A5	Used to provide analog input in the range of 0-5V

Input/Output Pins	Digital Pins 0 - 13	Can be used as input or output pins.
Serial	0(Rx), 1(Tx)	Used to receive and transmit TTL serial data.
External Interrupts	2, 3	To trigger an interrupt.
PWM	3, 5, 6, 9, 11	Provides 8-bit PWM output.
SPI	10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK)	Used for SPI communication.
Inbuilt LED	13	To turn on the inbuilt LED.
TWI	A4 (SDA), A5 (SCA)	Used for TWI communication.
AREF	AREF	To provide reference voltage for input voltage.

Arduino Uno Technical Specifications

Microcontroller	ATmega328P – 8 bit AVR family microcontroller
Operating Voltage	5V
Recommended Input Voltage	7-12V
Input Voltage Limits	6-20V
Analog Input Pins	6 (A0 – A5)
Digital I/O Pins	14 (Out of which 6 provide PWM output)
DC Current on I/O Pins	40 mA
DC Current on 3.3V Pin	50 mA

Flash Memory	32 KB (0.5 KB is used for Bootloader)
SRAM	2 KB
EEPROM	1 KB
Frequency (Clock Speed)	16 MHz

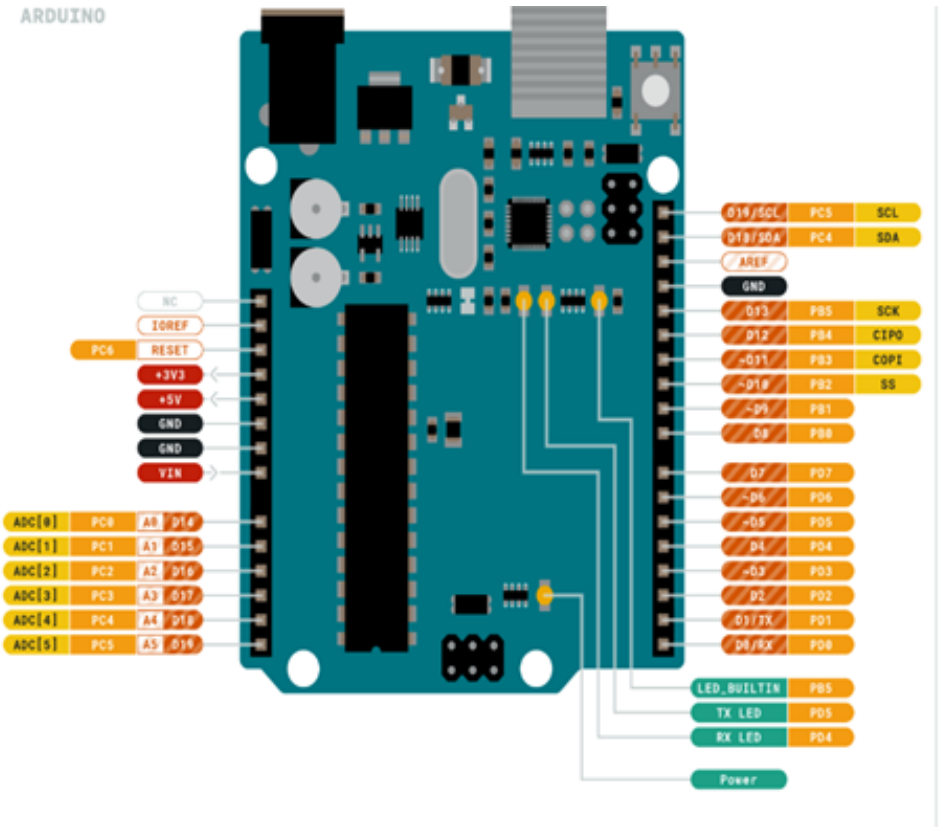


Figure 4: Arduino UNO

3.4.3 GSM Module(GSM 800L) –

Whether you want to listen to what happens in your house that's miles away from you or activate sprinkler system in your garden just with a silent call; Then SIM800L GSM/GPRS module serves as a solid launching point for you to get you started with IoT!

SIM800L GSM/GPRS module is a miniature GSM modem, which can be integrated into a great number of IoT projects. You can use this module to accomplish almost anything a normal cell phone can; SMS text messages, Make or receive phone calls, connecting to internet through GPRS, TCP/IP, and more! To top it off, the module supports quad-band GSM/GPRS network, meaning it works pretty much anywhere in the world. At the heart of the module is a SIM800L GSM cellular chip from Sim Com. The operating voltage of the chip is from 3.4V to 4.4V, which makes it an ideal candidate for direct LiPo battery supply. This makes it a good choice for embedding into projects without a lot of space. All the necessary data pins of SIM800L GSM chip are broken out to a 0.1″ pitch headers. This includes pins required for communication with a microcontroller over UART.

The module supports baud rate from 1200bps to 115200bps with Auto-Baud detection. The module needs an

external antenna to connect to a network. The module usually comes with a Helical Antenna and solders directly to NET pin on PCB. The board also has a U.FL connector facility in case you want to keep the antenna away from the board.

SIM800L Pinout Configuration

Pin Number	Pin Name	Description
1	NET	External antenna attachment pin
2	VCC	Power supply pin, 3.4V to 4.4V input
3	RST	Reset pin, pull low for 100ms to perform hard reset

4	RXD	Serial data input
5	TXD	Serial data output
6	GND	Module ground reference
7, 8	SPK	Speaker differential output
9, 10	MIC	Microphone differential input
11	DTR	Serial data terminal ready pin, pull high to enable sleep mode
12	RING	Interrupt output, active low

Features and Specifications

- Full modem serial port
- Two microphone inputs and speaker output
- SIM card interface
- Supports FM and PWM
- Sleep mode with 0.7mA current

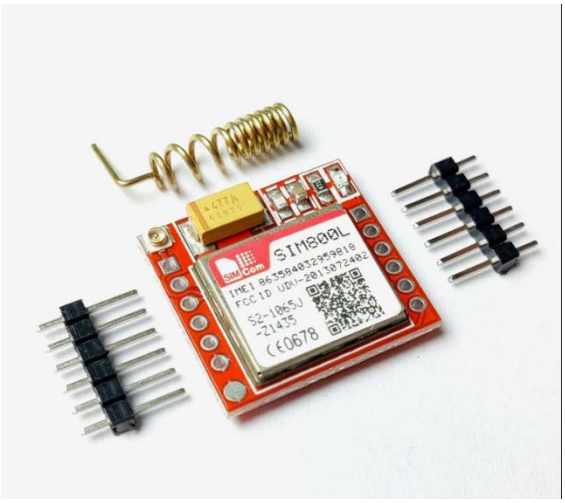


Figure 5: GSM 800L

3.4.4 GPS Module –

GPS is the abbreviation of Global Positioning System, which is a satellitenavigation system, which is about 20,000km away from the Earth. It can provide us with location and time information. It can work 24 hours a day under any conditions.
A complete GPS requires at least 24 satellites. As technology develop, more than 33 satellites work together in the system of GPS. Now we can use GPS in the navigation of airplanes,cars and trucks,GPS tracker that is aterminal devicebased on GPSpositioningtechnology.The US Department of Defense (USDOD)initially onlyput these satellites into orbit for military use, such as controlling missile launches, until the1980s, they weremade available for civilian use. Since then,we can see thatvarious applications of GPS appeare

Pinout configuration:

Pin Name	Description
VCC	Positive power pin
RX	UART receive pin
TX	UART transmit pin
GND	Ground

Technical Specifications

Frequency	1575.42MHz-L1 C/A Code
Cold Start Time	45 sec.
I/O Port	UART interface
Warm Start Time	38 sec
Protocol	NMEA 0183
Hot Start Time	10 sec.
GPS Channel	16 Channels
Reacquisition	100ms
Operating Voltage	3.0 V ~ 6.0 V
Update Rate	1Hz
Operating Temperature	-40°C ~ +85°C
External Antenna	
Current Range	2mA ~ 25mA
Power Consumption	27mA
I/O Connector	1.27mm Pin

Figure 6: GPS Module

3.4.5 LCD Display –

In LCD 16×2, the term LCD stands for Liquid Crystal Display that uses a plane panel display technology, used in screens of computer monitors & TVs, smartphones, tablets, mobile devices, etc. Both the displays like LCD & CRTs look the same but their operation is different. Instead of electrons diffraction at a glass display, a liquid crystal display has a backlight that provides light to each pixel that is arranged in a rectangular network.

Every pixel includes a blue, red, green sub-pixel that can be switched ON/OFF. Once all these pixels are deactivated, then it will appear black and when all the sub-pixels are activated then it will appear white. By changing the levels of each light, different color combinations are achievable. This article discusses an overview of LCD 16X2 & its working with applications.

An electronic device that is used to display data and the message is known as LCD 16×2. As the name suggests, it includes 16 Columns & 2 Rows so it can display 32 characters (16×2=32) in total & every character will be made with 5×8 (40) Pixel Dots. So the total pixels within this LCD can be calculated as 32 x 40 otherwise 1280 pixels

Pin configuration:

r. No	Pin No.	Pin Name	Pin Type	Pin Description	Pin Connection
1	Pin 1	Ground	Source Pin	This is a ground pin of LCD	Connected to the ground of the MCU/ Power source
2	Pin 2	VCC	Source Pin	This is the supply voltage pin of LCD	Connected to the supply pin of Power source
3	Pin 3	V0/VEE	Control Pin	Adjusts the contrast of the LCD.	Connected to a variable POT that can source 0-5V
4	Pin 4	Register Select	Control Pin	Toggles between Command/Data Register	Connected to a MCU pin and gets either 0 or 1. 0 -> Command Mode 1-> Data Mode
5	Pin 5	Read/Write	Control Pin	Toggles the LCD between Read/Write	Connected to a MCU pin and gets either 0 or 1.

				Operation	0 -> Write Operation 1-> Read Operation
6	Pin 6	Enable	Control Pin	Must be held high to perform Read/Write Operation	Connected to MCU and always held high.
7	Pin 7-14	Data Bits (0-7)	Data/Command Pin	Pins used to send Command or data to the LCD.	In 4-Wire Mode Only 4 pins (0-3) is connected to MCU In 8-Wire Mode All 8 pins(0-7) are connected to MCU
8	Pin 15	LED Positive	LED Pin	Normal LED like operation to illuminate the LCD	Connected to +5V
9	Pin 16	LED Negative	LED Pin	Normal LED like operation to illuminate the LCD connected with GND.	Connected to ground

Technical Specification:

This 16x2 lcd display has the outline size of 80.0 x 36.0 mm and VA size of 66.0 x 16.0 mm and the maximum thickness is 13.2 mm. WH1602W 16x2 LCD Displays are built-in controller ST7066 or equivalent. It is optional for + 5.0 V or + 3.0 V power supply. The LEDs can be driven by pin 1, pin 2, or pin 15 pin 16 or A/K.

Figure 7: 16*2 LCD

3.4.6 TP4056A Li-ion Battery Charging Module –

Pin Configuration:

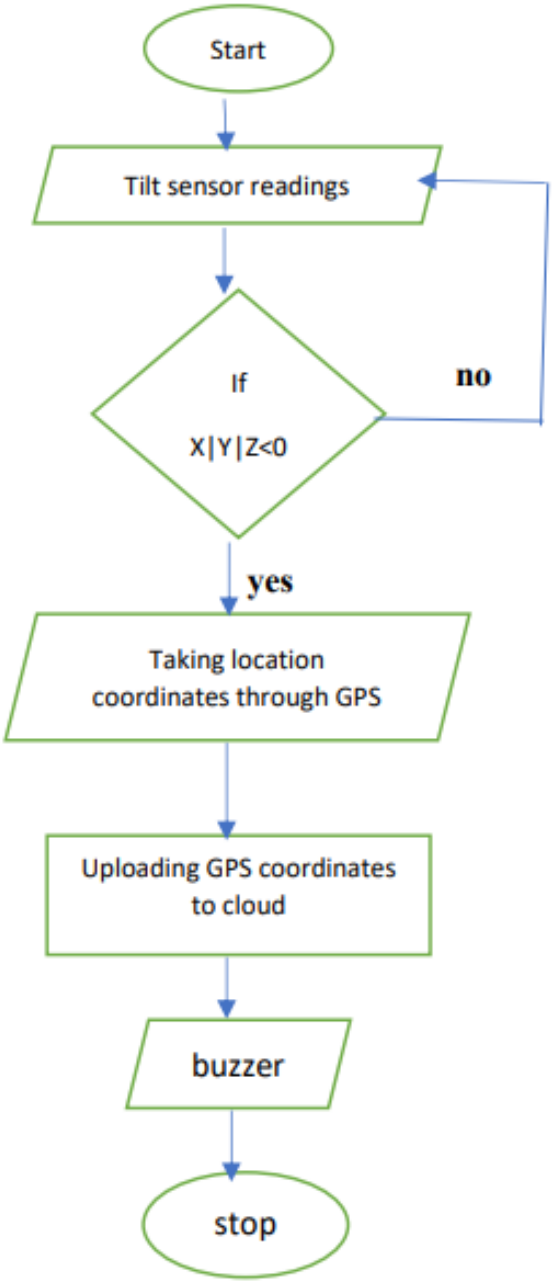
No:	Pin Name	Description
1	OUT +	This pins outputs the positive voltage from battery. It should be connected to the circuit which has to be powered by the battery
2	B +	Outputs positive voltage from USB cable to charge to battery. It should be connected to the positive of the battery
3	B -	Outputs negative voltage from USB cable for charging battery. It should be connected to negative of the battery
4	OUT -	This pin outputs negative voltage from battery. It should be connected to the ground of circuit which has to be powered by the battery
5	IN +	Should provide +5V, can be used if charge cable not available
6	IN -	Should provide ground of the +5V supply, can be used if charge cable not available
7	LED Red	This LED turns on while the battery is charging
8	LED Green	This LED turns on after the battery is fully charged

Module Specifications:

- This module can charge and discharge Lithium batteries safely
- Suitable for 18650 cells and other 3.7V batteries
- Charging current – 1A (adjustable)
- Input Voltage: 4.5V to 5.5V
- Full charge voltage 4.2V
- Protects battery from over charging and over discharging
- No verse polarity protection

Chapter 4 : Algorithms

4.1 Flow Chart of the System –



4.2 Source Code –

```
#include<SoftwareSerial.h>
SoftwareSerial Serial1(2,3); //make RX arduino line is pin 2, make TX arduino line is pin 3.
SoftwareSerial gps(10,11);
#include<LiquidCrystal.h>
LiquidCrystal lcd(4,5,6,7,8,9);

#define x A1
#define y A2
#define z A3

int xsample=0;
int ysample=0;
int zsample=0;

#define samples 10

#define minVal -50
#define MaxVal 50

int i=0,k=0;
int  gps_status=0;
float latitude=0;
float logitude=0;
String Speed="";
String gpsString="";
char *test="$GPRMC";

void initModule(String cmd, char *res, int t)
{
  while(1)
  {
    Serial.println(cmd);
```

```
    Serial1.println(cmd);
    delay(100);
    while(Serial1.available()>0)
    {
      if(Serial1.find(res))
      {
       Serial.println(res);
       delay(t);
       return;
      }

      else
      {
       Serial.println("Error");
      }
    }
    delay(t);
  }
}

void setup()
{
  Serial1.begin(9600);
  Serial.begin(9600);
  lcd.begin(16,2);
  lcd.print("Accident Alert  ");
  lcd.setCursor(0,1);
  lcd.print("     System     ");
  delay(2000);
  lcd.clear();
  lcd.print("Initializing");
  lcd.setCursor(0,1);
  lcd.print("Please Wait...");
  delay(1000);
```

```
Serial.println("Initializing....");
initModule("AT","OK",1000);
initModule("ATE1","OK",1000);
initModule("AT+CPIN?","READY",1000);
initModule("AT+CMGF=1","OK",1000);
initModule("AT+CNMI=2,2,0,0,0","OK",1000);
Serial.println("Initialized Successfully");
lcd.clear();
lcd.print("Initialized");
lcd.setCursor(0,1);
lcd.print("Successfully");
delay(2000);
lcd.clear();
lcd.print("Callibrating ");
lcd.setCursor(0,1);
lcd.print("Acceleromiter");
for(int i=0;i<samples;i++)
{
  xsample+=analogRead(x);
  ysample+=analogRead(y);
  zsample+=analogRead(z);
}

xsample/=samples;
ysample/=samples;
zsample/=samples;

Serial.println(xsample);
Serial.println(ysample);
Serial.println(zsample);
delay(1000);

lcd.clear();
```

```
  lcd.print("Waiting For GPS");
  lcd.setCursor(0,1);
  lcd.print("     Signal    ");
  delay(2000);
  gps.begin(9600);
  get_gps();
  show_coordinate();
  delay(2000);
  lcd.clear();
  lcd.print("GPS is Ready");
  delay(1000);
  lcd.clear();
  lcd.print("System Ready");
  Serial.println("System Ready..");
}

void loop()
{
    int value1=analogRead(x);
    int value2=analogRead(y);
    int value3=analogRead(z);

    int xValue=xsample-value1;
    int yValue=ysample-value2;
    int zValue=zsample-value3;

    Serial.print("x=");
    Serial.println(xValue);
    Serial.print("y=");
    Serial.println(yValue);
    Serial.print("z=");
    Serial.println(zValue);
```

```
   if(xValue < minVal || xValue > MaxVal  || yValue < minVal || yValue > MaxVal  || zValue
< minVal || zValue > MaxVal)
   {
     get_gps();
     show_coordinate();
     lcd.clear();
     lcd.print("Sending SMS ");
     Serial.println("Sending SMS");
     Send();
     Serial.println("SMS Sent");
     delay(2000);
     lcd.clear();
     lcd.print("System Ready");
   }
}

void gpsEvent()
{
  gpsString="";
  while(1)
  {
   while (gps.available()>0)           //Serial incoming data from GPS
   {
    char inChar = (char)gps.read();
     gpsString+= inChar;                 //store incoming data from GPS to temparary string str[]
     i++;
    // Serial.print(inChar);
     if (i < 7)
     {
      if(gpsString[i-1] != test[i-1])        //check for right string
      {
        i=0;
        gpsString="";
      }
```

```
     }
    if(inChar=='\r')
    {
     if(i>60)
     {
       gps_status=1;
       break;
     }
     else
     {
       i=0;
     }
    }
  }
   if(gps_status)
    break;
  }
}

void get_gps()
{
  lcd.clear();
  lcd.print("Getting GPS Data");
  lcd.setCursor(0,1);
  lcd.print("Please Wait.....");
   gps_status=0;
   int x=0;
   while(gps_status==0)
   {
    gpsEvent();
    int str_lenth=i;
    coordinate2dec();
    i=0;x=0;
    str_lenth=0;
```

```
  }
}

void show_coordinate()
{
   lcd.clear();
   lcd.print("Lat:");
   lcd.print(latitude);
   lcd.setCursor(0,1);
   lcd.print("Log:");
   lcd.print(logitu
```

Chapter 5: Implementation

5.1 Prototype model of the system –

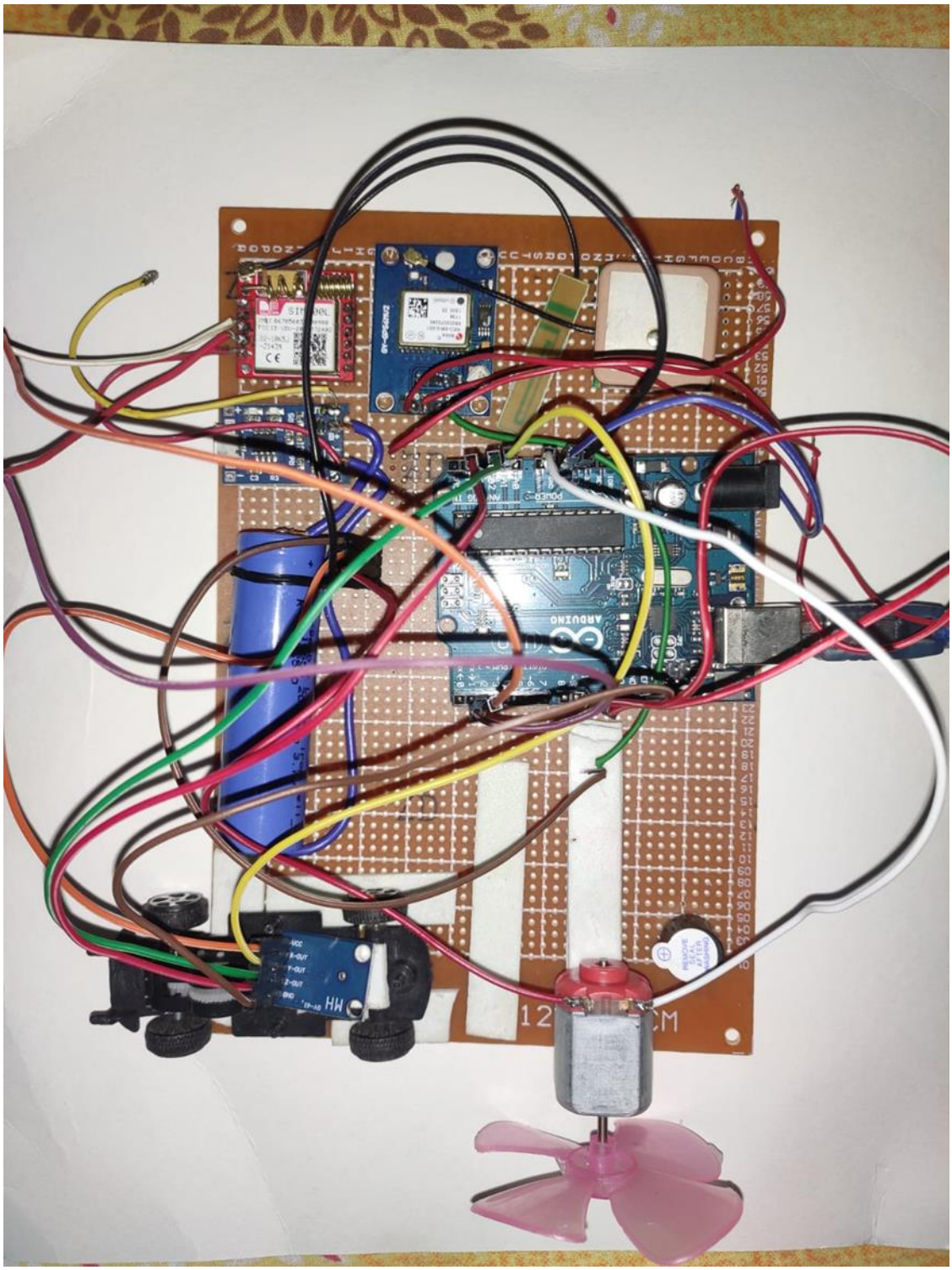


Figure 8: Prototype Model

5.2 Working of the Accident Detection and Alert System using Arduino:-

1. When accident is occurred, the location details of vehicle/object collected by the GPS module from the satellite, this information is in the form of latitude and longitude scale.
2. Thus, collected information is then fed to arduino uno. Necessary processing is completed and therefore the information is passed to the LCD and GSM modem.
3. The GSM modem collects the information for arduino uno and then transfer it to the concerned mobile phone of Traffic police control room through the SMS which is in text format.

We observe the sensor data characteristics for several simulated test cases or possible emergency scenarios. We recorded the responses of sensors and categorized the severity level as low-risk, minimum risk, and high-risk range values. Afterwards, based on these severity levels of emergency situations, we will notify the emergency responder or emergency contacts.

Chapter 6: Observation and Result

6.1 Details of experimental result –

In Fig.10, the SMS sub-system of the framework has been shown. The SMS is sent via the GSM module to the number that is already stored in the database. The message will contain detailed information on the accident location. When the system collecting the stored contact numbers of users, the system will send SMS of accident location link to the users by GSM Module. GSM (Global System for Mobile Communication) is an architecture used for mobile communication in almost all of the countries now a day.

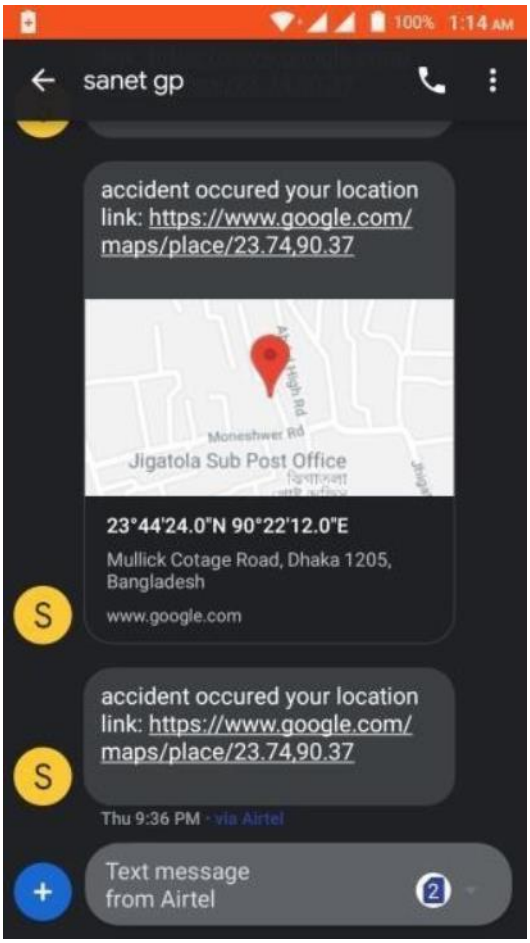


Figure 9 : sms alart

When a user clicks on the link of the point of accident, the location will be displayed on google map. By knowing the location, any user or the rescue team can dynamically take the shortest route to reach the destination, an ambulance will also head towards the accident location to provide emergency medical assistance.
The result and testing part is divided into two sections which represent the uniqueness of the framework and accuracy of the results.

TABLE I. INTEGRATION TEST RESULT

Test Case Expected	**Expected Result**	**Observed result**	**Test Result**
When the accident occurred the Accelerometer should be able to detect the accident	Can detect an accident.	Can detect accident	pass
GPS module of this system should be able to detect vehicle location correctly	Location should be exact.	Location is exact.	pass
GSM Module of the system should be able to send SMS	SMS will be sent.	SMS has been sent	pass
The Controller should be able to send data to a server using the Wi-Fi module. The microcontroller should be able to retrieve data from the server	Can send and retrieve data to and from the server	Can send Can retrieve data	pass

System testing of software or hardware is conducted ina complete and integrated environment to evaluate its compliance with the specified requirements. System testing takes all integrated modules that have passed integrated testing as its input. The testing then aims to detect any inconsistencies between the units integrated . System testing can detect bugs with the interaction between differentmodules of a framework. Oftentimes, these interactions glitches may not have a huge impact on a modular level, but when the impact is measured on the overall performance of the system, such minor modular level impacts may become more serious than anticipated initially. Table II. Shows test cases, expected results and observed results of system testing.

TABLE II. SYSTEM TEST RESULT

Test Case Expected	Expected Result	Observed result	Test Result
Users should be able to get SMS from this system successfully	SMS should arrive	SMS received	pass
User should see accident location	Accident location should be seen	Accident location can be seen	pass
Ambulance should be able to get the direction to reach the accident spots	Ambulance should get proper notification	Gets the required notification	pass
Authority should be able to update server data	Can update server data	Data in the server can be updated	pass

6.2 Result Analysis –

The system helps in detecting the severity of the accident based on the accelerometer sensor that is connected and send message with the help of GSM module. The GPS module tracks the location in which the accident has occurred and helps communicate to the rescue system using GSM module. The system is more efficient and is very much helpful in detecting the accidents at the earliest and reduce the rate of deaths that occurs due to accident. Since the severity is measured the rescue team can arrive to the accident spot with all medical aid and rescue the victim at the earliest. Thus, this system rescues the victim at the earliest and help in reducing the rate of deaths to a greater extent.

Chapter : 7 Conclution and Future Scope

7.1 Conclution –

The completed module is successfully detecting accidents using both tilt sensor and temperature sensor, this module is connected to GSM and GPS to send the data via message or notification. This module is successfully transmitting the location coordinates of accident spots to mobile via the BLYNK App. The second module of this proposed system is an ambulance unit which houses pulse sensor, temperature sensor, and Glucose Dip sensor. The output of each sensor will be continuously displayed using an LCD display. As of now there is no technology to detect accidents and also no ambulance monitoring system. Here we combined both systems to work as a new efficient system but along with these two systems more concepts can be combined in it. Traffic also plays the most important role in a victim's survival. So to aid this concept a traffic management system can be implemented. By taking advantage of RFID concept and RF communications a reliable traffic management system can be implemented.

7.2 Future Scope –

The proposed program deals with detecting incidents and warning paramedics to reach the specific location by taking them to the nearest hospital and providing the medical services to the person affected by the incident. This can be extended through providing the victim with medication at the spot of the accident. We can also avoid accidents by increasing the technology and using warning systems that could really stop the vehicle to conquer them.

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