ACCIDENT DETECTION AND ALERTING SYSTEM USING 8051 MICROCONTROLLER

Fall Semester 2020-21

Microcontroller and Its Applications (ECE-3003)

Final Report

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ABSTRACT:

- This project is Accident Detection and Alerting System using 8051 Microcontroller. When an individual riding his/her bike, meets with an accident, there is a chance that the individual may suffer from a serious injury or expire instantaneously and there is no one around to help him. Well this system is a solution to the problem. The system acts as an accident identification system that gathers and sends this vehicle information that met with an accident, and conveys it to the nearest control room. For this the user vehicle is fixed with a GSM module and vibration sensor along with microcontroller. Whenever a user vehicle meets with any accident, the vibration sensor detects and gives its output. This output is then detected by the microcontroller. Now the microcontroller sends this change detection signal to a GSM Module. GSM Module begins sending the accident data by SMS. We can give anyone number. for example police number, ambulance number, doctor number etc. Here we are also using LCD Module. This displays the status.

INTRODUCTION:

- Our basic aim is to make an Accident Detection and Alerting System using 8051 Microcontroller which will help to reduce and also find out the number of accidents happening in the immediate surrounding.
- The presence of GSM module helps to send notifications to the people concerned and the GPS module which has been added as an extra feature is used to locate the accident area without much fuss so that action can be taken swiftly.
- Vibration sensor attached to the microcontroller helps in picking up vibrations and basically help in the detection of the accident. The LCD used is for the showing of the status if an accident has occurred or not.
- With this project we have tried to figure out a simple, cost-effective yet accurate solution which can be worked upon more with various additions and help save people's lives with this project being a popular "accessory" which people would prefer installing in their vehicles.

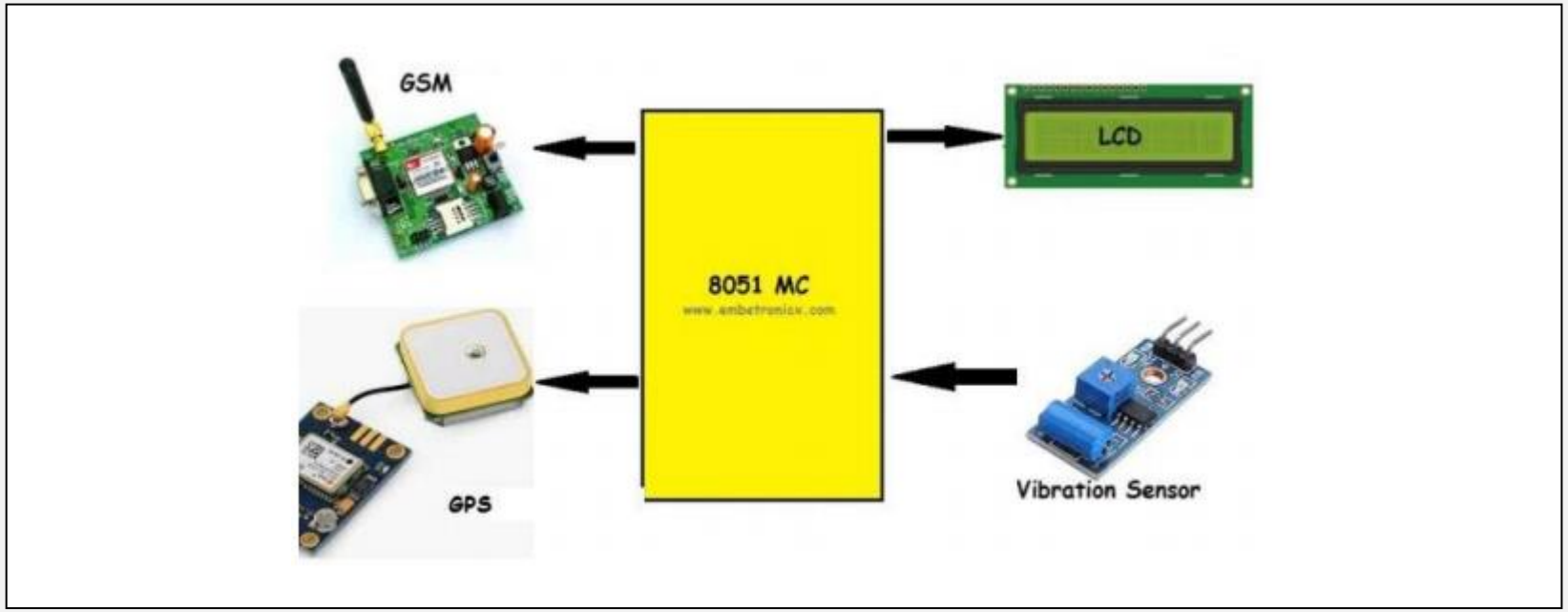
PROBLEM STATEMENT:

- The current generation likes the adrenaline pumping and always seek out for some or the other adventure. Most often they end up seeking this adventure on the highways or roads with them revving up their vehicles to full throttle and going all fast and furious. Statistics show that 60% of accidents on roads happen due to rash driving and drunk driving. The response time taken to reach the location or to even understand that an accident has occurred is so much in today's time that by the time someone reaches the place, it is too late.

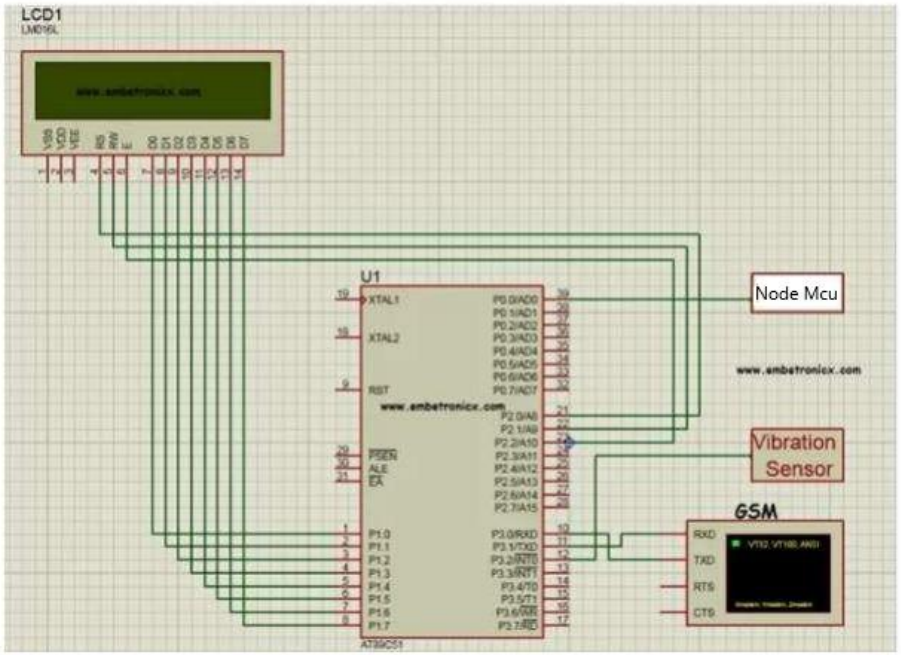
COMPONENTS

- 8051 Microcontroller
- LCD module
- GSM module
- Vibration sensor
- Node MCU
- GPS module

BLOCK DIAGRAM



CIRCUIT DIAGRAM



WORKING:

- When the circuit is switched on “INITIALISING” is displayed on the LCD Module for some time.
- The Vibration Sensor attached to the 8051 Microcontroller on pin P3.2 continuously checks for the vibrations.
- If there is no accident detected (no signal is sent to the microcontroller) and a message of “ACCIDENT DETECTED: NO” is displayed on the LCD Module.
- If an accident is detected, vibration sensor sends a signal to the microcontroller and a message of “ACCIDENT DETECTED: YES” is displayed on the LCD Module.
- Microcontroller also sends a signal to the GSM Module (connected to pin P3.0 and P3.1), when the accident is detected.
- The GSM Module sends a message “ACCIDENT DETECTED” to the numbers specified in the code.
- The GSM Module also gives a call to the numbers specified.
- The Microcontroller also sends a high logic to the Arduino (connected to the pin P0.0) when an accident is detected.
- When a high logic is detected on the Arduino, the signal is given to the GPSModule.
- The GPS location (longitude, latitude, altitude and time) is displayed on the serial monitor.

PROCEDURE:

- Connect the LCD data pins to Port P0 of the 8051 microcontroller.
- 2) Connect RS,R/W,E to the pins P2.0,P2.1,P2.2 respectively.
- 3) Power the LCD Module with 5V power supply.
- 4) Connect the Arduino (digital pin 7) to the pin P0.0.
- 5) Connect GPS Module to the digital pin of NodeMCU.
- 6) Power the GPS Module using the Arduino.
- 7) Connect the vibration sensor to pin P3.2.
- 8) Power the Vibration sensor with 5V.
- 9) Connect the RXD of GSM module to P3.1 and TXD of GSM to P3.0.
- 10) Power the GSM Module with 12V.
- 11) Power the 8051 micro controller with 5V supply. 12) Press the reset button.

CODE:

MAIN CODE:

```
#include<reg51.h>
#include"GSM.h"
#include"LCD.h"

#define NUMBER1 "9080515110" //Enter the mobile number
#define NUMBER2 "7016958644"
#define NUMBER3 "9532715168"

sbit vib = P3^2;
sbit arduino = P0^0;

void main()
{
  unsigned int r;
  init_serial();
  LCD_initialise();
  comwrt(0x80);
  display("INITIALISING ...");
  for(r=0;r<60000;r++);
  comwrt(0x80);
  display("GSM ACCIDENT DET");
  comwrt(0xC0);
  display(" VIBRATION: NO  ");
  arduino=0;
  while(1) {
    if(vib==1) {
      arduino=1;
      comwrt(0x80);
      display("VIBRATION DETECT");
      comwrt(0xC0);
      display(" VIBRATION: YES ");
      for(r=0;r<30000;r++);
      for(r=0;r<30000;r++);
      comwrt(0x80);
      display("SENDING MSG.... ");
      sendSMS(NUMBER1,"ACCIDENT DETECTED");
      sendSMS(NUMBER2,"ACCIDENT DETECTED");
      sendSMS(NUMBER3,"ACCIDENT DETECTED");
      comwrt(0xC0);
      display("    MSG SENT    ");
      for(r=0;r<30000;r++);
      for(r=0;r<30000;r++);
```

```
 for(r=0;r<30000;r++);
        comwrt(0x80);
        display("CALLING.....");
        call(NUMBER1);
        call(NUMBER2);
        call(NUMBER3);
        comwrt(0x80);
        display("GSM ACCIDENT DET");

     }
     else
     {
        arduino=0;
        comwrt(0xC0);
        display(" VIBRATION: NO ");
     }

   }
}
```

LCD:

```
#define LCDDATA P1
#define DELAY for(i=0;i<1200;i++)

sbit RS = P2^0;
sbit RW = P2^1;
sbit EN = P2^2;

void comwrt(unsigned char);
void datawrt(unsigned char);
void LCD_initialise();
void display(unsigned char *str);

void LCD_initialise()
{
   unsigned int i,j;
   int com[5]={0x38,0x0C,0x01,0x06,0x80};
   for(j=0;j<=4;j++) {
   comwrt(com[j]);
   DELAY;
   }
}

void comwrt(unsigned char dat)
```

```
{
   unsigned int i;
   LCDDATA=dat;
   RS = 0;
   RW = 0;
   EN = 1;
   DELAY;
   EN = 0;
}

void datawrt(unsigned char dat)
{
   unsigned int i;
   LCDDATA=dat;
   RS = 1;
   RW = 0;
   EN = 1;
   DELAY;
   EN = 0;
}

void display(unsigned char *str)
{
   int i;
   for(;*str!=0;str++) {
   datawrt(*str);
   DELAY;
   }
}
```

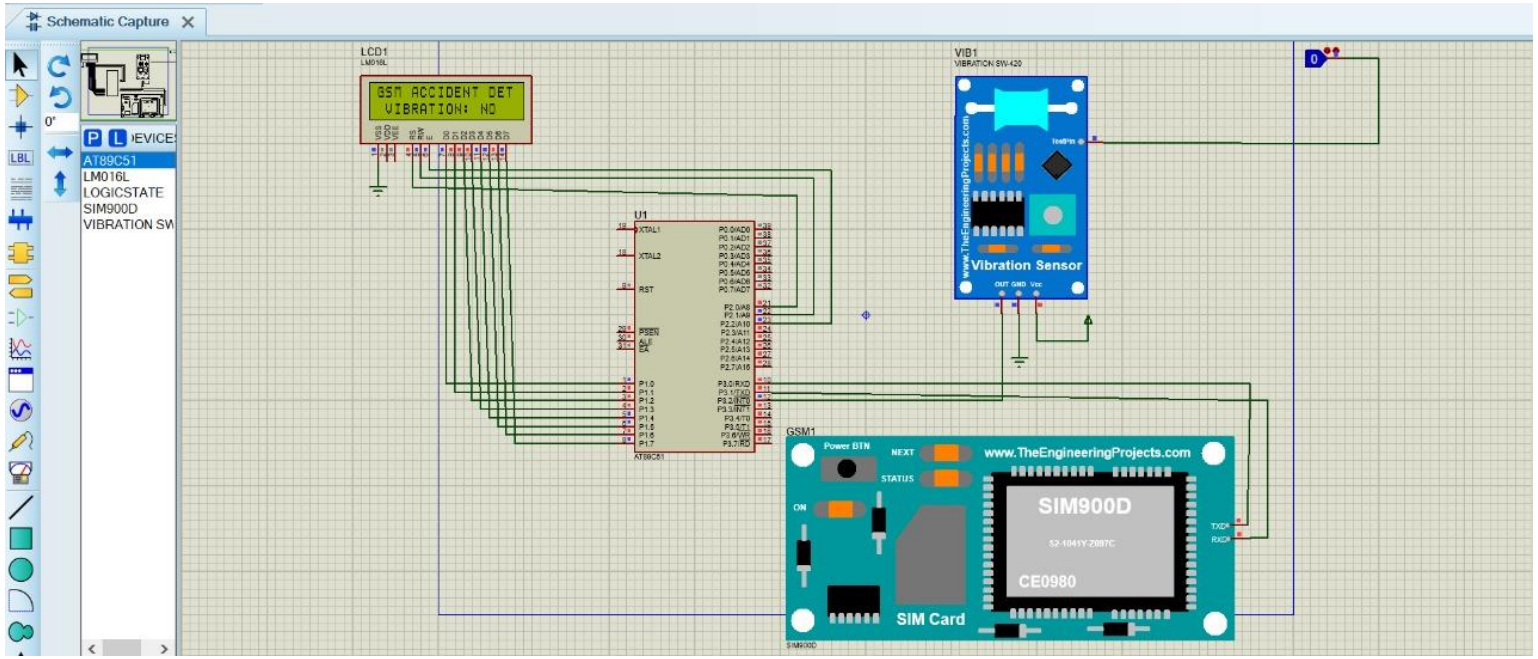
GSM:

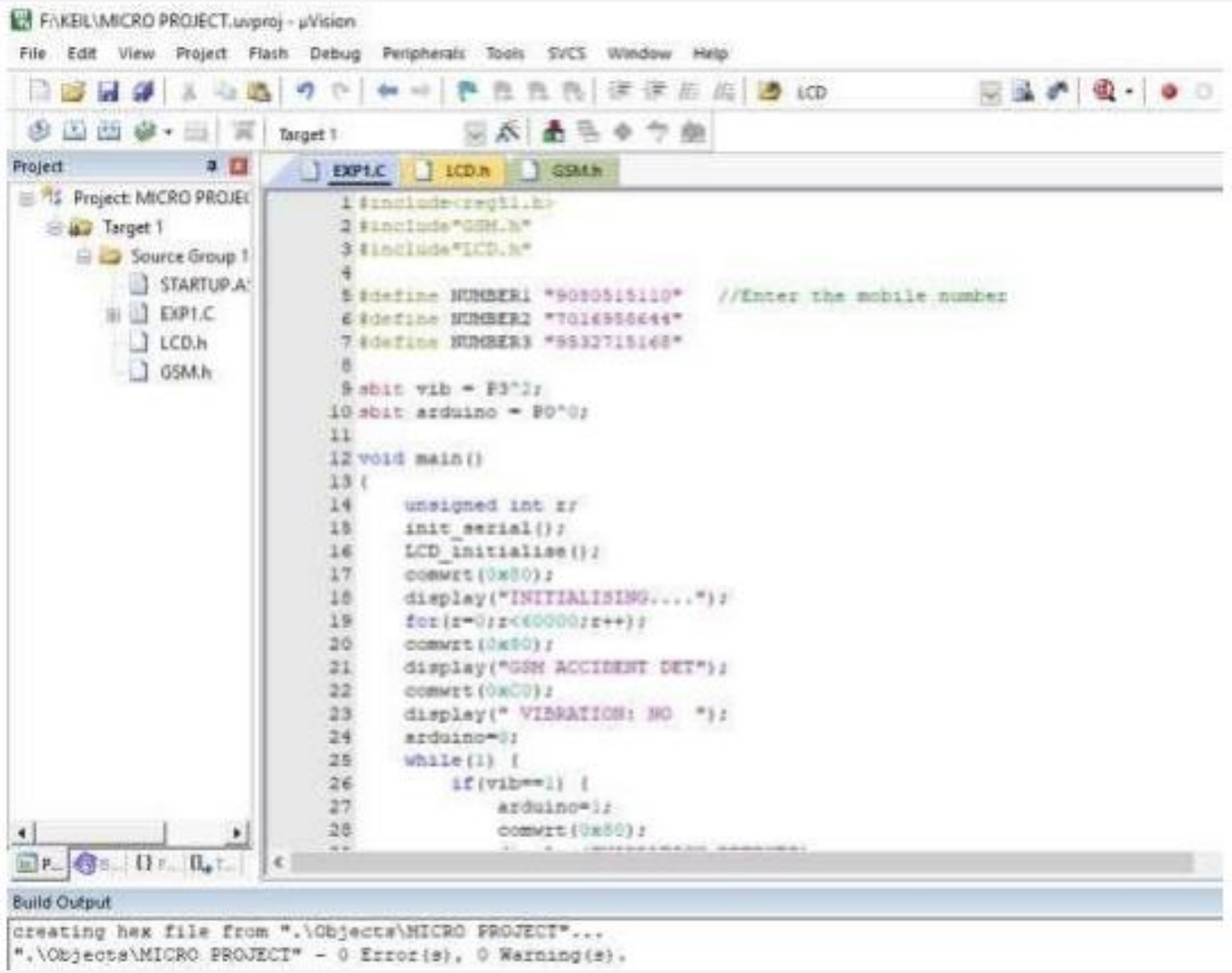
```
code unsigned char SMS1[2] = "AT" ;
code unsigned char SMS2[9] = "AT+CMGF=1" ;
code unsigned char SMS3[8]= "AT+CMGS=" ; // send"
code unsigned char SMS4[3]= "ATD" ; // send"
code unsigned char SMS5[3]= "ATH" ; // send"


void sendSMS(unsigned char *num , unsigned char *msg);
void delay1(unsigned int tim);
void sendserial(unsigned char mydata1);
void call(unsigned char *num1);

unsigned char i;
```

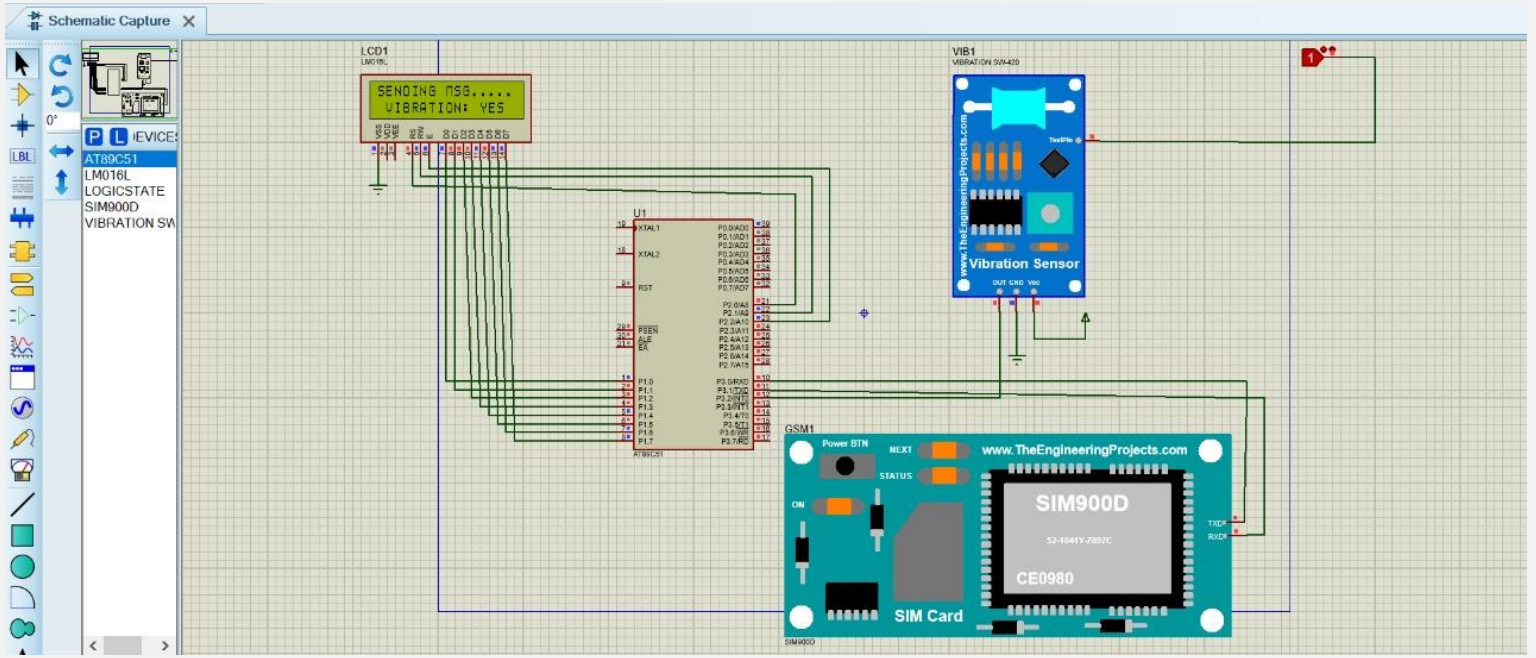
```
void sendSMS(unsigned char *num , unsigned char *msg)
{
  for (i=0;i<2;i++)
  sendserial(SMS1[i]);
  sendserial(0X0D);
  delay1(60);

  for (i=0;i<9;i++)
  sendserial(SMS2[i]);
  sendserial(0X0D);
  delay1(60);

  for (i=0;i<8;i++)
  sendserial(SMS3[i]);
  sendserial(0x22); // "

  for(;*num!=0;num++)
  sendserial(*num);
  sendserial(0x22); // "
  sendserial(0X0D);
  delay1(60);

  for(;*msg!=0;msg++)
  sendserial(*msg);
  sendserial(0X1A);
  delay1(80);

}

void call(unsigned char *num1)
{
  for (i=0;i<2;i++)
  sendserial(SMS1[i]);
  sendserial(0X0D);
  delay1(60);

  for (i=0;i<9;i++)
  sendserial(SMS2[i]);
  sendserial(0X0D);
  delay1(60);

  for (i=0;i<3;i++)
  sendserial(SMS4[i]);

  for(;*num1!=0;num1++)
  sendserial(*num1);
```

```
sendserial(0x3b);
   sendserial(0X0D);
   delay1(80);
   delay1(600);

   for (i=0;i<3;i++)
   sendserial(SMS5[i]);
   delay1(80);
}

void delay1(unsigned int tim)
{
   unsigned int h;
   for(h=0;h<=tim;h++) {
      TMOD=0X21;
      TH0=0x4B;
      TL0=0xFD;
      TR0=1;
      while(TF0==0);
      TF0=0;
   }
}

void sendserial(unsigned char mydata1)
{
   TI=0;
   SBUF= mydata1;
   while(TI==0);
}

void init_serial()
{
   SCON=0x50;
   TMOD=0x21;
   TH1=0xFD;
   TL1=0xFD;
   TR1=1;
}
```

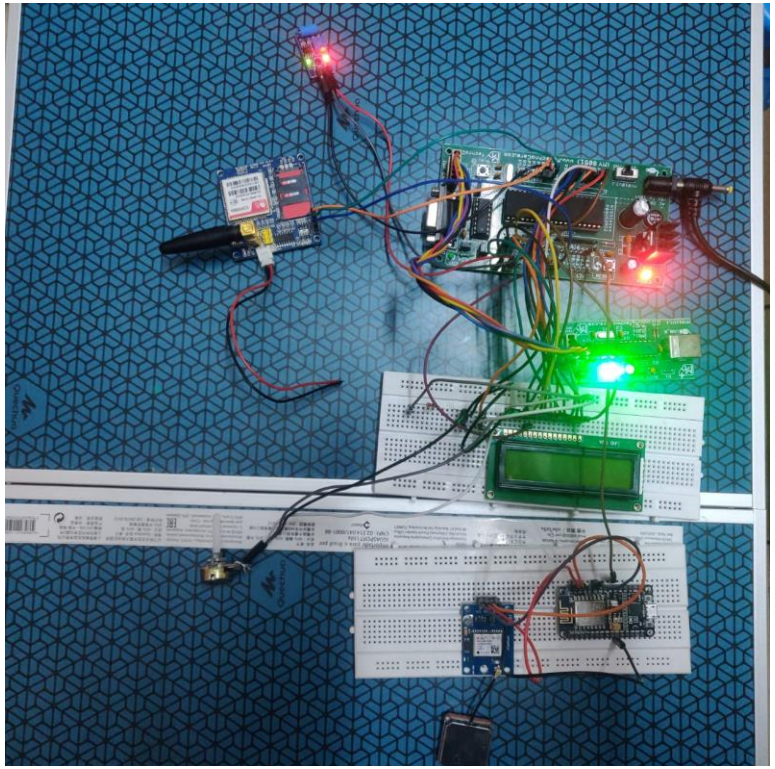
SIMULATION RESULTS:

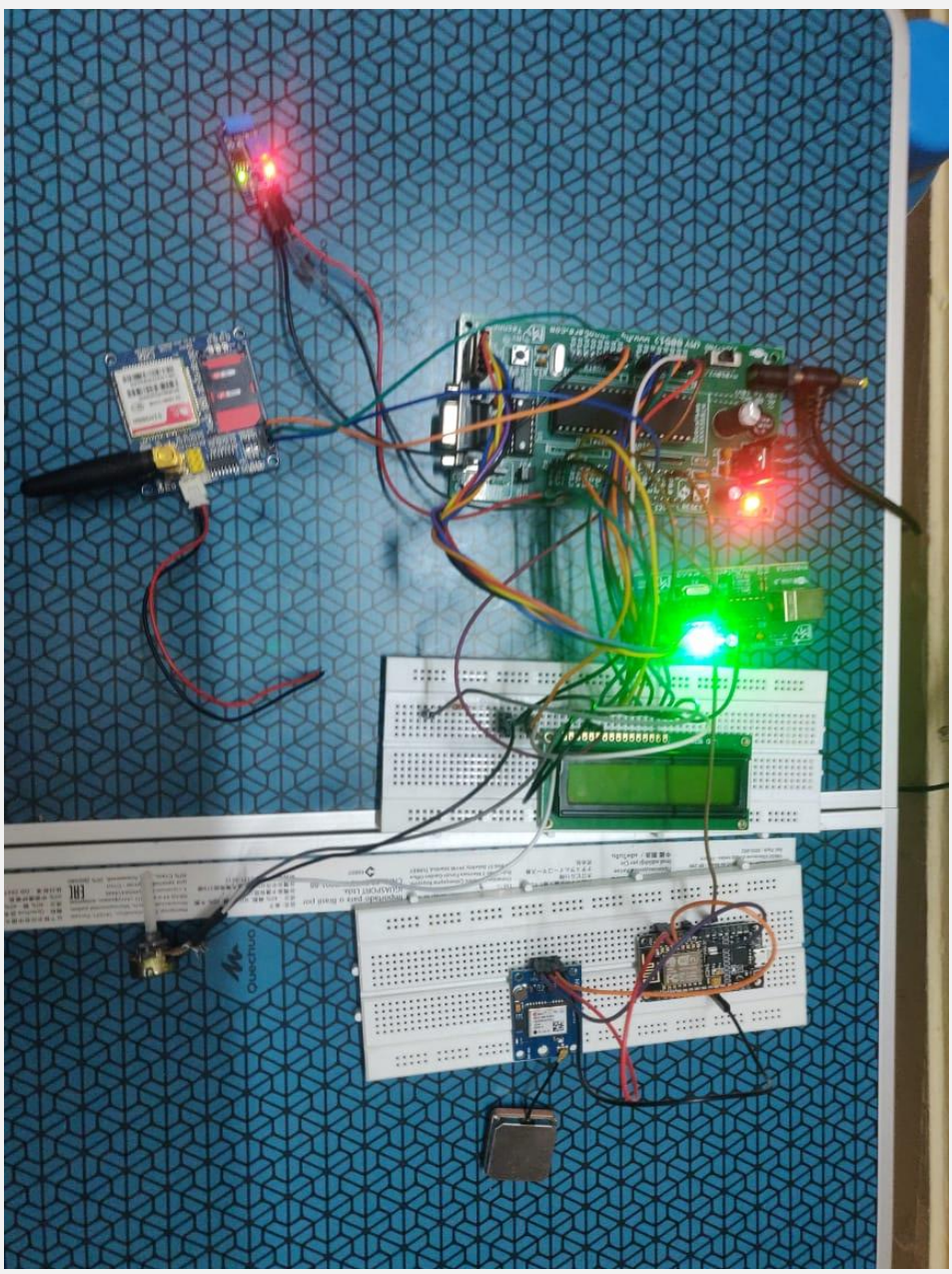


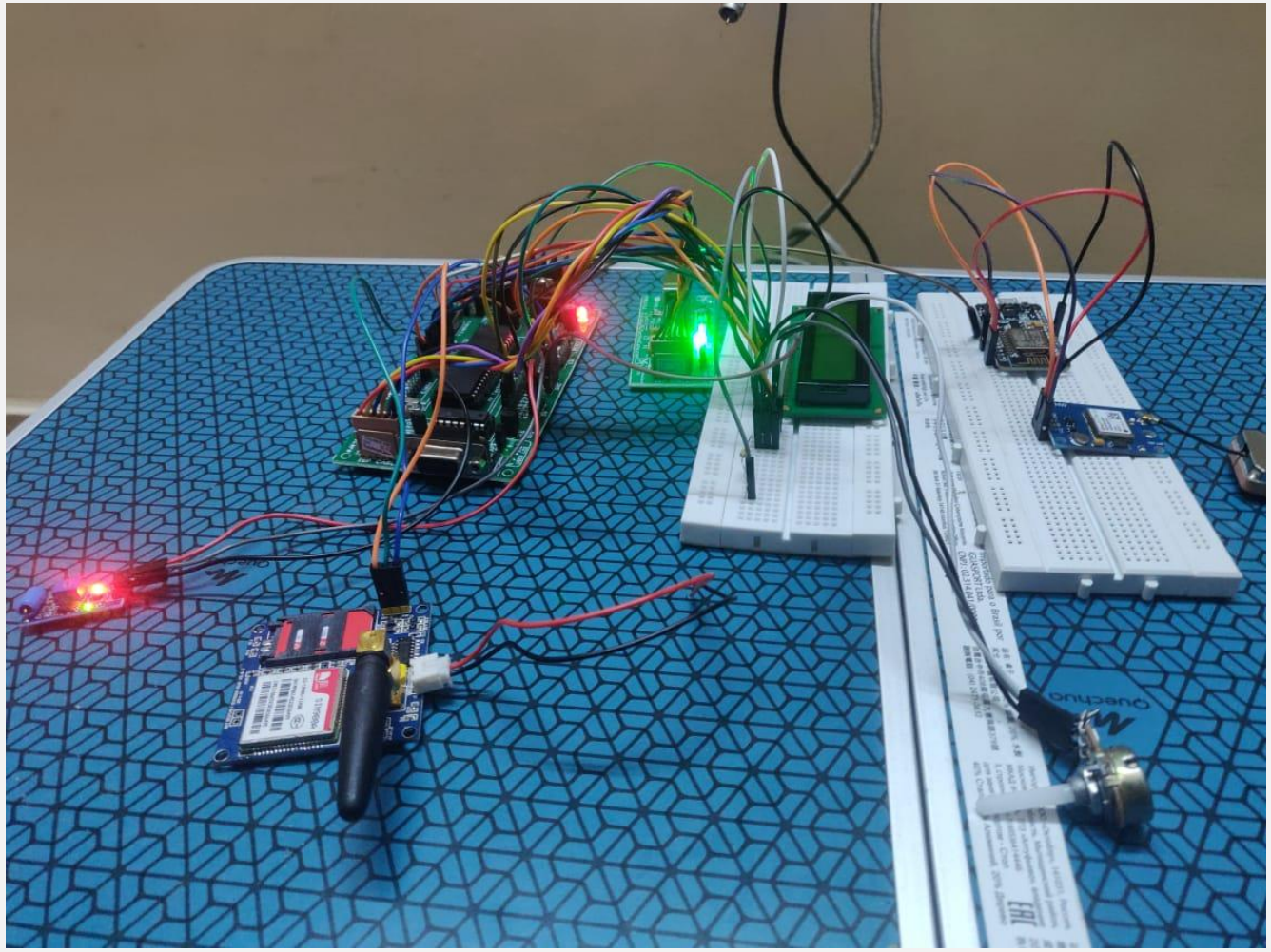

F:\KEIL\MICRO PROJECT.uvproj - µVision
File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
LCD
Target 1
Project
Project: MICRO PROJEC
Target 1
Source Group 1
STARTUP.A
EXP1.C
LCD.h
GSM.h
EXP1.C
LCD.h
GSM.h
1 #include<reg51.h>
2 #include"GSM.h"
3 #include"LCD.h"
4
5 #define NUMBER1 "9080515110" //Enter the mobile number
6 #define NUMBER2 "7016956644"
7 #define NUMBER3 "9532715168"
8
9 sbit vib = P3^2;
10 sbit arduino = P0^0;
11
12 void main()
13 {
14 unsigned int z;
15 init_serial();
16 LCD_initialise();
17 comwrt(0x80);
18 display("INITIALISING....");
19 for(z=0;z<60000;z++);
20 comwrt(0x80);
21 display("GSM ACCIDENT DET");
22 comwrt(0xC0);
23 display(" VIBRATION: NO ");
24 arduino=0;
25 while(1) {
26 if(vib==1) {
27 arduino=1;
28 comwrt(0x80);
Build Output
creating hex file from ".\Objects\MICRO PROJECT"...
".\Objects\MICRO PROJECT" - 0 Error(s), 0 Warning(s).


Schematic Capture
LCD1
SENDING MSG.....
VIBRATION: YES
VIB1
Vibration Sensor
www.TheEngineeringProjects.com
U1
GSM1
Power BTN
NEXT
STATUS
ON
SIM900D
CE0980
SIM Card
www.TheEngineeringProjects.com
AT89C51
LM016L
LOGICSTATE
SIM900D
VIBRATION SW

HARDWARE RESULTS:







ADVANTAGES AND DISADVANTAGES:

Advantages:

- Quick response is achieved
- Easy to maintain and repair
- Simple in construction
- Continuous operation is possible without stopping
- Immediate help can be sent to the location where accident has occurred

Disadvantages:

- If the accident occurs in a region where network connection is poor there is a chance that the GSM module might not be able send the SMS notification .
- In case of a huge accident there is a chance that the equipment might get damaged.

FUTURE SCOPE:

- This system can be upgraded to prevent accident caused due to drink and drive. We can also add an alcohol detector which will sense if the driver is drunk and would not start the vehicle.

CONCLUSION:

- This project shows that we can use the microcontroller 8051 to design an accident detection and alerting system which is more cost efficient, convenient, and easy to handle when compared to the already available expensive solutions in the market. We have successfully built up this system which can be started to use in a small manner and with more R&D and innovations we can redevelop this project as well. The function of the circuit is working according to what we predicted and the objectives also achieved. This shows that our program code and circuit design can be implemented in a real life system and situation as well.