#include <AltSoftSerial.h>

#include <TinyGPS++.h>

#include<Wire.h>

#include <math.h>

#include <SoftwareSerial.h>

const String EMERGENCY\_PHONE = "+91xxxxxxxxxx";

#define rxPin 2

#define txPin 3

SoftwareSerial sim800(rxPin, txPin);

AltSoftSerial neogps;

TinyGPSPlus gps;

//RX Pin To D9

//TX Pin To D8

String sms\_status, sender\_number, received\_date, msg;

String latitude, longitude;

#define BUZZER 5

#define BUTTON 6

#define xPin A0

#define yPin A1

#define zPin A2

byte updateflag;

int xaxis = 0, yaxis = 0, zaxis = 0;

int deltx = 0, delty = 0, deltz = 0;

int vibration = 2;

int devibrate = 75;

int magnitude = 0;

int sensitivity = 20;

double angle;

boolean impact\_detected = false;

unsigned long time1;

unsigned long impact\_time;

unsigned long alert\_delay = 30000;

void setup()

{

  Serial.begin(9600);

  sim800.begin(9600);

  neogps.begin(9600);

  pinMode(BUZZER, OUTPUT);

  pinMode(BUTTON, INPUT\_PULLUP);

  sms\_status = "";

  sender\_number = "";

  received\_date = "";

  msg = "";

  sim800.println("AT");

  delay(1000);

  sim800.println("ATE1");

  delay(1000);

  sim800.println("AT+CPIN?");

  delay(1000);

  sim800.println("AT+CMGF=1");

  delay(1000);

  sim800.println("AT+CNMI=1,1,0,0,0");

  delay(1000);

  time1 = micros();

  xaxis = analogRead(xPin);

  yaxis = analogRead(yPin);

  zaxis = analogRead(zPin);

}

void loop()

{

  if (micros() - time1 > 4999) Impact();

  if (updateflag > 0)

  {

    updateflag = 0;

    Serial.println("Impact detected!!");

    Serial.print("Magnitude:");

    Serial.println(magnitude);

    getGps();

    digitalWrite(BUZZER, HIGH);

    impact\_detected = true;

    impact\_time = millis();

  }

  if (impact\_detected == true)

  {

    if (millis() - impact\_time >= alert\_delay) {

      digitalWrite(BUZZER, LOW);

      makeCall();

      delay(1000);

      sendAlert();

      impact\_detected = false;

      impact\_time = 0;

    }

  }

  if (digitalRead(BUTTON) == LOW) {

    delay(200);

    digitalWrite(BUZZER, LOW);

    impact\_detected = false;

    impact\_time = 0;

  }

  while (sim800.available()) {

    parseData(sim800.readString());

  }

  while (Serial.available())  {

    sim800.println(Serial.readString());

  }

}

void Impact()

{

  time1 = micros();

  int oldx = xaxis;

  int oldy = yaxis;

  int oldz = zaxis;

  xaxis = analogRead(xPin);

  yaxis = analogRead(yPin);

  zaxis = analogRead(zPin);

  vibration--;

  Serial.print("Vibration = ");

  Serial.println(vibration);

  if (vibration < 0) vibration = 0;

  if (vibration > 0) return;

  deltx = xaxis - oldx;

  delty = yaxis - oldy;

  deltz = zaxis - oldz;

  magnitude = sqrt(sq(deltx) + sq(delty) + sq(deltz));

  if (magnitude >= sensitivity) //impact detected

  {

    updateflag = 1;

    vibration = devibrate;

  }

  else

  {

    magnitude = 0;

  }

}

void parseData(String buff) {

  Serial.println(buff);

  unsigned int len, index;

  index = buff.indexOf("\r");

  buff.remove(0, index + 2);

  buff.trim();

  if (buff != "OK") {

    index = buff.indexOf(":");

    String cmd = buff.substring(0, index);

    cmd.trim();

    buff.remove(0, index + 2);

    if (cmd == "+CMTI") {

      index = buff.indexOf(",");

      String temp = buff.substring(index + 1, buff.length());

      temp = "AT+CMGR=" + temp + "\r";

      sim800.println(temp);

    }

    else if (cmd == "+CMGR") {

      if (buff.indexOf(EMERGENCY\_PHONE) > 1) {

        buff.toLowerCase();

        if (buff.indexOf("get gps") > 1) {

          getGps();

          String sms\_data;

          sms\_data = "GPS Location Data\r";

          sms\_data += "http://maps.google.com/maps?q=loc:";

          sms\_data += latitude + "," + longitude;

          sendSms(sms\_data);

        }

      }

    }

  }

  else {

  }

}

void getGps()

{

  // Can take up to 60 seconds

  boolean newData = false;

  for (unsigned long start = millis(); millis() - start < 2000;) {

    while (neogps.available()) {

      if (gps.encode(neogps.read())) {

        newData = true;

        break;

      }

    }

  }

  if (newData)

  {

    latitude = String(gps.location.lat(), 6);

    longitude = String(gps.location.lng(), 6);

    newData = false;

  }

  else {

    Serial.println("No GPS data is available");

    latitude = "";

    longitude = "";

  }

  Serial.print("Latitude= "); Serial.println(latitude);

  Serial.print("Lngitude= "); Serial.println(longitude);

}

void sendAlert()

{

  String sms\_data;

  sms\_data = "Accident Alert!!\r";

  sms\_data += "http://maps.google.com/maps?q=loc:";

  sms\_data += latitude + "," + longitude;

  sendSms(sms\_data);

}

void makeCall()

{

  Serial.println("calling....");

  sim800.println("ATD" + EMERGENCY\_PHONE + ";");

  delay(20000); //20 sec delay

  sim800.println("ATH");

  delay(1000); //1 sec delay

}

void sendSms(String text)

{

  //return;

  sim800.print("AT+CMGF=1\r");

  delay(1000);

  sim800.print("AT+CMGS=\"" + EMERGENCY\_PHONE + "\"\r");

  delay(1000);

  sim800.print(text);

  delay(100);

  sim800.write(0x1A);

  delay(1000);

  Serial.println("SMS Sent Successfully.");

}

boolean SendAT(String at\_command, String expected\_answer, unsigned int timeout) {

  uint8\_t x = 0;

  boolean answer = 0;

  String response;

  unsigned long previous;

  while ( sim800.available() > 0) sim800.read();

  sim800.println(at\_command);

  x = 0;

  previous = millis();

  do {

    if (sim800.available() != 0) {

      response += sim800.read();

      x++;

      if (response.indexOf(expected\_answer) > 0) {

        answer = 1;

        break;

      }

    }

  }

  while ((answer == 0) && ((millis() - previous) < timeout));

  Serial.println(response);

  return answer;

}