#include <TinyGPSPlus.h>

#include <SoftwareSerial.h>

#define BLYNK\_PRINT Serial

#include <ESP8266WiFi.h>

#include <BlynkSimpleEsp8266.h>

#include "MAX30100\_PulseOximeter.h"

#include <Adafruit\_MLX90614.h>

#include <Wire.h>

#include "PCF8574.h"

//comment when done

//#define DEBUG

//#define MAX\_NOT\_IN\_USE

//#define MLX\_NOT\_IN\_USE

//#define GPS\_NOT\_IN\_USE

//max30100 va mlx, pcf8574 se dung chan d1 d2: scl va sda

//dung them mach mo rong pcf8574, su dung i2c => chuyen sim sang chan d7 va d8, nghieng va hong ngoai + coi se sang pcf

#define REPORTING\_PERIOD\_MS 1000

#define RXPin D7 //chan rx softuart gps

#define TXPin D8 //chan tx softuart gps

#define RXSIM D5 //chan rx softuart sim (chan rx cua sim00l se noi vao D6, tX- D5)

#define TXSIM D6 //chan tx softuart sim

#define HONGNGOAI 0 //chan P0 cua pcf8574

#define NGHIENG 1 //chan P1 cua pcf8574

#define COI 2 //chan P2 cua pcf8574 //noi day kieu source

#define GPSBaud 9600 //toc do giao tiep voi gps

#define SIMBaud 9600 //toc do giao tiep voi SIM

uint32\_t tsLastReport = 0;

uint32\_t last\_check = 0;

PulseOximeter pox;

Adafruit\_MLX90614 mlx = Adafruit\_MLX90614();

TinyGPSPlus gps;

WidgetMap myMap(V0); // V0 for virtual pin of Map Widget

SoftwareSerial mygps(RXPin, TXPin);

SoftwareSerial mysim(RXSIM, TXSIM);

BlynkTimer timer;

PCF8574 PCF(0x20);

float latitude; //Storing the Latitude

float longitude; //Storing the Longitude

float nhiptim, oxy, nhietdo;

unsigned int move\_index = 1; // fixed location for now

int nghieng1 = 1, nghieng2 = 1;

int xung = 0, a = 1, b = 1;

float chuViBanhXe = 22.3 , khoangcach = 0;

char auth[] = "DIEN\_CODE\_VAO\_DAY"; //Blynk Authentication Token

char ssid[] = "NHAP\_TEN\_WIFI\_VAO\_DAY"; // WiFi SSID

char pass[] = "NHAP\_PASS\_WIFI\_VAO\_DAY"; // WiFi Password

void setup()

{

Serial.begin(115200);

Serial.println();

Serial.println("\nKhung tap di cho nguoi gia!!!");

Blynk.begin(auth, ssid, pass);

pinMode(LED\_BUILTIN, OUTPUT);

mysim.begin(SIMBaud);

PCF.begin();

#ifndef GPS\_NOT\_IN\_USE

mygps.begin(GPSBaud); //khoi dong cho gps

#endif

#ifndef MAX\_NOT\_IN\_USE

Serial.println("Khoi tao cam bien nhip tim va cam bien oxy..");

if (!pox.begin()) {

Serial.println("FAILED");

for (;;);

} else {

Serial.println("SUCCESS");

}

pox.setIRLedCurrent(MAX30100\_LED\_CURR\_20\_8MA);

#endif

#ifndef MLX\_NOT\_IN\_USE

Serial.println("Khoi tao cam bien than nhiet.... SUCCESS");

mlx.begin(0x5A);

//do cam bien than nhiet co xung clk khac max30100 nen can lam nhu nay

#endif

#ifndef GPS\_NOT\_IN\_USE

timer.setInterval(5000L, checkGPS); // every 5s check if GPS is connected, only really needs to be done once

#endif

#ifndef MAX\_NOT\_IN\_USE

timer.setInterval(1000L, max\_mlx); //send data to blynk every 1s

#endif

timer.setInterval(1100L, toggleLed);

Wire.setClock(100000);

}

void toggleLed() {

digitalWrite(LED\_BUILTIN, !digitalRead(LED\_BUILTIN));

}

void max\_mlx() {

#ifndef MAX\_NOT\_IN\_USE

nhiptim = pox.getHeartRate();

oxy = pox.getSpO2();

Serial.println(nhiptim);

#endif

#ifndef MLX\_NOT\_IN\_USE

nhietdo = mlx.readObjectTempC();

#endif

Blynk.virtualWrite(V1, nhietdo);

Blynk.virtualWrite(V2, nhiptim);

Blynk.virtualWrite(V3, oxy);

Blynk.run();

delay(1);

}

void checkGPS()

{

if (gps.charsProcessed() < 10)

{

Serial.println(F("No GPS detected: check wiring."));

}

}

void loop()

{

pox.update();

canhBaoNghieng();

doKhoangCach();

while (mygps.available() > 0)

{

// sketch displays information every time a new sentence is correctly encoded.

if (gps.encode(mygps.read()))

Location();

}

Blynk.run();

timer.run();

}

void doKhoangCach () {

if (PCF.read(HONGNGOAI) == 0) {

a = 0;

} else {

a = 1;

}

if (a < b) {

xung++;

khoangcach = xung \* chuViBanhXe;

Blynk.virtualWrite(V4, khoangcach);

};

b = a;

}

void canhBaoNghieng() {

if (PCF.read(NGHIENG) == 1) {

if (millis() - last\_check > 100) {

if (PCF.read(NGHIENG) == 1) {

nghieng1 = 0;

}

}

last\_check = millis();

}

if (nghieng1 < nghieng2) {

PCF.write(COI, LOW);

Blynk.notify("Benh nhan bi nga, can ho tro ngay!!!");

#ifndef DEBUG

mysim.print("AT+CMGF=1\r");

delay(500);

mysim.println("AT+CMGS=\"+84xxxxxxxxx\""); // can doi so dien thoai khac

delay(500);

mysim.println("!CANH BAO! Benh nhan bi nga, can ho tro ngay!!!");

delay(500);

mysim.print((char)26);

delay(10000);

#endif

Serial.println("!CANH BAO! Benh nhan bi nga, can ho tro ngay!!!");

delay(1000);

}

nghieng1 = 1;

nghieng2 = nghieng1;

PCF.write(COI, HIGH);

}

void Location()

{

if (gps.location.isValid() )

{

latitude = (gps.location.lat()); //Storing the Lat. and Lon.

longitude = (gps.location.lng());

#ifdef DEBUG

Serial.print("LATITUDE: ");

Serial.println(latitude, 6); // float to x decimal places

Serial.print("LONGITUDE: ");

Serial.println(longitude, 6);

#endif

myMap.location(move\_index, latitude, longitude, "GPS\_Location");

}

}