**IoT based Prenatal supervision for women**

**PREGACARE**

**CODE**

//define baro prs sensor

#include <Adafruit\_BMP085.h> Adafruit\_BMP085 bmp;

int systolic, diastolic,alert; long temperature,pressure;

#define alarm D3 #define trig D7 #define echo D8 long time1;

long distance;

long val1,val2,val3,val4,val5,val6;

#include<Wire.h> #include"MAX30100\_PulseOximeter.h" #define REPORTING\_PERIOD\_MS 1000

PulseOximeter pox; uint32\_t tsLastReport = 0;

void onBeatDetected() // a loop to Print "beat" when a beat is detected

{

Serial.println("Beat!"); // print statement}

#include <ESP8266WiFi.h> //include the necessary libraries to the program (ESP library)

#include <WiFiClient.h> // wifi communication library #include <ThingSpeak.h> // thingspeak library

const char\* ssid = "OnePlus7"; // Your Network SSID (Your Hotspot name) to connect to wifi

const char\* password = "00000000"; // Your Network Password (Your Hotspot password)

WiFiClient client; // Initialization for wifi communication to specific IP address(Your Thingspeak account)

unsigned long myChannelNumber = 234117; // Your Thingspeak Channel Number (Without Brackets)

const char \* myWriteAPIKey = "H65RHJGZ95B6T89H"; // Your Thingspeak Write API Key

void setup()

{

Serial.begin(9600); pinMode(trig, OUTPUT);

pinMode(echo, INPUT); //DEFINE ECHO PIN AS INPUT

pinMode(alarm, OUTPUT); //DEFINE alarm AS OUTPUT delay(10);

WiFi.begin(ssid, password); //Connect to WiFi network ThingSpeak.begin(client); // begin communication through the network to thingspeak

// ~~~~~~~~~~~~~~~~~~~~~~~INITIALIZE PRESSURE SENSOR~~~~~~~~~~~~~~~~~~~~~~~~~~~

if (!bmp.begin())

{

Serial.println("Could not find a valid BMP085 sensor, check wiring!"); while (1) {}

}

// ~~~~~~~~~~~~~~~~~~~~~~~INITIALIZE PULSE OXIMETER SENSOR~~~~~~~~~~~~~~~~~~~~~~~~~~~

Serial.println("Initializing pulse oximeter..");

if (!pox.begin())

{

Serial.println("FAILED"); for(;;);

}

else

{

Serial.println("SUCCESS");

}

pox.setIRLedCurrent(MAX30100\_LED\_CURR\_7\_6MA);

pox.setOnBeatDetectedCallback(onBeatDetected);

}

void loop() {

// ~~~~~~~~~~~~~~~~~~~~~~~HEART RATE AND OXYGEN LEVEL MEASUREMENT~~~~~~~~~~~~~~~~~~~~~~~~~~~

pox.update();

if (millis() - tsLastReport > REPORTING\_PERIOD\_MS)

{

val4 = pox.getHeartRate();

val5 = pox.getSpO2();

val5 = constrain(val5,0,100); tsLastReport = millis();

// Make sure to call update as fast as possible

// ~~~~~~~~~~~~~~~~~~~~~~~TEMPERATURE MEASUREMENT~~~~~~~~~~~~~~~~~~~~~~~~~~~

temperature = bmp.readTemperature(); val1 = ((temperature\*1.8)+46);

// ~~~~~~~~~~~~~~~~~~~~~~~PRESSURE MEASUREMENT~~~~~~~~~~~~~~~~~~~~~~~~~~~

pressure = bmp.readPressure();

val2 =map(pressure,100943,101200,90,120); //systolic val3 = map(pressure,100943,101200,60,89); //diastolic

// ~~~~~~~~~~~~~~~~~~~~~~~DISTANCE MEASUREMENT~~~~~~~~~~~~~~~~~~~~~~~~~~~

digitalWrite(trig, LOW); delayMicroseconds(2); digitalWrite(trig, HIGH); delayMicroseconds(10); digitalWrite(trig, LOW);

time1 = pulseIn(echo, HIGH); distance = time1 / 58;

val6 = map(distance,3,20,0,20); val6 = constrain(val6,0,20);

// ~~~~~~~~~~~~~~~~~~~~~~~SEND TO CLOUD LOGIC - IOT DISPLAY~~~~~~~~~~~~~~~~~~~~~~~~~~~

ThingSpeak.writeField(myChannelNumber, 1,val1, myWriteAPIKey); //write the temperature value to ThingSpeak in channel 1

ThingSpeak.writeField(myChannelNumber, 2,val2, myWriteAPIKey); //write the

temperature value to ThingSpeak in channel 2 ThingSpeak.writeField(myChannelNumber, 3,val3, myWriteAPIKey); //write the

temperature value to ThingSpeak in channel 3 ThingSpeak.writeField(myChannelNumber, 4,val4, myWriteAPIKey); //write the

temperature value to ThingSpeak in channel 4 ThingSpeak.writeField(myChannelNumber, 5,val5, myWriteAPIKey); //write the

temperature value to ThingSpeak in channel 5 ThingSpeak.writeField(myChannelNumber, 6,val6, myWriteAPIKey); //write the

temperature value to ThingSpeak in channel 6 ThingSpeak.writeField(myChannelNumber, 7,alert, myWriteAPIKey); //write the

temperature value to ThingSpeak in channel 7

// ~~~~~~~~~~~~~~~~~~~~~~~SERIAL PRINT LOGIC - LOCAL DISPLAY~~~~~~~~~~~~~~~~~~~~~~~~~~~

Serial.print(" Temperature = "); Serial.print(val1);

Serial.print(" F"); Serial.print(" Systolic = "); Serial.print(val2); Serial.print(" Diastolic = "); Serial.print(val3);

Serial.print(" Heart beat (bpm):"); Serial.print(val4);

Serial.print(" Oxygen (%):"); Serial.print(val5);

Serial.print(" Distance (Cm):");

Serial.print(val6); Serial.print(" Alert:"); Serial.print(alert);

Serial.println();

}// end of pulse loop

// ~~~~~~~~~~~~~~~~~~~~~~~ALERT LOGIC~~~~~~~~~~~~~~~~~~~~~~~~~~~

// if temp greater than 100

// if systolic pressure less than 90

// if systolic pressure greater than 120

// if diastolic pressure less than 60

// if diastolic pressure greater than 89

// if heart rate less than 50

// if heart rate greater than 95

// if oxygen level less than 95

if((val1>=100)||(val2<90)||(val2>120)||(val3<60)||(val3>89)||(val4<50)||(val4>95)||(va l5<95))

{

digitalWrite(alarm,HIGH); alert = 1;

}

else

{

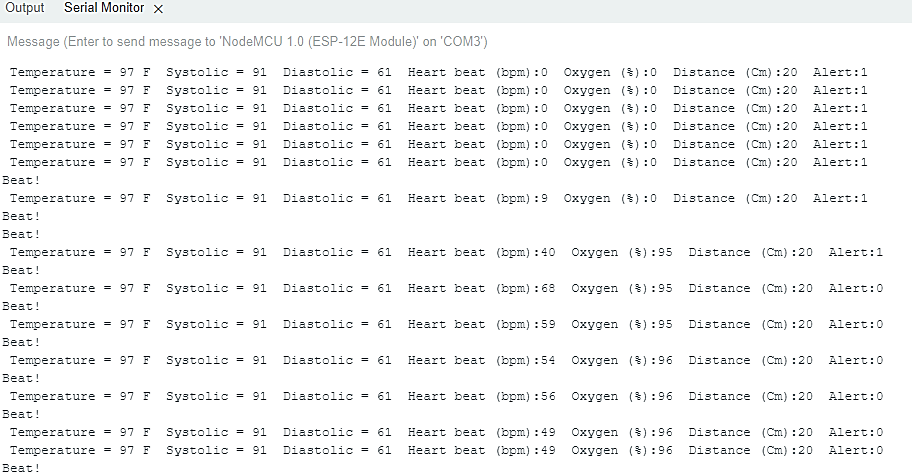
digitalWrite(alarm,LOW);

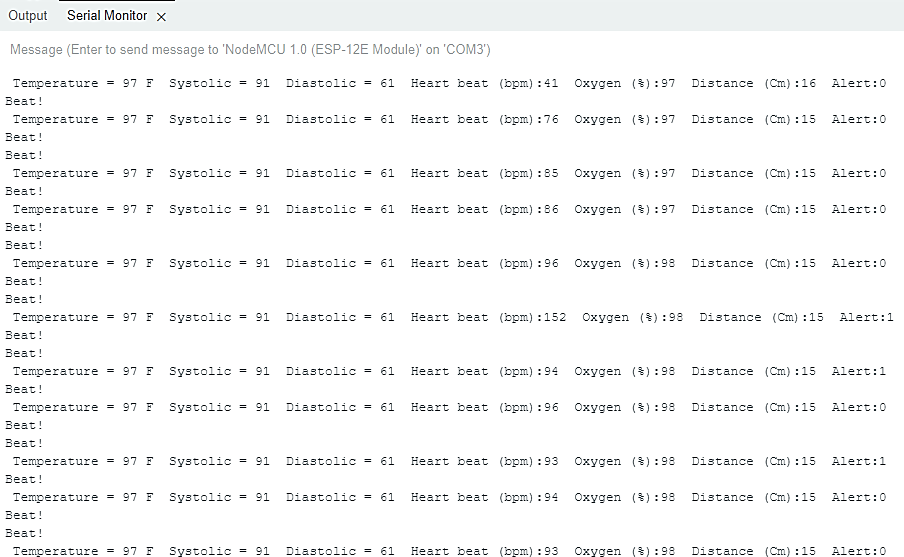
alert = 0;

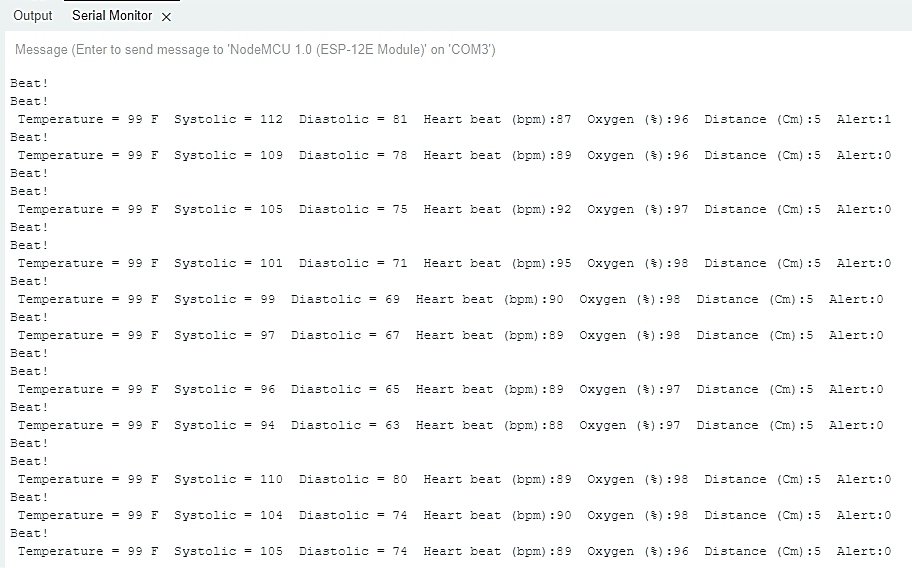
}

} // end of void loop

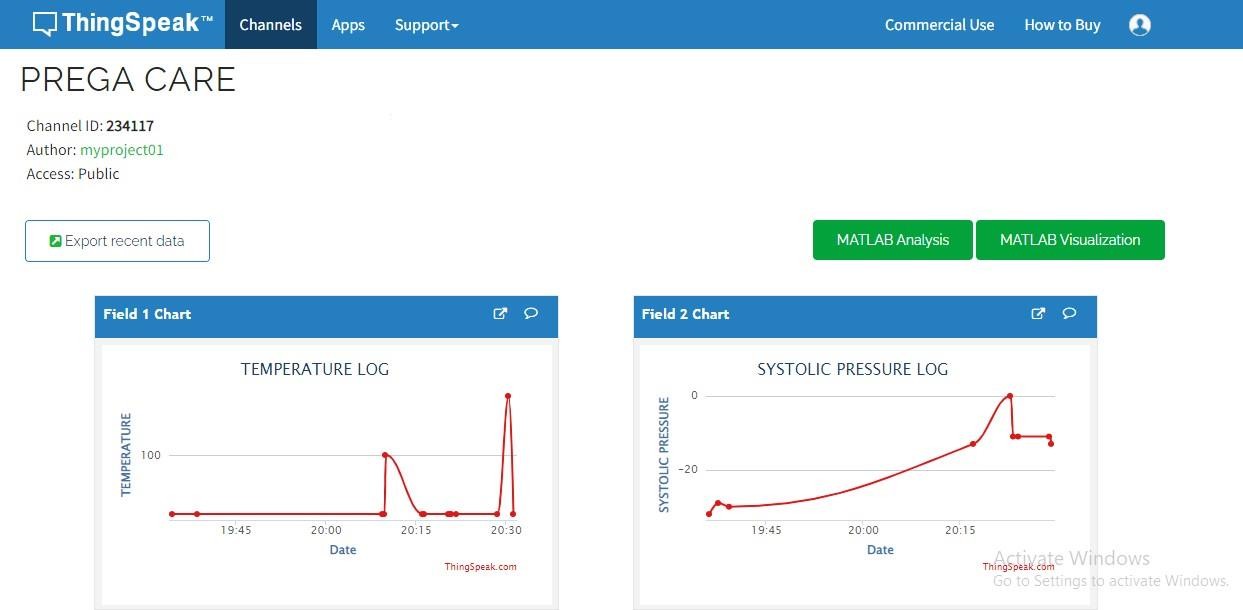
**RESULTS – SERIAL MONITOR – LOCAL DISPLAY**



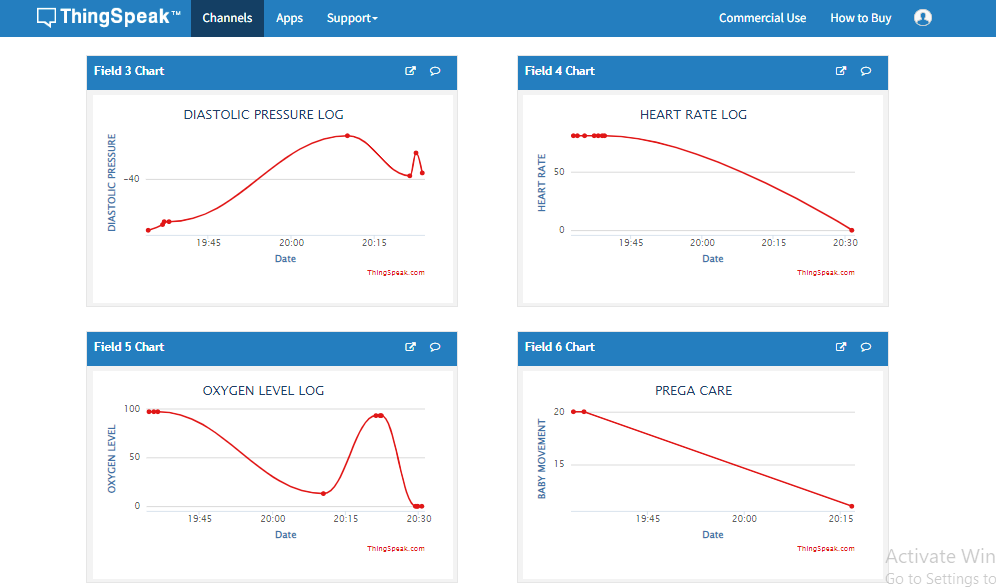




**IOT THINGSPEAK SCREEN**

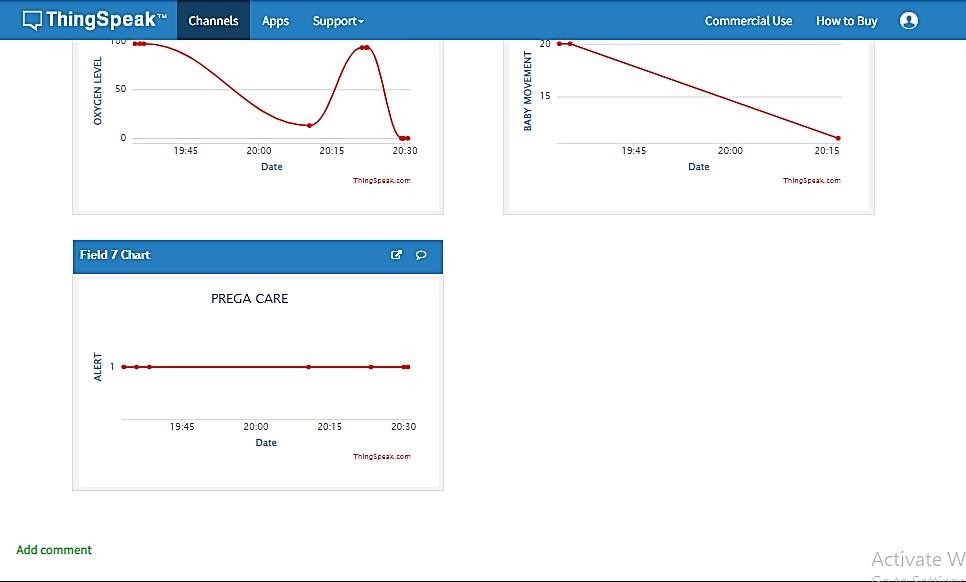


The above figure shows the temperature and systolic pressure of pregnant women.



The above figure shows the diastolic pressure , heart rate, oxygen level and baby

movement in a pregnant women



The above figure depicts showing Alert when there is a abnormal change in the health

parameters in a pregnant women

**APP CODE**

