* **Code Implementation for Iot based patient monitoring system**

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Code:

//ESP8266 Based Patient Health Monitoring System

#include <ESP8266WebServer.h>

#include <Wire.h>

#include "MAX30100\_PulseOximeter.h"

#include <OneWire.h>

#include <DallasTemperature.h>

#include "DHT.h"

#define DHTTYPE DHT22

#define DHTPIN 14 //D5 pin= GPIO pin 14

#define DS18B20 2 //D4 pin= GPIO pin 2

#define REPORTING\_PERIOD\_MS 1000

float temperature, humidity, BPM, SpO2, bodytemperature;

/\*Put your SSID & Password\*/

const char\* ssid = "Alsan Air WiFi 1"; // Enter SSID here

const char\* password = ""; //Enter Password here

DHT dht(DHTPIN, DHTTYPE);; //--> Initialize DHT sensor, DHT dht(Pin\_used, Type\_of\_DHT\_Sensor);

PulseOximeter pox;

uint32\_t tsLastReport = 0;

OneWire oneWire(DS18B20);

DallasTemperature sensors(&oneWire);

ESP8266WebServer server(80);

void setup() {

Serial.begin(115200);

pinMode(16, OUTPUT);

delay(100);

Serial.println(F("DHTxx test!"));

dht.begin();

Serial.println("Connecting to ");

Serial.println(ssid);

//connect to your local wi-fi network

WiFi.begin(ssid, password);

//check wi-fi is connected to wi-fi network

while (WiFi.status() != WL\_CONNECTED) {

delay(1000);

Serial.print(".");

}

Serial.println("");

Serial.println("WiFi connected..!");

Serial.print("Got IP: "); Serial.println(WiFi.localIP());

server.on("/", handle\_OnConnect);

server.onNotFound(handle\_NotFound);

server.begin();

Serial.println("HTTP server started");

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

if (!pox.begin()) {

Serial.println("FAILED");

for (;;);

} else {

Serial.println("SUCCESS");

}

}

void loop() {

server.handleClient();

pox.update();

sensors.requestTemperatures();

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

float t = dht.readTemperature();

String Temperature\_Value = String(t);

float h = dht.readHumidity();

String Humidity\_Value = String(h);

bodytemperature = sensors.getTempCByIndex(0);

temperature = t;

humidity = h;

BPM = pox.getHeartRate();

SpO2 = pox.getSpO2();

Serial.print("Room Temperature: ");

Serial.print(t);

Serial.println("°C");

Serial.print("Room Humidity: ");

Serial.print(h);

Serial.println("%");

Serial.print("BPM: ");

Serial.println(BPM);

Serial.print("SpO2: ");

Serial.print(SpO2);

Serial.println("%");

Serial.print("Body Temperature: ");

Serial.print(bodytemperature);

Serial.println("°C");

Serial.println("\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*");

Serial.println();

tsLastReport = millis();

}

}

void handle\_OnConnect() {

server.send(200, "text/html", SendHTML(temperature, humidity, BPM, SpO2, bodytemperature));

}

void handle\_NotFound() {

server.send(404, "text/plain", "Not found");

}

String SendHTML(float temperature, float humidity, float BPM, float SpO2, float bodytemperature) {

String html = "<!DOCTYPE html>";

html += "<html>";

html += "<head>";

html += "<title>Patient Health Monitoring</title>";

html += "<meta name='viewport' content='width=device-width, initial-scale=1.0'>";

html += "<link rel='stylesheet' href='https://cdnjs.cloudflare.com/ajax/libs/font-awesome/5.7.2/css/all.min.css'>";

html += "<link rel='stylesheet' type='text/css' href='styles.css'>";

html += "<style>";

html += "body { background-color: #fff; font-family: sans-serif; color: #333333; font: 14px Helvetica, sans-serif box-sizing: border-box;}";

html += "#page { margin: 20px; background-color: #fff;}";

html += ".container { height: inherit; padding-bottom: 20px;}";

html += ".header { padding: 20px;}";

html += ".header h1 { padding-bottom: 0.3em; color: #008080; font-size: 45px; font-weight: bold; font-family: Garmond, 'sans-serif'; text-align: center;}";

html += "h2 { padding-bottom: 0.2em; border-bottom: 1px solid #eee; margin: 2px; text-align: left;}";

html += ".header h3 { font-weight: bold; font-family: Arial, 'sans-serif'; font-size: 17px; color: #b6b6b6; text-align: center;}";

html += ".box-full { padding: 20px; border 1px solid #ddd; border-radius: 1em 1em 1em 1em; box-shadow: 1px 7px 7px 1px rgba(0,0,0,0.4); background: #fff; margin: 20px; width: 300px;}";

html += "@media (max-width: 494px) { #page { width: inherit; margin: 5px auto; } #content { padding: 1px;} .box-full { margin: 8px 8px 12px 8px; padding: 10px; width: inherit;; float: none; } }";

html += "@media (min-width: 494px) and (max-width: 980px) { #page { width: 465px; margin 0 auto; } .box-full { width: 380px; } }";

html += "@media (min-width: 980px) { #page { width: 930px; margin: auto; } }";

html += ".sensor { margin: 12px 0px; font-size: 2.5rem;}";

html += ".sensor-labels { font-size: 1rem; vertical-align: middle; padding-bottom: 15px;}";

html += ".units { font-size: 1.2rem;}";

html += "hr { height: 1px; color: #eee; background-color: #eee; border: none;}";

html += "</style>";

//Ajax Code Start

html += "<script>\n";

html += "setInterval(loadDoc,1000);\n";

html += "function loadDoc() {\n";

html += "var xhttp = new XMLHttpRequest();\n";

html += "xhttp.onreadystatechange = function() {\n";

html += "if (this.readyState == 4 && this.status == 200) {\n";

html += "document.body.innerHTML =this.responseText}\n";

html += "};\n";

html += "xhttp.open(\"GET\", \"/\", true);\n";

html += "xhttp.send();\n";

html += "}\n";

html += "</script>\n";

//Ajax Code END

html += "</head>";

html += "<body>";

html += "<div id='page'>";

html += "<div class='header'>";

html += "<h1>Health Monitoring System</h1>";

html += "<h3><a href='https://theiotprojects.com'>https://theiotprojects.com</a></h3>";

html += "</div>";

html += "<div id='content' align='center'>";

html += "<div class='box-full' align='left'>";

html += "<h2>Sensors Readings</h2>";

html += "<div class='sensors-container'>";

//For Temperature

html += "<div class='sensors'>";

html += "<p class='sensor'>";

html += "<i class='fas fa-thermometer-half' style='color:#0275d8'></i>";

html += "<span class='sensor-labels'> Room Temperature </span>";

html += (int)temperature;

html += "<sup class='units'>°C</sup>";

html += "</p>";

html += "<hr>";

html += "</div>";

//For Humidity

html += "<div class='sensors'>";

html += "<p class='sensor'>";

html += "<i class='fas fa-tint' style='color:#5bc0de'></i>";

html += "<span class='sensor-labels'> Room Humidity </span>";

html += (int)humidity;

html += "<sup class='units'>%</sup>";

html += "</p>";

html += "<hr>";

//For Heart Rate

html += "<p class='sensor'>";

html += "<i class='fas fa-heartbeat' style='color:#cc3300'></i>";

html += "<span class='sensor-labels'> Heart Rate </span>";

html += (int)BPM;

html += "<sup class='units'>BPM</sup>";

html += "</p>";

html += "<hr>";

//For Sp02

html += "<p class='sensor'>";

html += "<i class='fas fa-burn' style='color:#f7347a'></i>";

html += "<span class='sensor-labels'> Sp02 </span>";

html += (int)SpO2;

html += "<sup class='units'>%</sup>";

html += "</p>";

html += "<hr>";

//For Body Temperature

html += "<p class='sensor'>";

html += "<i class='fas fa-thermometer-full' style='color:#d9534f'></i>";

html += "<span class='sensor-labels'> Body Temperature </span>";

html += (int)bodytemperature;

html += "<sup class='units'>°C</sup>";

html += "</p>";

html += "</div>";

html += "</div>";

html += "</div>";

html += "</div>";

html += "</div>";

html += "</body>";

html += "</html>";

return html;

}