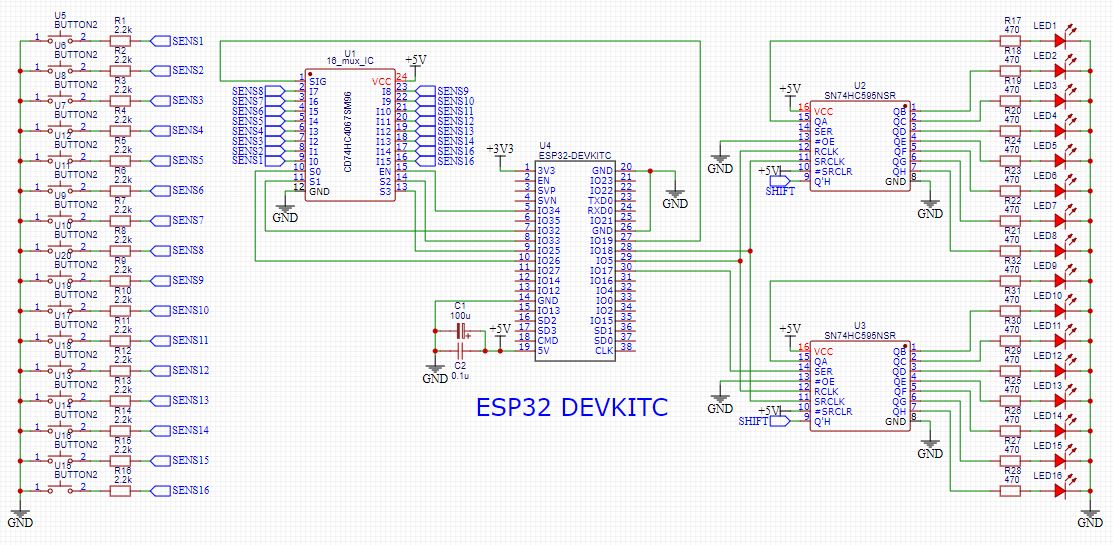
**Урок 8. Курсовая работа. Настольная метеостанция**

Задание 1. Исходя из имеющихся комплектующих, необходимо создать метеостанцию(или какую-либо станцию, исходя из имеющихся датчиков). Вывод значений должен активно индицироваться, либо выводиться на дисплей. Питание должно быть независимым( при возможности). Плата должна иметь функцию энергосбережения.  
Задание 2 (для тех, кто хочет посложнее).\* Исходя из имеющихся комплектующих создать метеостанцию, с управлением энкодером и двухуровневым меню. При желании можно добавить игру. Остальные требования соответствуют ДЗ без звездочки.

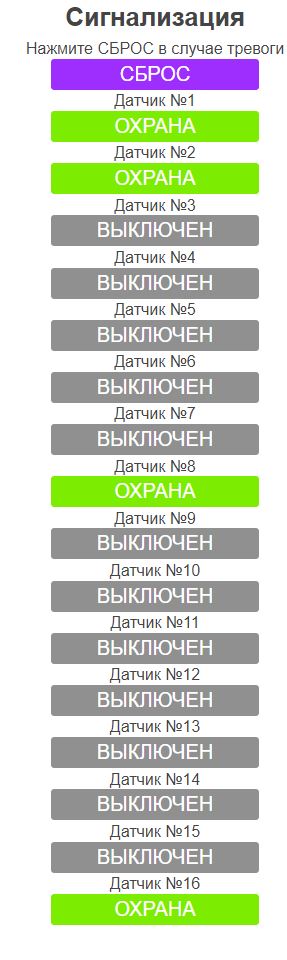
Задание 1:

В качестве курсовой работы была выбрана станция на ESP32 для подключения датчиков сигнализации. Станция должна иметь возможность подключения 16 датчиков через демультиплексор HP4067 и индикацию 16 светодиодами, подключёнными через сдвиговые регистры SN74HC595NSR, а также WEB-интерфейс для контроля и управления станцией в браузере.

Схема устройства:



WEB-интерфейс представлен ниже:



Код программы:

#include <WiFi.h>

#include <WebServer.h>

#define S0\_2 26

#define S1\_2 32

#define S2\_2 33

#define S3\_2 25

#define EN\_2 34

#define SIG\_2 19

const int SER = 16;

const int LATCH = 5;

const int CLK = 18;

int LedOut1 = 0, LedOut2 = 0;

bool leds[16];

bool s0, s1, s2, s3;

int Pins[16];

/\* Установите здесь свои SSID и пароль \*/

const char\* ssid = "RT-GPON-27D0";

const char\* password = "D3bh3hdjig";

WebServer server(80);

bool flag1 = LOW, flag2 = LOW, flag3 = LOW, flag4 = LOW, flag5 = LOW, flag6 = LOW, flag7 = LOW, flag8 = LOW, flag9 = LOW, flag10 = LOW, flag11 = LOW, flag12 = LOW, flag13 = LOW, flag14 = LOW, flag15 = LOW, flag16 = LOW;

bool alarm1 = LOW, alarm2 = LOW, alarm3 = LOW, alarm4 = LOW, alarm5 = LOW, alarm6 = LOW, alarm7 = LOW, alarm8 = LOW, alarm9 = LOW, alarm10 = LOW, alarm11 = LOW, alarm12 = LOW, alarm13 = LOW, alarm14 = LOW, alarm15 = LOW, alarm16 = LOW;

bool LED1status = LOW;

bool LED2status = LOW;

bool SENSOR3status = LOW;

void setup() {

  Serial.begin(115200);

  delay(100);

  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(WiFi.status());

  //Serial.println(WiFi.begin(ssid, keyIndex, key));

  pinMode(SER, OUTPUT);

  pinMode(LATCH, OUTPUT);

  pinMode(CLK, OUTPUT);

  pinMode(EN\_2, OUTPUT);

  pinMode(S0\_2, OUTPUT);

  pinMode(S1\_2, OUTPUT);

  pinMode(S2\_2, OUTPUT);

  pinMode(S3\_2, OUTPUT);

  pinMode(SIG\_2, INPUT\_PULLUP);

  }

  Serial.println("");

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

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

  server.on("/", handle\_OnConnect);

  server.on("/reset", handle\_reset);

  server.on("/set", handle\_set);

  server.on("/sensor1off", handle\_sensor1off);

  server.on("/sensor1check", handle\_sensor1check);

  server.on("/sensor1alarm", handle\_sensor1alarm);

  server.on("/sensor2off", handle\_sensor2off);

  server.on("/sensor2check", handle\_sensor2check);

  server.on("/sensor2alarm", handle\_sensor2alarm);

  server.on("/sensor3off", handle\_sensor3off);

  server.on("/sensor3check", handle\_sensor3check);

  server.on("/sensor3alarm", handle\_sensor3alarm);

  server.on("/sensor4off", handle\_sensor4off);

  server.on("/sensor4check", handle\_sensor4check);

  server.on("/sensor4alarm", handle\_sensor4alarm);

  server.on("/sensor5off", handle\_sensor5off);

  server.on("/sensor5check", handle\_sensor5check);

  server.on("/sensor5alarm", handle\_sensor5alarm);

  server.on("/sensor6off", handle\_sensor6off);

  server.on("/sensor6check", handle\_sensor6check);

  server.on("/sensor6alarm", handle\_sensor6alarm);

  server.on("/sensor7off", handle\_sensor7off);

  server.on("/sensor7check", handle\_sensor7check);

  server.on("/sensor7alarm", handle\_sensor7alarm);

  server.on("/sensor8off", handle\_sensor8off);

  server.on("/sensor8check", handle\_sensor8check);

  server.on("/sensor8alarm", handle\_sensor8alarm);

  server.on("/sensor9off", handle\_sensor9off);

  server.on("/sensor9check", handle\_sensor9check);

  server.on("/sensor9alarm", handle\_sensor9alarm);

  server.on("/sensor10off", handle\_sensor10off);

  server.on("/sensor10check", handle\_sensor10check);

  server.on("/sensor10alarm", handle\_sensor10alarm);

  server.on("/sensor11off", handle\_sensor11off);

  server.on("/sensor11check", handle\_sensor11check);

  server.on("/sensor11alarm", handle\_sensor11alarm);

  server.on("/sensor12off", handle\_sensor12off);

  server.on("/sensor12check", handle\_sensor12check);

  server.on("/sensor12alarm", handle\_sensor12alarm);

  server.on("/sensor13off", handle\_sensor13off);

  server.on("/sensor13check", handle\_sensor13check);

  server.on("/sensor13alarm", handle\_sensor13alarm);

  server.on("/sensor14off", handle\_sensor14off);

  server.on("/sensor14check", handle\_sensor14check);

  server.on("/sensor14alarm", handle\_sensor14alarm);

  server.on("/sensor15off", handle\_sensor15off);

  server.on("/sensor15check", handle\_sensor15check);

  server.on("/sensor15alarm", handle\_sensor15alarm);

  server.on("/sensor16off", handle\_sensor16off);

  server.on("/sensor16check", handle\_sensor16check);

  server.on("/sensor16alarm", handle\_sensor16alarm);

  server.onNotFound(handle\_NotFound);

  server.begin();

  Serial.println("HTTP server started");

}

void Shift16Leds()

{

int reg[8] = {128,64,32,16,8,4,2,1};

for (int i = 0; i<=7;i++)

{

LedOut1 = LedOut1 + (leds[i]\*reg[i]);

}

for (int i = 8; i<=15;i++)

{

LedOut2 = LedOut2 + (leds[i]\*reg[i-8]);

}

    digitalWrite(LATCH, LOW);

    shiftOut(SER, CLK, MSBFIRST, LedOut1);

    shiftOut(SER, CLK, MSBFIRST, LedOut2);

    digitalWrite(LATCH, HIGH);

  //  delay(1000);

    LedOut1 = 0;

    LedOut2 = 0;

}

void MUXin()

{

  for (int i=0; i<=15; i++)

  {

  s0 = i%2;

  s1 = i/2%2;

  s2 = i/4%2;

  s3 = i/8%2;

  digitalWrite(EN\_2, HIGH);

  digitalWrite(S0\_2, s0);

  digitalWrite(S1\_2, s1);

  digitalWrite(S2\_2, s2);

  digitalWrite(S3\_2, s3);

  digitalWrite(EN\_2, LOW);

  delay(5);

  Pins[i] = (1-digitalRead(SIG\_2))\*(i+1);

  leds[i] = 1-digitalRead(SIG\_2);

  }

}

void loop() {

  MUXin();

  Shift16Leds();

  if((1-leds[0])==0 && flag1 == 0)

  {flag1 = 1;}

  if((1-leds[1])==0 && flag2 == 0)

  {flag2 = 1;}

  if((1-leds[2])==0 && flag3 == 0)

  {flag3 = 1;}

  if((1-leds[3])==0 && flag4 == 0)

  {flag4 = 1;}

  if((1-leds[4])==0 && flag5 == 0)

  {flag5 = 1;}

  if((1-leds[5])==0 && flag6 == 0)

  {flag6 = 1;}

  if((1-leds[6])==0 && flag7 == 0)

  {flag7 = 1;}

  if((1-leds[7])==0 && flag8 == 0)

  {flag8 = 1;}

  if((1-leds[8])==0 && flag9 == 0)

  {flag9 = 1;}

  if((1-leds[9])==0 && flag10 == 0)

  {flag10 = 1;}

  if((1-leds[10])==0 && flag11 == 0)

  {flag11 = 1;}

  if((1-leds[11])==0 && flag12 == 0)

  {flag12 = 1;}

  if((1-leds[12])==0 && flag13 == 0)

  {flag13 = 1;}

  if((1-leds[13])==0 && flag14 == 0)

  {flag14 = 1;}

  if((1-leds[14])==0 && flag15 == 0)

  {flag15 = 1;}

  if((1-leds[15])==0 && flag16 == 0)

  {flag16 = 1;}

  server.handleClient();

}

void handle\_OnConnect() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,SENSOR3status));

}

void handle\_reset() {

  flag1 = 0;

  alarm1 = 0;

  flag2 = 0;

  alarm2 = 0;

  flag3 = 0;

  alarm3 = 0;

  flag4 = 0;

  alarm4 = 0;

  flag5 = 0;

  alarm5 = 0;

  flag6 = 0;

  alarm6 = 0;

  flag7 = 0;

  alarm7 = 0;

  flag8 = 0;

  alarm8 = 0;

  flag9 = 0;

  alarm9 = 0;

  flag10 = 0;

  alarm10 = 0;

  flag11 = 0;

  alarm11 = 0;

  flag12 = 0;

  alarm12 = 0;

  flag13 = 0;

  alarm13 = 0;

  flag14 = 0;

  alarm14 = 0;

  flag15 = 0;

  alarm15 = 0;

  flag16 = 0;

  alarm16 = 0;

  server.send(200, "text/html", SendHTML(true,LED2status,SENSOR3status));

}

void handle\_set() {

  LED1status = LOW;

  server.send(200, "text/html", SendHTML(false,LED2status,SENSOR3status));

}

void handle\_sensor1off() {

  SENSOR3status = HIGH;

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor1check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor1alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor2off() {

  SENSOR3status = HIGH;

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor2check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor2alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor3off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor3check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor3alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor4off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor4check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor4alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor5off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor5check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor5alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor6off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor6check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor6alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor7off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor7check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor7alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor8off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor8check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor8alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor9off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor9check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor9alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor10off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor10check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor10alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor11off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor11check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor11alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor12off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor12check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor12alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor13off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor13check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor13alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor14off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor14check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor14alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor15off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor15check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor15alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_sensor16off() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,1));

}

void handle\_sensor16check() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,2));

}

void handle\_sensor16alarm() {

  server.send(200, "text/html", SendHTML(LED1status,LED2status,3));

}

void handle\_NotFound(){

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

}

String SendHTML(uint8\_t led1stat, uint8\_t led2stat, uint8\_t sensor3stat){

  String ptr = "<!DOCTYPE html> <html>\n";

  ptr +="<meta http-equiv=\"Content-type\" content=\"text/html; charset=utf-8\"><head><meta name=\"viewport\" content=\"width=device-width, initial-scale=0.8, user-scalable=no\">\n";

  ptr +="<meta http-equiv=\"Refresh\" content=\"1\" />\n";

  ptr +="<title>Сигнализация</title>\n";

  ptr +="<style>html { font-family: Helvetica; display: inline-block; margin: 0px auto; text-align: center;}\n";

  ptr +="body{margin-top: 10px;} h1 {color: #444444;margin: 10px auto 10px;}\n"; //h3 {color: #444444;margin-bottom: 50px;}\n";

  ptr +=".button {display: block;width: 200px;background-color: #7CEC00;border: none;color: white;padding: 5px 30px;text-decoration: none;font-size: 25px;margin: 0px auto 0px;cursor: pointer;border-radius: 4px;}\n";

  ptr +=".button-on {background-color: #9D2EFE;}\n";

  ptr +=".button-check:on {background-color: #9D2EFE;}\n";

  ptr +=".button-check {background-color: #7CEC00;}\n";

  ptr +=".button-check:active {background-color: #7CEC00;}\n";

  ptr +=".button-alarm {background-color: #ff0000;}\n";

  ptr +=".button-alarm:active {background-color: #ff0000;}\n";

  ptr +=".button-off {background-color: #909090;}\n";

  ptr +=".button-off:active {background-color: #909090;}\n";

  ptr +="p {font-size: 20px;color: #444444;margin-bottom: 1px; margin-top: 3px}\n";

  ptr +="</style>\n";

  ptr +="</head>\n";

  ptr +="<body>\n";

  ptr +="<h1>Сигнализация</h1>\n";

  //  ptr +="<h3>Режим станции (STA)</h3>\n";

   if(led1stat)

  {ptr +="<p>Подключите датчики и нажмите ПЕРЕЗАПУСК</p><a class=\"button button-off\" href=\"/set\">ПЕРЕЗАПУСК</a>\n";}

  else

  {ptr +="<p>Нажмите СБРОС в случае тревоги</p><a class=\"button button-on\" href=\"/reset\">СБРОС</a>\n";}

  if(((1-leds[0]) && flag1) || alarm1 == 1)

  {ptr +="<p>Датчик №1</p><a class=\"button button-alarm\" href=\"/sensor1alarm\">ТРЕВОГА!</a>\n";

  alarm1 = 1;}

  else if ((1-leds[0])==0)

  {ptr +="<p>Датчик №1</p><a class=\"button button-check\" href=\"/sensor1check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №1</p><a class=\"button button-off\" href=\"/sensor1off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[1]) && flag2) || alarm2 == 1)

  {ptr +="<p>Датчик №2</p><a class=\"button button-alarm\" href=\"/sensor2alarm\">ТРЕВОГА!</a>\n";

  alarm2 = 1;}

  else if ((1-leds[1])==0)

  {ptr +="<p>Датчик №2</p><a class=\"button button-check\" href=\"/sensor2check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №2</p><a class=\"button button-off\" href=\"/sensor2off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[2]) && flag3) || alarm3 == 1)

  {ptr +="<p>Датчик №3</p><a class=\"button button-alarm\" href=\"/sensor3alarm\">ТРЕВОГА!</a>\n";

  alarm3 = 1;}

  else if ((1-leds[2])==0)

  {ptr +="<p>Датчик №3</p><a class=\"button button-check\" href=\"/sensor3check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №3</p><a class=\"button button-off\" href=\"/sensor3off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[3]) && flag4) || alarm4 == 1)

  {ptr +="<p>Датчик №4</p><a class=\"button button-alarm\" href=\"/sensor4alarm\">ТРЕВОГА!</a>\n";

  alarm4 = 1;}

  else if ((1-leds[3])==0)

  {ptr +="<p>Датчик №4</p><a class=\"button button-check\" href=\"/sensor4check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №4</p><a class=\"button button-off\" href=\"/sensor4off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[4]) && flag5) || alarm5 == 1)

  {ptr +="<p>Датчик №5</p><a class=\"button button-alarm\" href=\"/sensor5alarm\">ТРЕВОГА!</a>\n";

  alarm5 = 1;}

  else if ((1-leds[4])==0)

  {ptr +="<p>Датчик №5</p><a class=\"button button-check\" href=\"/sensor5check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №5</p><a class=\"button button-off\" href=\"/sensor5off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[5]) && flag6) || alarm6 == 1)

  {ptr +="<p>Датчик №6</p><a class=\"button button-alarm\" href=\"/sensor6alarm\">ТРЕВОГА!</a>\n";

  alarm6 = 1;}

  else if ((1-leds[5])==0)

  {ptr +="<p>Датчик №6</p><a class=\"button button-check\" href=\"/sensor6check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №6</p><a class=\"button button-off\" href=\"/sensor6off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[6]) && flag7) || alarm7 == 1)

  {ptr +="<p>Датчик №7</p><a class=\"button button-alarm\" href=\"/sensor7alarm\">ТРЕВОГА!</a>\n";

  alarm7 = 1;}

  else if ((1-leds[6])==0)

  {ptr +="<p>Датчик №7</p><a class=\"button button-check\" href=\"/sensor7check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №7</p><a class=\"button button-off\" href=\"/sensor7off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[7]) && flag8) || alarm8 == 1)

  {ptr +="<p>Датчик №8</p><a class=\"button button-alarm\" href=\"/sensor8alarm\">ТРЕВОГА!</a>\n";

  alarm8 = 1;}

  else if ((1-leds[7])==0)

  {ptr +="<p>Датчик №8</p><a class=\"button button-check\" href=\"/sensor8check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №8</p><a class=\"button button-off\" href=\"/sensor8off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[8]) && flag9) || alarm9 == 1)

  {ptr +="<p>Датчик №9</p><a class=\"button button-alarm\" href=\"/sensor9alarm\">ТРЕВОГА!</a>\n";

  alarm9 = 1;}

  else if ((1-leds[8])==0)

  {ptr +="<p>Датчик №9</p><a class=\"button button-check\" href=\"/sensor9check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №9</p><a class=\"button button-off\" href=\"/sensor9off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[9]) && flag10) || alarm10 == 1)

  {ptr +="<p>Датчик №10</p><a class=\"button button-alarm\" href=\"/sensor10alarm\">ТРЕВОГА!</a>\n";

  alarm10 = 1;}

  else if ((1-leds[9])==0)

  {ptr +="<p>Датчик №10</p><a class=\"button button-check\" href=\"/sensor10check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №10</p><a class=\"button button-off\" href=\"/sensor10off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[10]) && flag11) || alarm11 == 1)

  {ptr +="<p>Датчик №11</p><a class=\"button button-alarm\" href=\"/sensor11alarm\">ТРЕВОГА!</a>\n";

  alarm11 = 1;}

  else if ((1-leds[10])==0)

  {ptr +="<p>Датчик №11</p><a class=\"button button-check\" href=\"/sensor11check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №11</p><a class=\"button button-off\" href=\"/sensor11off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[11]) && flag12) || alarm12 == 1)

  {ptr +="<p>Датчик №12</p><a class=\"button button-alarm\" href=\"/sensor12alarm\">ТРЕВОГА!</a>\n";

  alarm12 = 1;}

  else if ((1-leds[11])==0)

  {ptr +="<p>Датчик №12</p><a class=\"button button-check\" href=\"/sensor12check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №12</p><a class=\"button button-off\" href=\"/sensor12off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[12]) && flag13) || alarm13 == 1)

  {ptr +="<p>Датчик №13</p><a class=\"button button-alarm\" href=\"/sensor13alarm\">ТРЕВОГА!</a>\n";

  alarm13 = 1;}

  else if ((1-leds[12])==0)

  {ptr +="<p>Датчик №13</p><a class=\"button button-check\" href=\"/sensor13check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №13</p><a class=\"button button-off\" href=\"/sensor13off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[13]) && flag14) || alarm14 == 1)

  {ptr +="<p>Датчик №14</p><a class=\"button button-alarm\" href=\"/sensor14alarm\">ТРЕВОГА!</a>\n";

  alarm14 = 1;}

  else if ((1-leds[13])==0)

  {ptr +="<p>Датчик №14</p><a class=\"button button-check\" href=\"/sensor14check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №14</p><a class=\"button button-off\" href=\"/sensor14off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[14]) && flag15) || alarm15 == 1)

  {ptr +="<p>Датчик №15</p><a class=\"button button-alarm\" href=\"/sensor15alarm\">ТРЕВОГА!</a>\n";

  alarm15 = 1;}

  else if ((1-leds[14])==0)

  {ptr +="<p>Датчик №15</p><a class=\"button button-check\" href=\"/sensor15check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №15</p><a class=\"button button-off\" href=\"/sensor15off\">ВЫКЛЮЧЕН</a>\n";}

  if(((1-leds[15]) && flag16) || alarm16 == 1)

  {ptr +="<p>Датчик №16</p><a class=\"button button-alarm\" href=\"/sensor16alarm\">ТРЕВОГА!</a>\n";

  alarm16 = 1;}

  else if ((1-leds[15])==0)

  {ptr +="<p>Датчик №16</p><a class=\"button button-check\" href=\"/sensor16check\">ОХРАНА</a>\n";}

  else

  {ptr +="<p>Датчик №16</p><a class=\"button button-off\" href=\"/sensor16off\">ВЫКЛЮЧЕН</a>\n";}

  ptr +="</body>\n";

  ptr +="</html>\n";

  return ptr;

}

Работа станции показана на видео: Signal\_ESP32.mp4