

# Covid-19 patient monitoring

**Member of the group:**

Chiara Morgillo

Erika del Rosso

**Professors:**

OSMANI Aomar

HAMIDI Massinissa

# Summary



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The Covid 19 virus is a big problem in this period of health crisis, this has led to several changes in the daily lives of all of us. One of the biggest problems is related to the monitoring of patients from home, who tested positive for coronavirus, but asymptomatic, or those at risk of contagion, such as the elderly. There are multiple solutions, but most involve a waste of time and personnel, which not all hospitals can cope with.

While on a personal level they involve the use of multiple medical devices, sometimes expensive or unavailable given the high frequency of demand on the market.

## *Introduction: The problem*



# Our solution

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There are numerous solutions to these problems. Our consists in the creation of a single device capable of monitoring some symptoms from home that may represent the onset of the virus in the patient considered. This is possible thanks to the measurement of three vital signs:

- **Heart rate** of the patient;
- **Blood oxygen level** of the patient;
- **Body temperature** of the patient.

The doctor treating the patient in question will therefore be able to access this information at any time and whenever these parameters change substantially, arrange for a visit to the patient in the manner deemed most appropriate. In fact, our device must allow those with the right information to be able to view the parameters considered with a simple internet connection at any time.

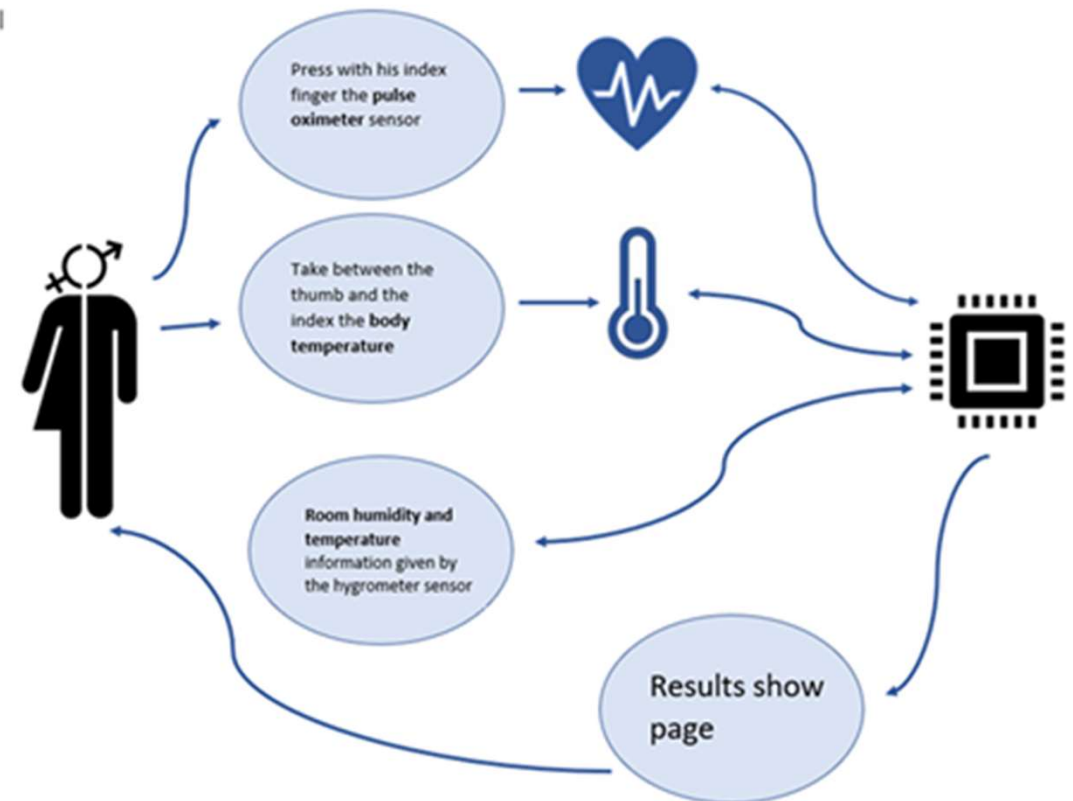
# Our solution

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The device must therefore be composed of three sensors, each with a different and specific task:

- **Pulse Oximeter Sensor**, used to monitor heart rate and oxygenation;
- **Temperature sensor**, is used to monitor the patient's body temperature;
- **Temperature and humidity sensor**, is used to monitor the temperature and humidity of the room where the patient is, as these conditions could bring significant changes in the parameters previously described.

The device will input all the above parameters and then bring them back to a single web page, by entering the IP address.



# State of the art

The first non-invasive oximeters were the ear oximeters around 1935, but it had too many problems:

- Inability to differentiate light absorption due to arterial blood from the venous blood and tissues.
- High cost of instrumentation

Nowadays, there are small oximeters, based in laser oximetry, that measure the oxygen saturation on the extremities of human body, as finger.

The oximeter has jumped to the forefront of the news because it helps to discover a severe complication, such as pneumonia.

There exists some that also measure body temperature and, in exceptional cases, it can contain also room thermometer.



# State of the art



There exists different kinds of thermometer.

The first one was 30 cm long and taking a patient's temperature could take up to half an hour.

These days thermometers have many important quality, as:

Compactness

Speed of measurement

Accuracy

The most used in these time are the infrared thermometer, which doesn't need to be touched and takes only few seconds to measure the temperature.

Più venduto



ThermoPro TP49 Mini Igrometro Termometro Digitale Termoigrometro da Interno per Casa Monitor di Temperatura e umidità per Ambient...

★★★★☆ ~ 3.522

9,99€



Sponsorizzato

Waweche Termometro febbre infrarossi 2 in 1 Termoscanner professionale per febbre Misuratore temperatura corporea Termometro...

★★★★☆ ~ 183

39,99€ (39,99 €/unità)

# Market Study



Pulsossimetro, Monitore di Battito Cardiaco Portatile con LED Display, FED e CE Certificato per Misurazione di Pulsazione (PR) e Saturazione di...

★★★★☆ ~ 2

20,09€

Pulsossimetro Saturimetro Palmare Display 2,8" LCD con Sensore Adulti a Clip, Sonda Temperatura e Batteria Ricaricabile

197,00 € (IVA escl.)

197,00 € (IVA incl.)

250,00-€ (Risparmi 21,2%)

CATEGORIA: PULSOSSIMETRI - SATURIMETRI RIFERIMENTO: OTNO DISPONIBILE: 6 ARTICOLI

Saturimetro palmare con sensore adulti e sonda temperatura cutanea saturimetro professionale ospedaliero Saturimetro con batteria ricaricabile e memoria interna da 90 ore.

1 AGGIUNGI AL CARRELLO

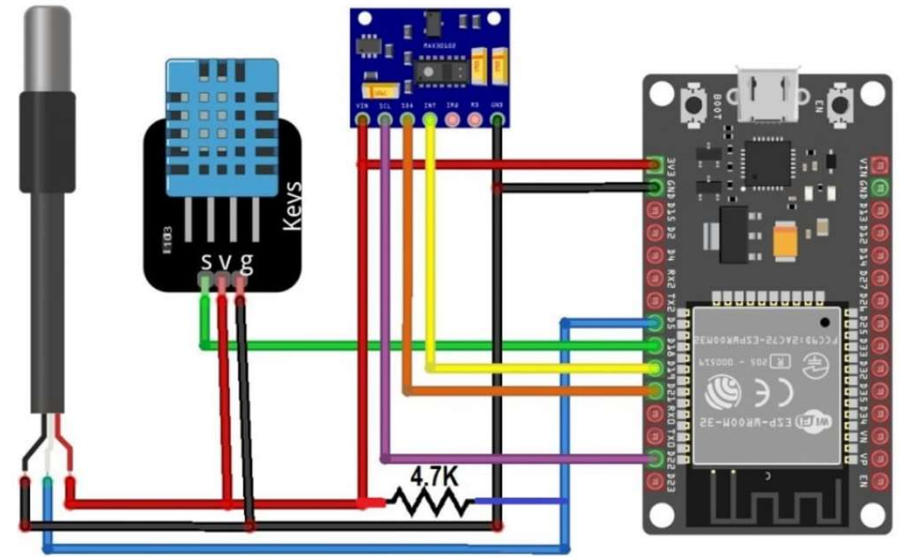
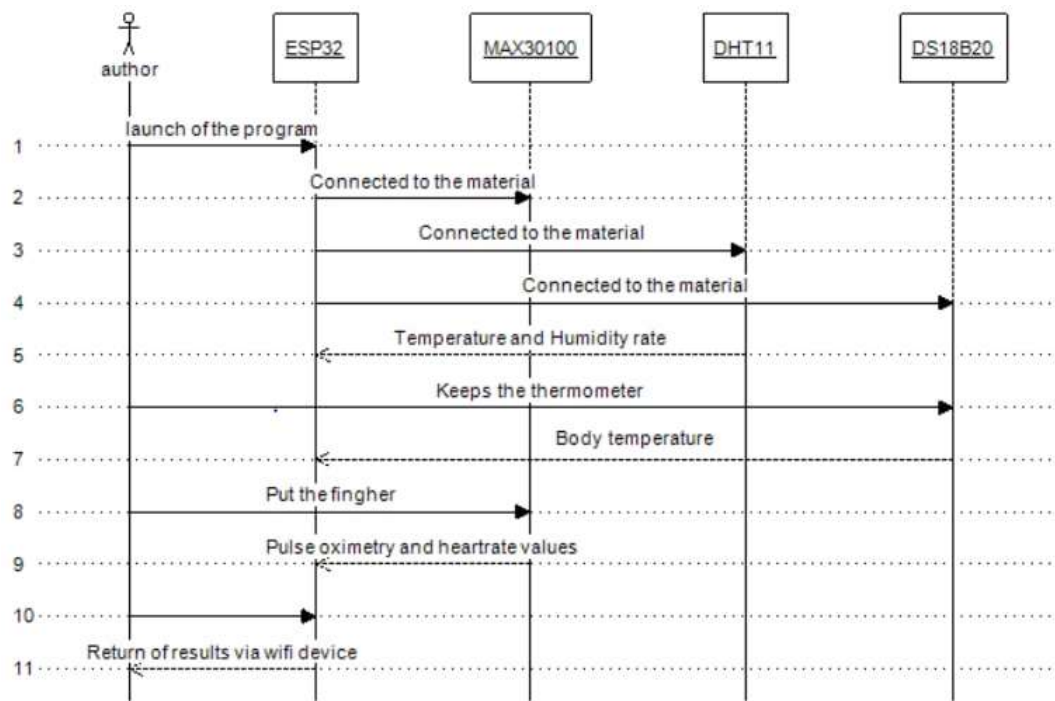
LISTA DEI DESIDERI CONFRONTARE

	Min Price	Max Price
Pulse oximeter	20€	200€
Thermometer	3€	1000€
Hygrometer thermometer	2€	300€





# Implementation



# Code

Link of the project code: <https://how2electronics.com/iot-based-patient-health-monitoring-esp32-web-server/>

During the implementation we encountered problems with this code in the DTH11 component part.

```
const char* ssid = "The IoT Projects"; // Enter SSID here
const char* password = "11122235122@kap"; //Enter Password here

Dht DHT;
PulseOximeter pox;
uint32_t tsLastReport = 0;
OneWire oneWire(DS18B20);
DallasTemperature sensors(&oneWire);

WebServer server(80);

void onBeatDetected()
{
  // ...
}

// ...

exit status 1
'dht' does not name a type
```

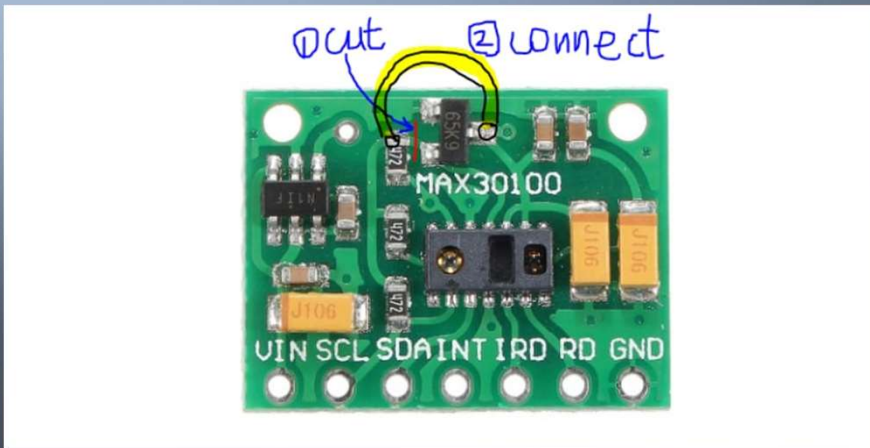


# Problem

Another problem encountered concerns the MAX30100: there is a design problem.

The SCL and SDA pins are pulled-up via the 4.7k ohm resistors to 1.8V! This means it won't work well with microcontrollers with higher logic levels.

A possible solution can be to cut the path in the place of the red cross and make a jumper as shown by the yellow line.



# Conclusion

Following the problems encountered, we opted for the construction of multiple devices instead of just one.

Despite several attempts and the modification made, we have not yet been able to solve the problem with the MAX30100.

However, we are convinced that this project, if completed, can be of great help in various situations of health problems.

```
sketch_jan14a
#include <WiFi.h>
#include "DHT.h"

// Uncomment one of the lines below for whatever DHT sensor type you're using!
#define DHTTYPE DHT11 // DHT 11

// Replace with your network credentials
const char* ssid = "AndroidAP4692";
const char* password = "1492b9f2fa7b";

WiFiServer server(80);

// DHT Sensor
const int DHTPin = 18;
// Initialize DHT sensor.
DHT dht(DHTPin, DHTTYPE);

// Temporary variables
static char celsiusTemp[7];
static char fahrenheitTemp[7];
static char humidityTemp[7];

// Client variables
char linebuf[80];
int charcount=0;

void setup() {
  // initialize the DHT sensor
  dht.begin();

  //Initialize serial and wait for port to open:
  Serial.begin(115200);
}
```

← → × ⚠ Non sicuro | 192.168.43.121

## ESP32 DHT11 example

21.09 \*C

69.96 \*F

53.00 %

```
n Temp C: 28.69 Temp F: 83.64
r Temperature for device: 0
r Temp C: 28.81 Temp F: 83.86
Temperature for device: 0
Temp C: 28.94 Temp F: 84.09
Temperature for device: 0
Temp C: 29.00 Temp F: 84.20
Temperature for device: 0
Temp C: 29.25 Temp F: 84.65
Temperature for device: 0
r Temp C: 29.25 Temp F: 84.65
Temperature for device: 0
Temp C: 29.06 Temp F: 84.31
Temperature for device: 0
i Temp C: 24.75 Temp F: 76.55
```

```
termometro_esame_2
/*****
Rui Santos
Complete project details at https://RandomNerdTutorials.com
*****/

#include <OneWire.h>
#include <DallasTemperature.h>

// Data wire is plugged TO GPIO 4
#define ONE_WIRE_BUS 5

// Setup a oneWire instance to communicate with any OneWire devices (not just Maxim/Dallas temperature ICs)
OneWire oneWire(ONE_WIRE_BUS);

// Pass our oneWire reference to Dallas Temperature.
DallasTemperature sensors(&oneWire);

// Number of temperature devices found
int numberOfDevices;

// We'll use this variable to store a found device address
DeviceAddress tempDeviceAddress;

void setup() {
  // start serial port
  Serial.begin(115200);

  // Start up the library
  sensors.begin();

  // Grab a count of devices on the wire
  numberOfDevices = sensors.getDeviceCount();
}
```



*Merci à vous!  
Grazie per  
l'attenzione!*

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