

# SpO<sub>2</sub> and Pulse Measuring Health Monitoring System Using Arduino Nano

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**Abstract:** The main aim of this paper is to design a “Wireless Health Monitoring System” that can monitor our heart rate and SpO<sub>2</sub> (oxygen-carrying haemoglobin in blood)/ Wireless Health Monitoring in a systematic manner. In this amplifying world, health is a very important topic for every human being and to monitor it is also a major thing to be done. Health professionals play a very big role for monitoring health of every individual, but nowadays the population is becoming large and it is very difficult for them to monitor health. In this pandemic situation, health is a most prior thing for every people around the world. There are many devices that has been already developed for monitoring health, but this device is very much convenient as well as efficient. For aged people monitoring them health by visiting Hospitals daily is a big burden and also, for newborns it is very necessary for their regular check-ups. Looking into all these situations we have made a Device that can monitor our health wirelessly. This device basically consists of Arduino Nano, OLED Display, MAX30100 Pulse oximeter, HC-05 Bluetooth Module along with two capacitors of different values and two Resistors of same value. In future by adding more sensors this device can be more effective and it can have many new functions.

**Keywords:** Arduino Nano, OLED Display, MAX30100, HC-05 Bluetooth Module

## I. INTRODUCTION

In the present scenario monitoring health is very important as many diseases/viruses are being developed with time. Covid 19 is one of the diseases which had affected the whole world in these past few years. In these upcoming years many diseases may arise as Covid 19 and can affect the world again. So, it becomes very important for us to be healthy and fit to fight against such diseases. In such cases health monitoring becomes very important for us and for this type of situation, we have tried to make a wireless health monitoring system using Arduino Nano. This device helps us to monitor our health wirelessly without going to any Health Centre's. The MAX30100 pulse oximeter senses the heart rate (BPM) and SpO<sub>2</sub>, then the data is sent to Arduino Nano and it is displayed on OLED Display. Furthermore, with the help of HC-05 Bluetooth Module, we can be able to see the readings on our Mobile Phones by the help of Android app. With the help of this device, we can save our time as it becomes very easier for us to monitor our health. Health professionals work is also reduced by the help of this device and also the manpower in hospitals is decreased. For sports person it is an easiest way to check their health. This device is very beneficial for everyone from small children to old aged people.

## II. THE PROBLEM

It has become so difficult for health professionals to monitor patient's health due to increase in population. For aged and young ones also, it has been very hard to travel and monitor health. During this pandemic situation it is very risky to travel outside the home.

## III. PROPOSED SOLUTION

This proposed device is made to solve all the problems being faced in terms of health monitoring. It solves the problem faced by people in rural areas where there is no Health Care Centre's. It helps in reducing manpower, paper work

**IV. COMPONENTS**

SL.NO	ITEMS	QUANTITY
1.	Arduino Nano	1
2.	MAX30100 Sensor	1
3.	OLED Display	1
4.	HC-05 Bluetooth Module	1
5.	Resistors	2
6.	Capacitors	3

Table.no-1

**V. BLOCK DIAGRAM**

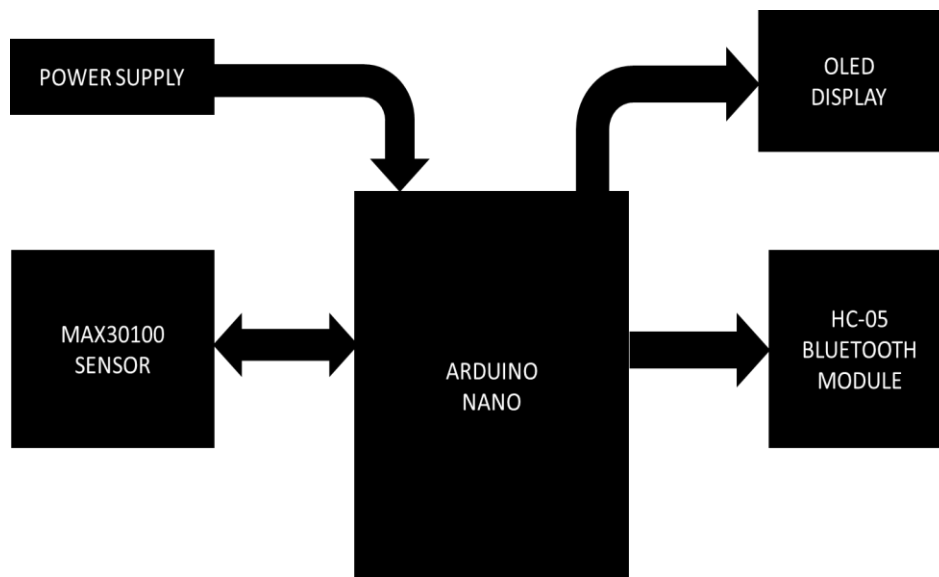


Fig.no-1

**V. BLOCK DIAGRAM DESCRIPTION**

First MAX30100 senses the Heart rate and spO2 of human body when finger is placed upon it. Further the data is sent to Arduino board, and after that the data is sent to OLED display where it displays the readings of Heart rate and spO2. Further more we can see the readings in our mobile phones by the use of HC-05 Bluetooth Module.

**Arduino NANO**

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.

**MAX30100 sensor**

The MAX30100 senses the heart rate and the SpO2 levels of the blood. It combines of two LEDs, a photodetector, optimized optics, and low-noise analog signal processing to detect pulse Oximetry and heart rate signals. One of the two LEDs emits red light, and another emits infrared light. For pulse rate, only the infrared light is needed.

### HC-05 BLUETOOTH MODULE

HC-05 Bluetooth Module is a Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication. It has red LED which blinks in different frequencies indicating the status of connection.

### OLED DISPLAY

The organic light-emitting diode (OLED) display is a mono-color, 0.96-inch display with 128x64 pixels. Its pixels consume energy only when they are on, so the OLED display consumes less power as compared with other displays. It has four pins and communicates with Arduino using I2C communication protocol. It operates on 5 Volts.

## VI. CIRCUIT DIAGRAM

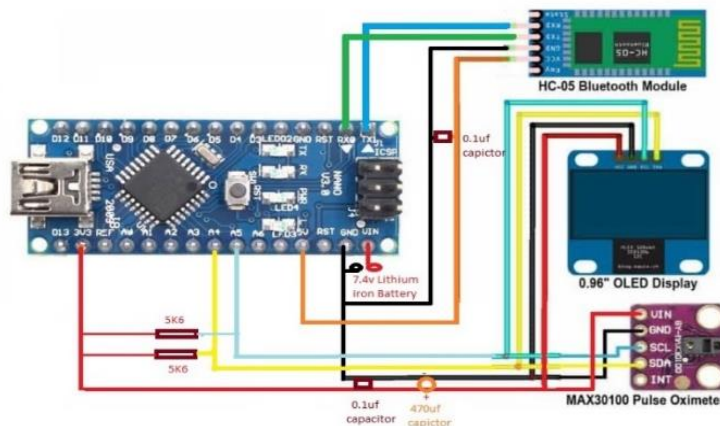


Fig.no-2

## VII. CIRCUIT DIAGRAM DESCRIPTION

In the circuit diagram given above the analog pins of Arduino A4 and A5 is connected with SCL and SDA of MAX30100 pulse oximeter. The pins of Arduino RX and TX is connected with the RX and TX of HC-05 Bluetooth module and the power supply is given to pin no 27 which is used to provide power supply to the Arduino Nano board as well as other components. The pin no 29 is connected to the GND of HC-05 Bluetooth module and it is also connected with the GND of OLED Display and MAX30100 pulse oximeter. The pin no 17 is used to give power supply to the OLED Display and MAX30100 pulse oximeter because the required voltage for its operation is 3V. In addition, we have used two resistors of  $5K\Omega$  in which one of the resistors is connected in series with pin no 17 and 25 of Arduino and another is connected with pin no 17 and 24 of Arduino. Likewise, we have connected three Capacitors of two different values which is  $0.1\mu\text{f}$  and  $470\mu\text{f}$ . We have connected the Capacitor of value  $470\mu\text{f}$  and  $0.1\mu\text{f}$  which is connected with 3V Power supply of Arduino,  $V_{in}$  of MAX30100 Sensor and OLED Display. And another capacitor of value  $0.1\mu\text{f}$  is connected with 5V Power Supply, GND of Arduino and VCC, GND of HC-05 Bluetooth Module.

## VIII. APPLICATIONS

- 1.It reduces the work load of health professionals and also manpower in Hospitals.
- 2.It can also be used by Sports person to monitor their health.

## IX. ADVANTAGES

1. It gives us peace of mind as it is a very easy way to monitor health.
2. It reduces the workload of doctors and also manpower in hospitals.
3. It can be used in Hospitals for monitoring different patients.

## X. DISADVANTAGES

- 1.It may generate incorrect readings if the finger has not been properly placed.

**XI. RESULT**

The project has been tested in proteus and also in breadboard. This device has been more efficient and effective as it was earlier before. It has been simulated in Proteus Software Version 8.0 and also it has been executed in Breadboard and in PCB board. It has been developed in such a way that it can monitor our health wirelessly. The clear output readings can be seen in our OLED Display.

**XII. CONCLUSION**

Hence, we have completed our project successfully. During this project we faced lots of problems which were disturbing the further steps of the project. But by the guidance of our Project coordinator, Project guide and the help which we got from our teachers and friends gave us the idea to solve the problems and today we are able to complete the project. From this project we came to learn and how to troubleshoot the problem how to design a “Wireless Health Monitoring System”. We can now monitor our health in an effective and efficient way. This device can be used in many Healths Centre’s, Hospitals, Schools, Rural areas etc.

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