



SARVAJANIK COLLEGE OF ENGINEERING AND TECHNOLOGY

Heart Rate and SpO2 Monitoring System with Automated Excel Reporting

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INTRODUCTION

- Blood oxygen monitoring, heart rate monitoring, and temperature monitoring are all important in healthcare.
- Blood oxygen monitoring involves measuring the oxygen saturation level in a person's blood, which is a critical indicator of respiratory function.
- Heart rate monitoring involves measuring the number of times a person's heart beats per minute, which is a critical indicator of cardiovascular function.
- All Two monitoring techniques can help diagnose and monitor a wide range of medical conditions, and are important tools for healthcare professionals in providing effective treatment and care to patients.

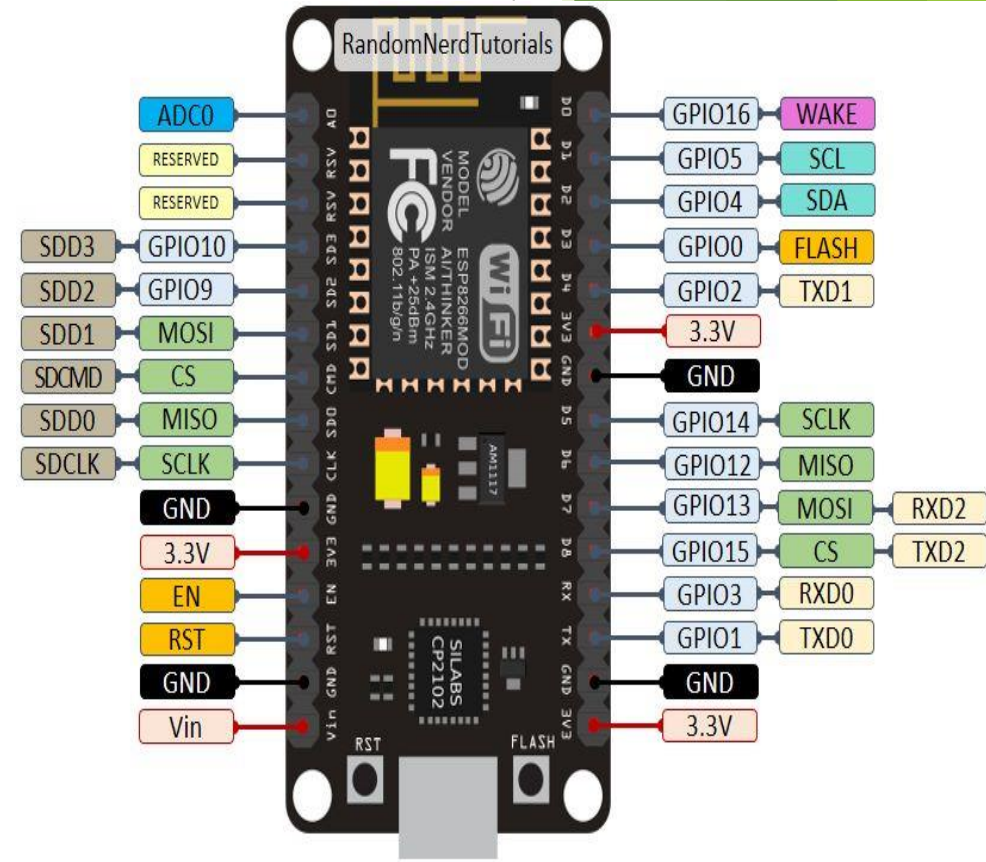
SYSTEM COMPONENTS

- ESP 8266
- MAX 30102
- OLED DISPLAY (0.98 INCHES)
- BREADBOARD
- JUMPER WIRES

COMPONENTS SPECIFICATIONS

ESP 8266

- The ESP8266, which is a low-cost Wi-Fi module that is commonly used in Internet of Things (IoT) projects.
- The ESP8266 has a built-in Wi-Fi module and can be programmed using the Arduino IDE, With its small size, low power consumption, and Wi-Fi connectivity.
- The ESP8266 is an ideal choice for projects that require remote monitoring and control, such as home automation, smart appliances, and environmental sensing.



I2C PROTOCOL IS USED

- I²C (I2C, IIC) is a serial 2-wire bus for communicating with various devices.
- ESP8266 chip does not have hardware I²C, so module uses software I²C driver. It can be set up on any GPIO pins including GPIO16.
- This module supports :Master mode Multiple buses (up to 10) with different speeds on each bus Standard(Slow, 100kHz), Fast(400kHz)
- MAX 30102 supports up to fast (400kHz) I2C communication.
- MAX 30102 Sensor has I2C address 0x57.
- OLED has I2C address 0x3C

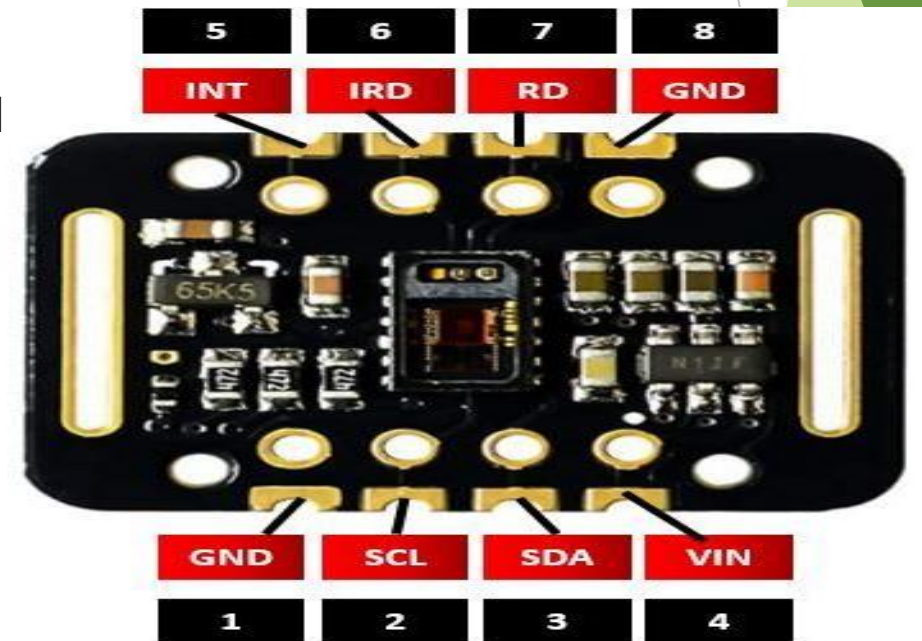
- Operating voltage: 1.8V to 5.5V
- Integrated photodiode and LED driver
- Low-power operation: 600 nA standby current, 4.4 mA active current
- Two LEDs for emitting light and one photodetector for measuring light intensity
- Digital output (I2C interface)
- Adjustable LED brightness for different skin tones and ambient light conditions
- Operating temperature range: -40°C to +85°C
- Size: 5mm x 6.4mm x 1.5mm



MAX 30102

Pin Description

- VIN This pin is used to supply power to the sensor. This sensor powered on at 3.3-5V.
- SCL This is the I2C serial clock pin.
- SDA This is the I2C serial data pin
- INT This is the active low interrupt pin. It is pulled HIGH by the onboard resistor but when an interrupt occurs it goes LOW until the interrupt clears.
- IRD IR LED Cathode and LED Driver Connection Point
- RD Red LED Cathode and LED Driver Connection Point
- GND This is used for supplying ground to this sensor and it is connected to the source ground pin.



OLCD DISPLAY

- 0.96-inch (1x1) inch display makes this one of our smaller versions; perfect for small projects, wearables, and other portables.
- It has a low, low 0.06W power consumption in regular working conditions.

Specifications

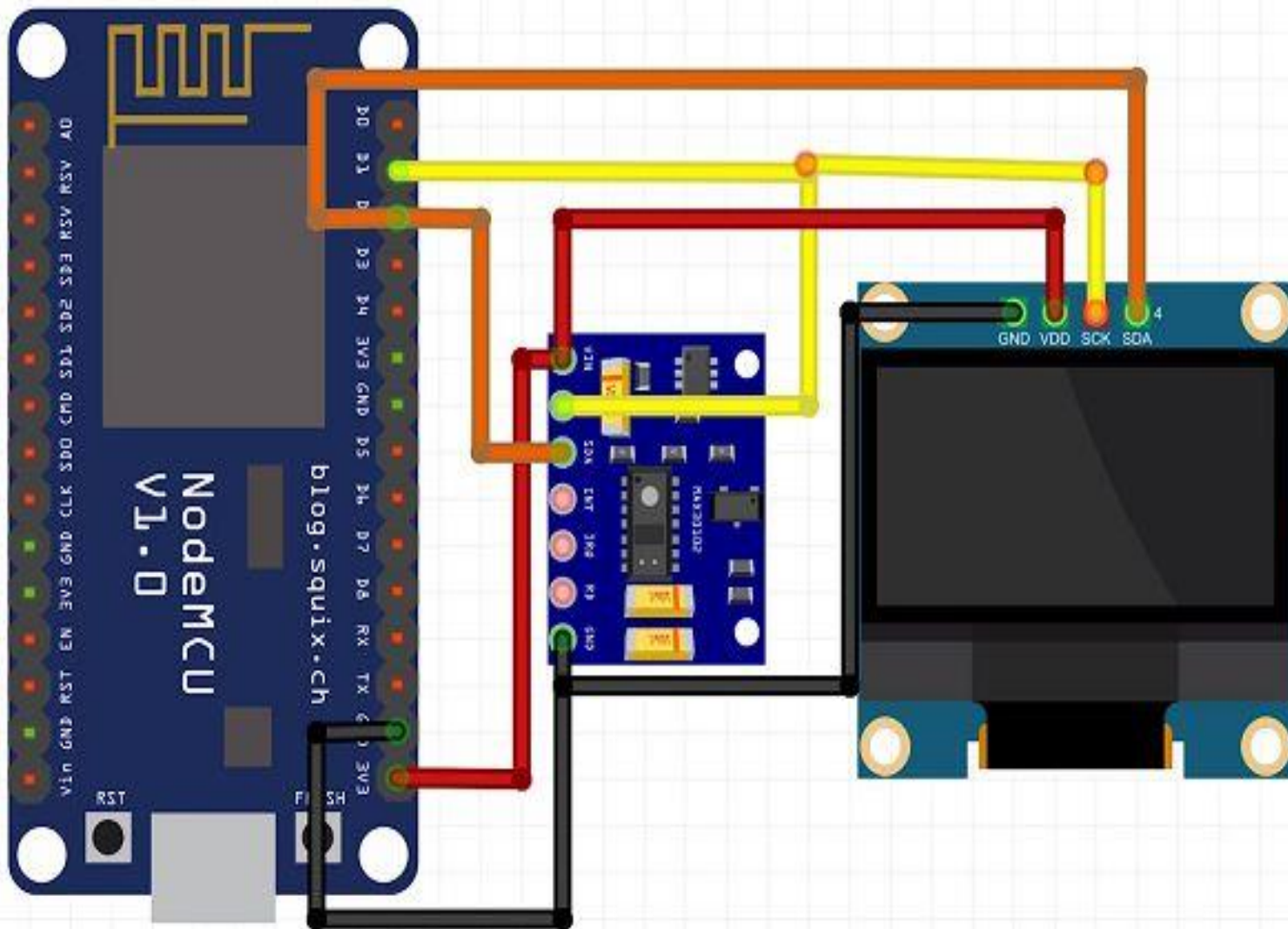
- ❖ Display Size: 0.96 inch
- ❖ Dimension: 26.3x26.1 mm
- ❖ Display area: 21.7x10.9 mm
- ❖ Display Driver IC: SSD1315
- ❖ Resolution : 128x64
- ❖ Port: IIC Operating
- ❖ Voltage: 3.3-5V
- ❖ Display color : Blue, White (Optional)



ESP32 TO GOOGLE SHEETS

- Google Sheets come to play as these are free, familiar, and most importantly reliable.
 - It has a lot of functionalities and built-in integration with many other Google services and APIs.
 - We can use this for many IoT applications from simple data logging to live monitoring and management of IoT devices.
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- ❑ Steps to create data logger using google spreadsheet.
 1. Create a new Google Sheet.
 2. Create a header row for your data.
 3. Create a Google Script.
 4. Deploy the script as a web app.
 5. Update your ESP32 code to send data to the Google Sheet.

CIRCUIT DIAGRAM



ADVANTAGES

- Early Detection of Medical Conditions: Monitoring blood oxygen levels and heart rate can help detect medical conditions early, allowing for prompt diagnosis and treatment.
- Non-Invasive: Blood oxygen and heart rate monitoring can be done non-invasively, which means there is no need for needles or other invasive procedures
- monitor blood oxygen levels and heart rate using wireless devices. This allows for continuous monitoring of patients in real-time, even when they are away from the hospital or clinic.
- Cost-Effective

DISADVANTAGES

- False Readings: Monitoring systems may occasionally provide inaccurate or false readings, which can lead to incorrect diagnoses and treatment plans.
- Technical Difficulties: Technical issues such as device malfunctions or software errors can cause monitoring systems to fail or provide incorrect data.
- Privacy Concerns: Wireless monitoring systems may raise privacy concerns, as they transmit sensitive patient information over the internet or other networks.

APPLICATIONS

- Medical Settings: In hospitals and clinics, blood oxygen and heart rate monitoring systems are commonly used to monitor patients with respiratory and cardiovascular diseases..
- Sports and Fitness: Athletes and fitness enthusiasts use blood oxygen and heart rate monitoring systems to track their performance and training progress.
- Aviation and Aerospace
- Military and Defense

REFERENCES

- <https://www.mouser.com/ProductDetail/Analog-Devices-Maxim-Integrated/MAXM86161EFD+T?qs=XeJtXLiO41T6hWnBlrpJ0w%3D%3D>
- <https://iotdesignpro.com/articles/esp32-data-logging-to-google-sheets-with-google-scripts>
- <https://chat.openai.com/>

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THANK
You! 😊