

Dual Wavelength Pulse Oximeter

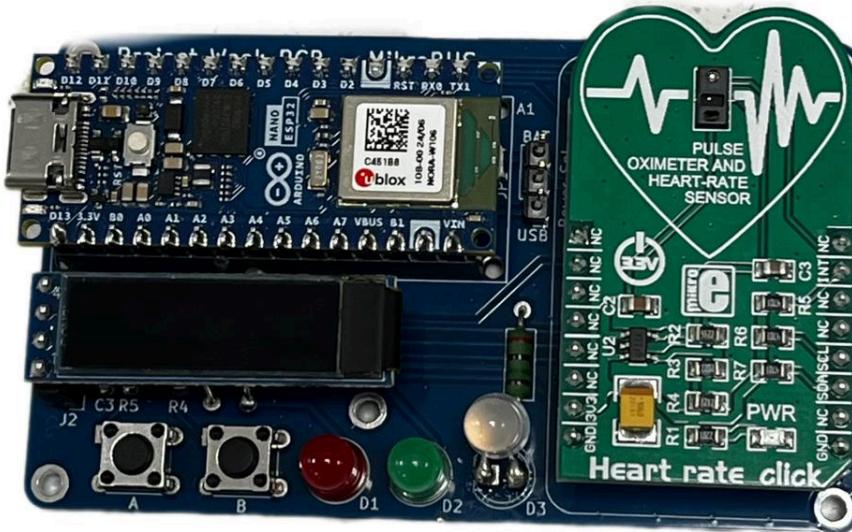


Fig.1. Dual Wavelength Pulse Oximeter

Description

The Dual Wavelength Pulse Oximeter provides a Heart Rate and SpO₂ at a polling rate of 1Hz. It uses a Heart Rate Click and an MAX30100 sensor to gather the data non-invasively and outputs the values on a small OLED screen.

Specifications

Electrical

- Input voltage range: 6V to 20V

Mechanical

- Dimensions : 7.3 cm x 4.5 cm x 1.5 cm

Environmental

- Thermal operating range -40°C to 80°C
- Storage humidity Maximum 50%
- Potential WEEE Compliance

MAX30101 sensor

- Ultra-Low-Power Operation
- Programmable Sample Rate and LED Current for Power Savings
- Ultra-Low Shutdown Current (0.7µA, typ)

Key Performances

- Polling rate: 1Hz

MAX30101 sensor

Pulse Width (μs)

Samples (/s)	200	400	800	1600
50	o	o	o	o
100	o	o	o	o
167	o	o	o	
200	o	o	o	
400	o	o		
600	o			
800	o			
1000	o			
Resolution (bits)	13	14	15	16

Fig.2. Table of oximeter under SpO2 Mode

Electrical and Timing Characteristics

Red LED:

- Peak wavelength: 635 nm
- Forward voltage range: between 1.6V and 2.6V, the typical is 2V

Green LED:

- Peak wavelength: 568 nm
- Forward voltage range: between 1.7V and 2.6, the typical is 2.1V

MAX30101 sensor:

- Input voltage: 3.3V or 5V
- Size: (42.9 x 25.4) mm
- Interface: IC2, GPIO

OLED module:

- Resolution: 128x32
- Interface: IC2

Arduino nano ESP32:

- Input voltage from Vin pad: minimum: 6V, typical: 7V, maximum: 21V
- Input voltage from USB connector: minimum 4.8V, typical: 5.0V, maximum 5.5V
- Dimensions: 12.76 x 43.16 x 2.54 mm

Block Diagram

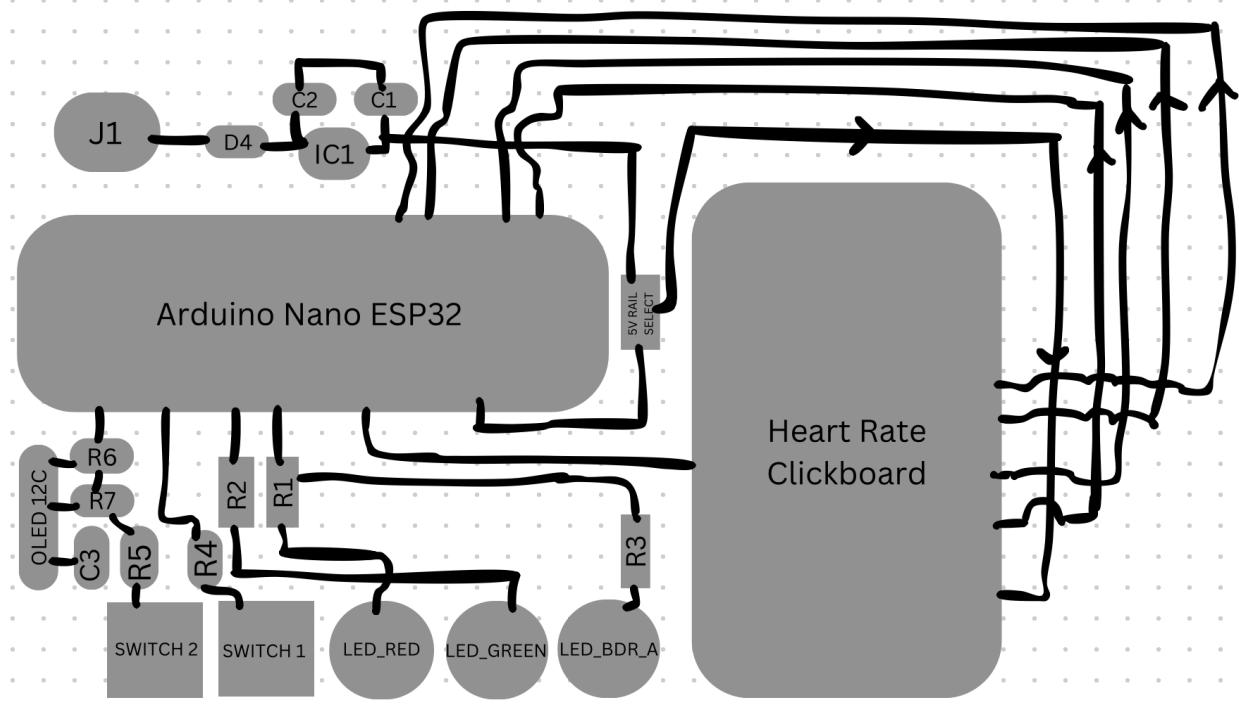


Fig.3. Block Diagram of Dual Wavelength Oximeter

Interfaces and Connections

- USB C connector for power and access to Arduino IDE
- 3 pin battery connector
- 96x16 OLED screen
- Red and Green LEDs for warning

MicroBUS Motherboard - the shield used to connect an Arduino Nano ESP32 to the mikroBUS™

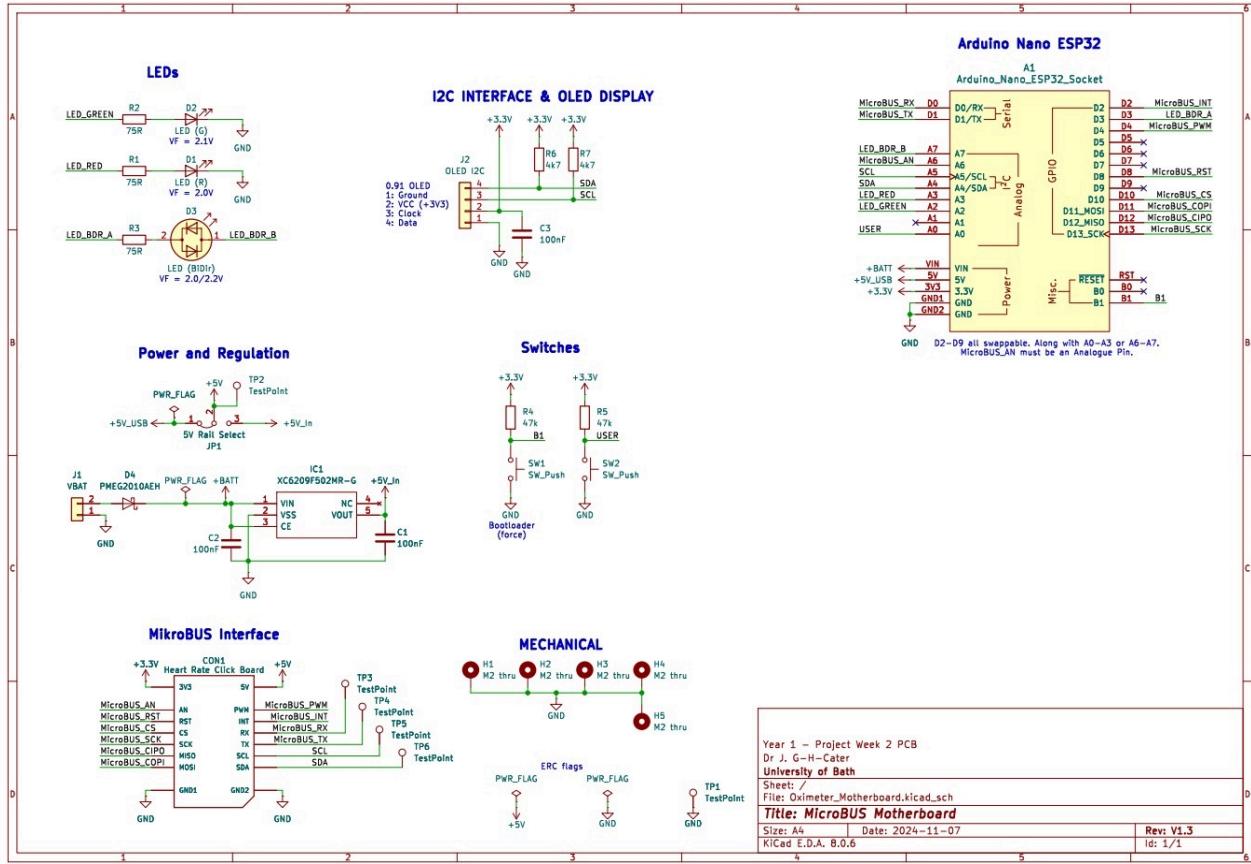


Fig.4. Engineering Drawing of MicroBUS Motherboard

Reference : [Project Week 2 Lab Script](#)

Pin Configuration

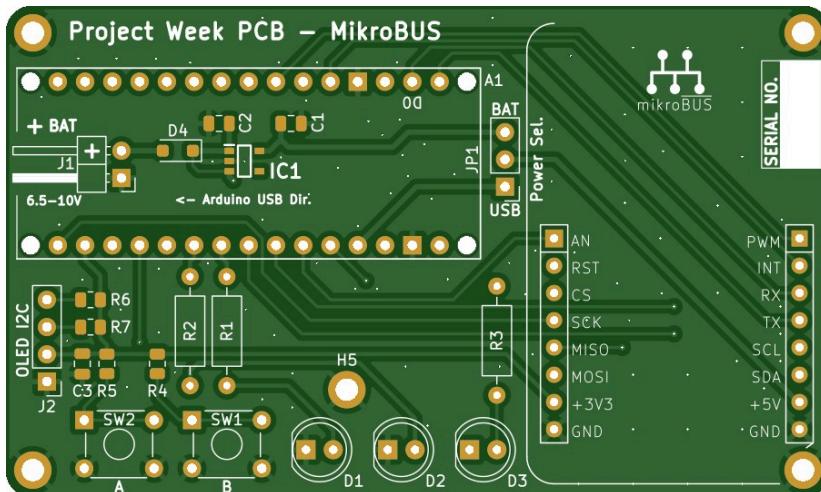


Fig.5. PCB Layout of MicroBUS Motherboard

Reference : [Project Week 2 Lab Script](#)

Relevant Safety and standard compliance

Medical device standards:

- **BS EN ISO 80601-2-61:** Specific to pulse oximeters, detailing safety and essential performance requirements.
- **BS EN 60601-1:** General requirements for safety and performance of medical electrical equipment.
- **BS EN ISO 14971:** Application of risk management to medical devices.
- **BS EN 60601-1-2:** Electromagnetic compatibility (EMC) requirements.

Safety considerations

- Ensure compliance with BS EN 60601-1, protecting against overcurrent
- Test the device to function in different environmental situations (5-40 degrees)
- Ensure SpO₂ and heart rate measurements meet accuracy requirement (+- 2% SpO₂ between values of 70 and 100 %)

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