DIY Oximeter

By Group 4, Batch 1

AI-DS 'A'

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TEAM MEMBERS

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AIM

- The aim of the project is to create a DIY Oximeter using the principle based on the difference in the absorption spectrum of hemoglobin.
- The DIY Oximeter measures SPO2 level and pulse rate of the user.

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NEED FOR THE PROJECT

- A pulse oximeter is a painless, non-invasive method of measuring the saturation of oxygen in a person's blood.
- It's particularly valuable for individuals with conditions like asthma, COPD, or heart conditions, as well as during illnesses that affect breathing, such as pneumonia or COVID-19.
- A sudden drop in oxygen saturation can indicate a serious issue, so having an oximeter can provide early warning signs and prompt medical attention if needed.

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WORKING OF THE DEVICE

- When light is sent from Light Emitting Diode (LED) to the light sensor, it is absorbed by an amount that is dependent on its wavelength and amount of oxygen present in the blood.
- The amount also fluctuates because of the expansion and contraction of arteries allowing us to calculate the pulse rate from the transmitted signal.
- The oxygen level and pulse rate is displayed in the LCD display.

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MAX30100 SENSOR

- The MAX30100 is a popular pulse oximeter and heart-rate sensor module. It utilizes two LEDs (typically red and infrared) to measure the absorption of light by oxygenated and deoxygenated hemoglobin in the blood.

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WORKING OF THE OXIMETER

- LED Emission: The MAX30100 emits red and infrared light into the skin using its LEDs.
- Light Absorption: The oxygenated and deoxygenated hemoglobin in the blood absorbs different amounts of light. Oxygenated hemoglobin absorbs more infrared light and allows more red light to pass through, while deoxygenated hemoglobin absorbs more red light and allows more infrared light to pass through.
- Photodetector: The sensor has a photodetector that measures the intensity of light not absorbed by the blood.
- Signal Processing: By analyzing the differences in the detected light, the sensor calculates the ratio of oxygenated hemoglobin to total hemoglobin (known as SpO2, or peripheral capillary oxygen saturation).
- Heart Rate Detection: Additionally, it can detect the pulsatile flow of blood, allowing it to determine the heart rate.
- Data Output: The processed data (SpO2 and heart rate) is then made available for reading through the sensor's interface (such as I2C or SPI) to be used by a microcontroller or other devices.

ESTIMATION OF COST

Name of Product	Cost
Arduino IDE	Free download
Arduino UNO Board	Rs. 460
Project Board	Rs. 90
Max 30100 Oximeter Sensor	Rs. 280
16*3 LCD Display for displaying readings	Rs. 380 (with soldering)
Jump wires for connection	Rs. 40
	Total: 1,250 (approx)

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TIME TAKEN

- Coding for Arduino board-1 week
- Connecting sensor and getting display-1 week.

Total : 2-3 weeks(approx.)

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Flowchart

Explanation of flowchart

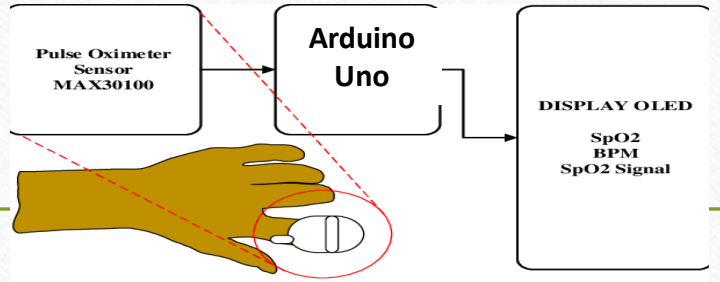

FIGURE 1. Diagram Block

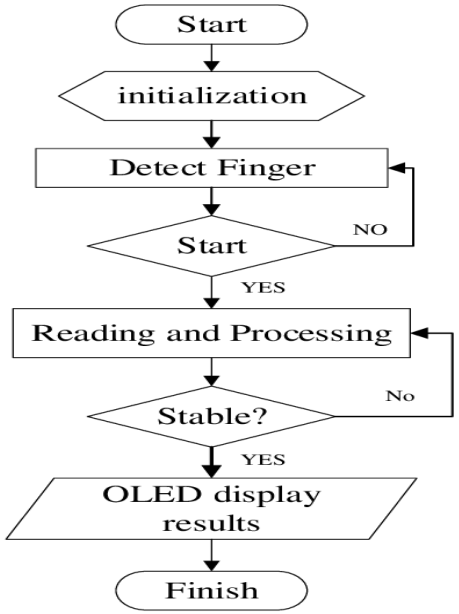

FIGURE 2. The Flowchart of Flowrate

CODE

- Arduino code.docx

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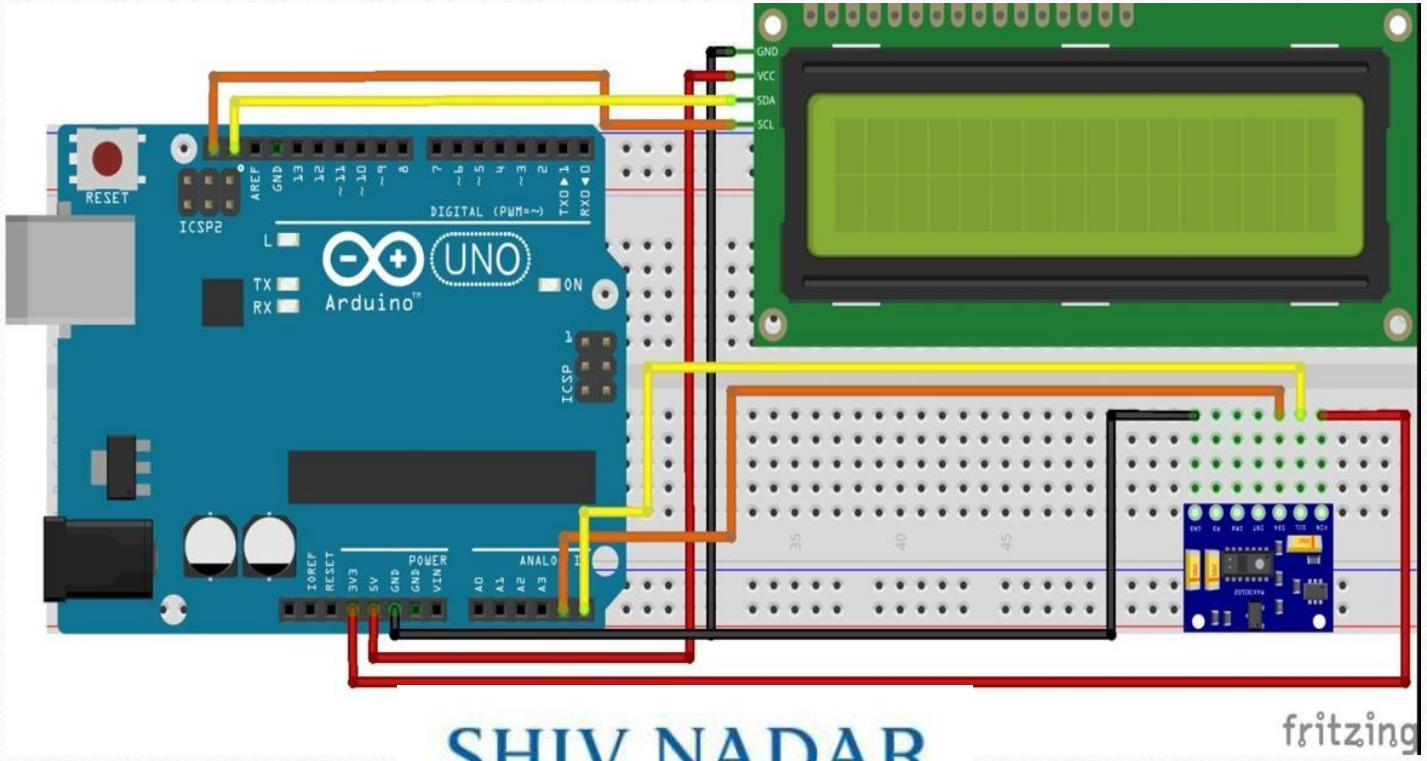
CIRCUIT DIAGRAM



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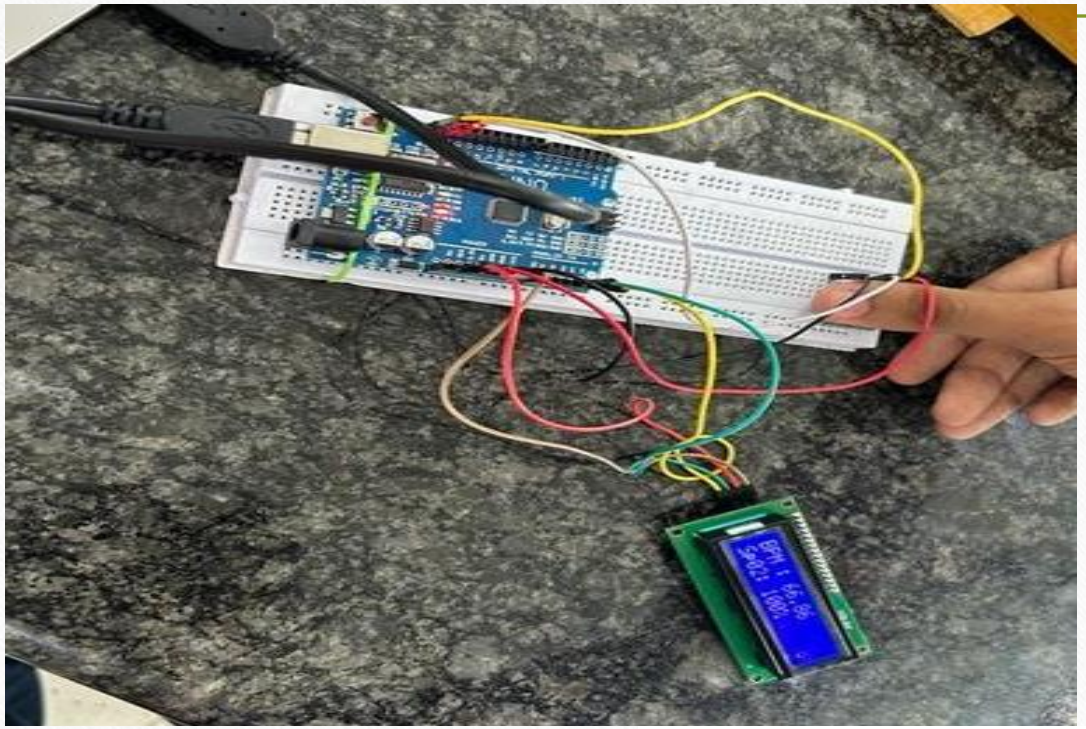
TESTING DEVICE PHYSICALLY IN LAB



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READING TAKEN IN LAB

NAME	SPO2 CONCENTRATION	PULSE RATE
Aditya S	99	84
Anish	94	74
Ankith	99	72
Ashwin	94	71
Vishal	99	80
Prof. S.M Dhivya Ma'am (Staff)	94	85

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GRAPH

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ALTERNATE METHODS

1. Arterial Blood Gas Test(ABG)- This method is used to calculate the amount of oxygen and carbon dioxide level in blood by taking blood from artery present in the wrist.

---> Why is the pulse oximeter better than the ABG test?

- Non-Invasive method
- It is a continuous monitoring modality
- Inexpensive compared to ABG.
- No calibration is necessary.

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APPLICATION

- **It** is used to check the health of a person with any condition that affects the blood oxygen level, like:

1. Heart Attack
2. Anaemia
3. Lung Cancer
4. Pneumonia

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