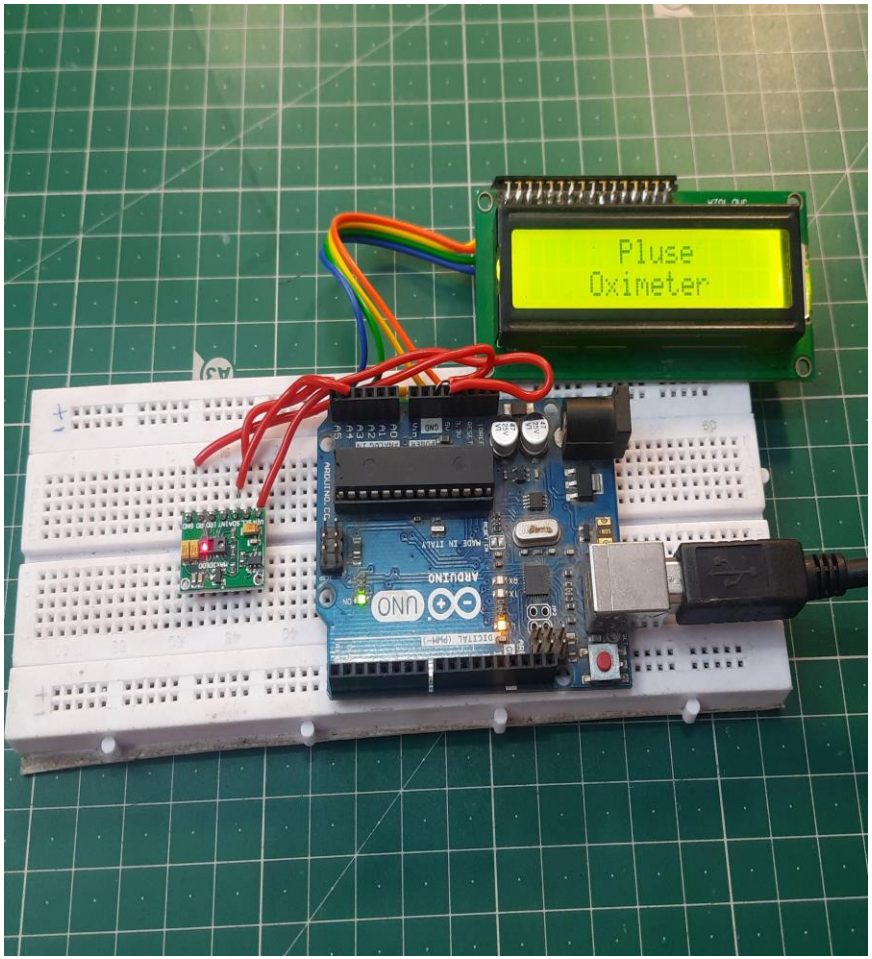
PULSE RATE DETECTION USING ARDUINO UNO

- T. JAHNAVI(22BQ1A04E3)
- V. SIVA LAHARI(22BQ1A04F1)
- S.RISHITHA(22BQ1A04D9)
- V. MADHURI(22BQ1A04F4)



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INTRODUCTION

- Pulse rate detection is a critical aspect of monitoring vital signs in medical and fitness contexts. The pulse, or heart rate, indicates how many times the heart beats per minute. These metrics provide essential information about cardiovascular health and respiratory efficiency.
- Oximeters are invaluable tools in modern healthcare, providing critical information about a patient's cardiovascular health. Their non-invasive nature, ease of use, and reliability make them suitable for a wide range of applications, from clinical settings to personal health monitoring.
- Oximeters have become an essential tool in both clinical and home settings due to their ability to provide critical information about a person's cardiovascular health.

ABSTRACT

- In modern healthcare, monitoring vital signs like pulse rate and oxygen saturation is crucial for timely diagnosis and treatment of various medical conditions. This project presents a cost-effective and efficient solution for real-time monitoring of pulse rate and oxygen saturation levels using Arduino microcontroller
- The max30102 sensor is a is a flexible and powerful sensor enabling sensing of distance, heart rate, particle detection which is used to check the health of a person with any condition that affects blood oxygen levels, such as Heart attack, Heart failure, Lungs Cancer, Asthma. Overall, the MAX30102 pulse oximeter Arduino project offers a wide range of applications across healthcare, education, research, and technology development, demonstrating the versatility and potential impact of DIY medical device projects in addressing various societal needs and challenges.
- Overall, the MAX30102 Pulse Oximeter Arduino project exemplifies the transformative potential of DIY health monitoring solutions in improving healthcare accessibility, promoting health literacy, and driving innovation in the healthcare industry.

COMPONENTS

Some of the hardware and software components that are used:

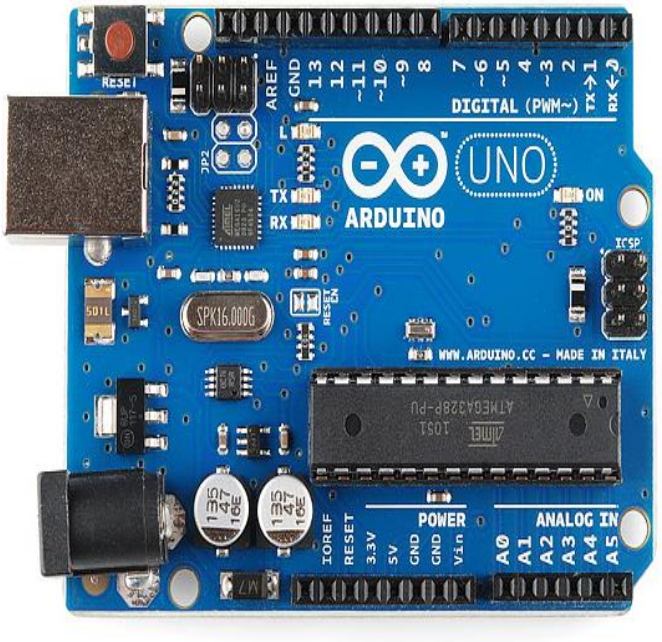
- **HARDWARE:**
  - ARDUINO UNO
  - MAX30102 PULSE SENSOR
  - 16X2 LCD DISPLAY
  - JUMPER WIRES
  - BREAD BOARD
  - USB CABLE
- **SOFTWARE:**
  - ARDUINO IDE

DESCRIPTION

HARDWARE:

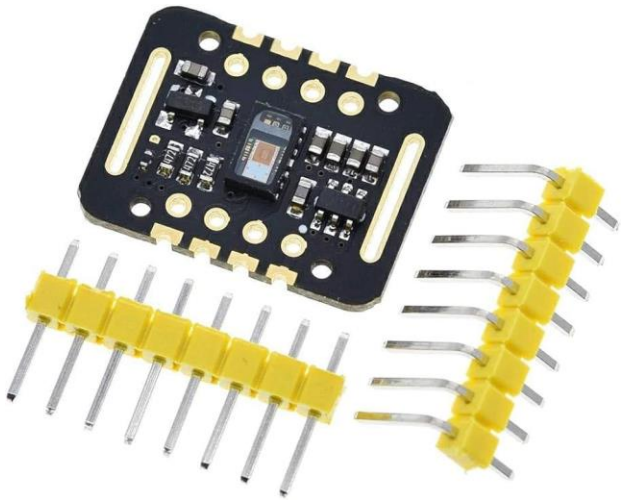
1) ARDUINO UNO

- Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices.
- In this project the systems provide sets of digital and analog input/output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits.
- The Arduino project provides an integrated development environment(IDE) based on a programming language named Processing



2) MAX30102 PULSE SENSOR

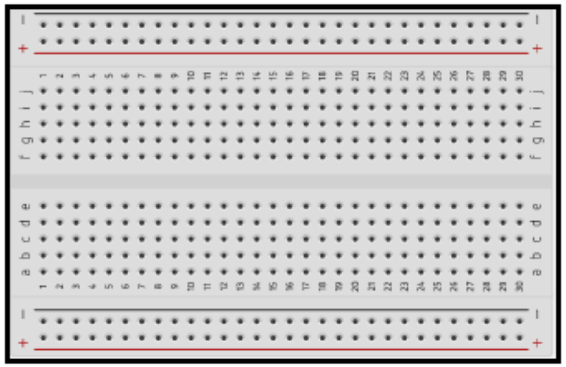
- ✓ Oximetry sensors are devices used to measure pulse rate.
- ✓ These sensors are integral to pulse oximeters, 7 which are widely used in medical, fitness, and home health monitoring applications.
- ✓ The non-invasive nature of oximetry sensors, combined with their ability to provide real-time data, makes them essential tools in various health-related fields.
- ✓ It' s key features are non-invasive, real time monitoring, compact and portable and low power consumption



3) 16x2 LCD DISPLAY

4) JUMPER WIRES

5) BREAD BOARD



6) USB CABLE

SOFTWARE:

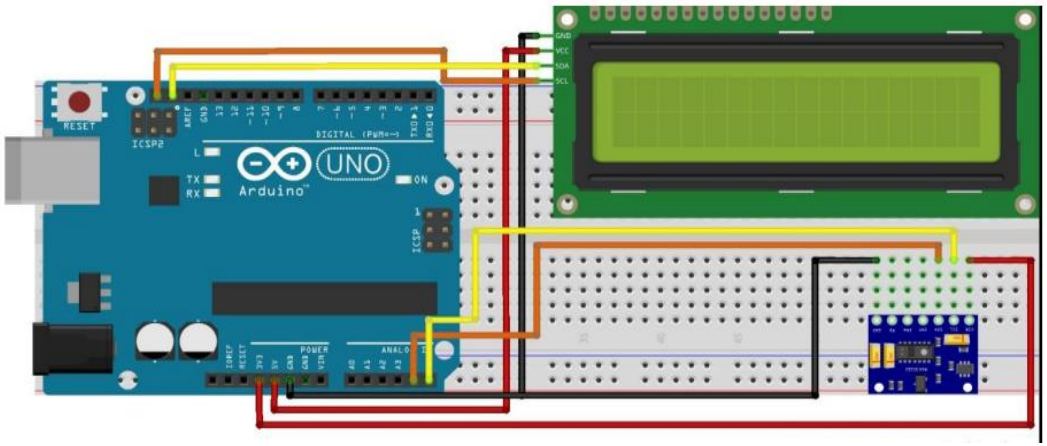
<> ARDUINO IDE

The Arduino Integrated Development Environment (IDE) is an opensource software, which is used to write and upload code to the Arduino boards. The IDE application is suitable for different operating systems such as Windows, Mac OS X, and Linux. It supports the programming languages C and C++. Programs written using Arduino Software (IDE) are called sketches. We need to connect the Arduino Uno board with the IDE to upload the sketch written in the Arduino IDE software. These sketches are written in the text editor and are saved with the extension '.ino'.

CIRCUIT INTERFACE

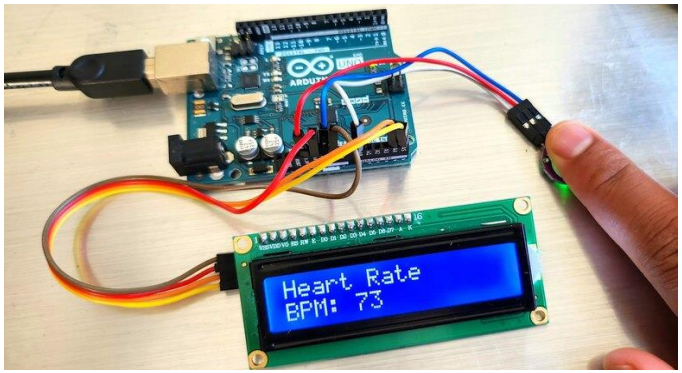
Pulse Oximeter Sensor Module:

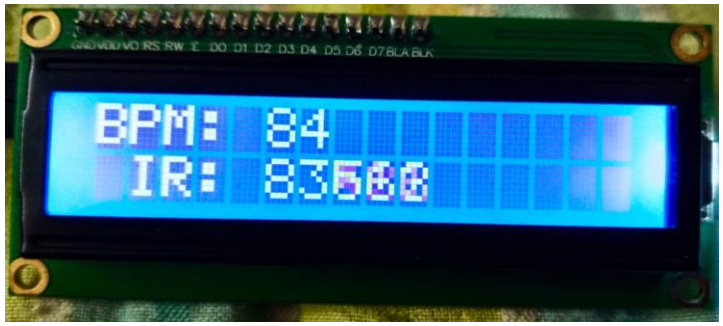
VCC: Connected to the 5V pin on the Arduino (or 3.3V if specified by the sensor).
GND: Connected to the GND pin on the Arduino.
19 SCL: Connected to the A5 pin on the Arduino (for I2C communication).
SDA: Connected to the A4 pin on the Arduino (for I2C communication). Optional
LED Display: VCC: Connected to 3.3V or 5V (depending on the display's voltage requirements).
GND: Connected to the GND pin on the Arduino.
SCL: Connected to the A5 pin on the Arduino.
SDA: Connected to the A4 pin on the Arduino.



WORKING

- The Arduino code begins by including the necessary libraries and setting up the LED display and pulse oximeter sensor. In the setup function, initialize serial communication, the pulse oximeter sensor, and the LED display.
- The loop function continuously updates the sensor readings and displays the heart rate on the serial monitor and LED display.
- The code also includes a callback function to detect heartbeats. With everything connected and programmed, upload the code to the Arduino, and the device will measure and display the heart rate and providing a functional oximeter.
- This project is a practical application of integrating sensors with microcontrollers, offering real-time health monitoring capabilities.

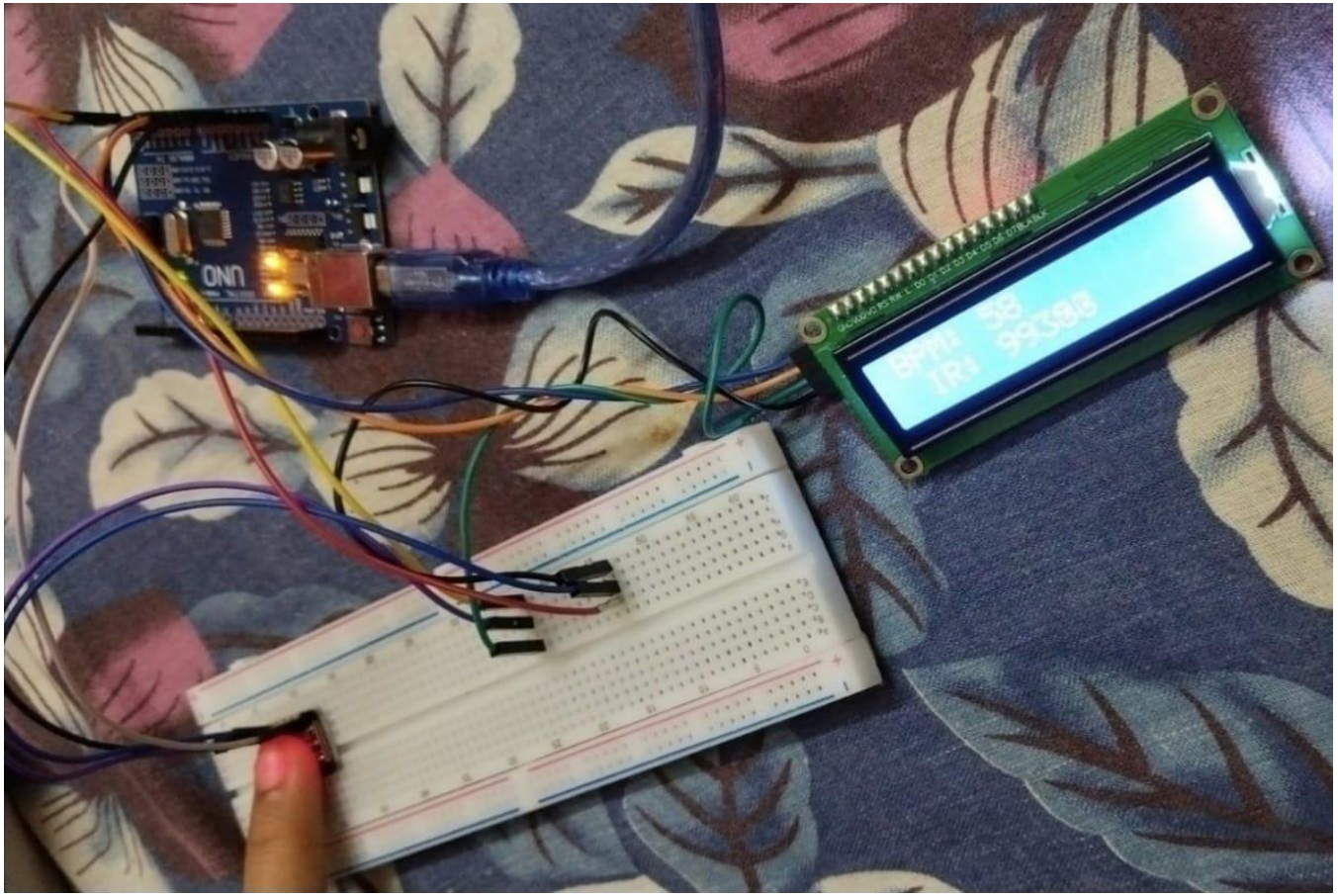




CONCLUSION

- By integrating components like the pulse oximeter sensor module and optional OLED display, this project provides a user-friendly interface for real-time health monitoring.
- Through careful hardware setup and software programming, the oximeter circuit accurately measures and processes physiological data, enabling users to track their health status conveniently.
- The oximeter project holds significant educational value, serving as a practical demonstration of sensor integration, data processing, and display techniques using the Arduino platform.
- It provides an engaging hands-on experience for students, hobbyists, and enthusiasts to learn about electronics, programming

OUTPUT



FUTURE SCOPE

- The miniaturization and integration of oximeter sensors into wearable devices offer the potential for continuous and unobtrusive health monitoring
- The integration of oximeter data with artificial intelligence (AI) and machine learning algorithms holds the promise of personalized health insights and predictive analytics.
- Oximeters have a wide range of applications across various industries and settings due to their ability to measure pulse rate accurately.
- Medical monitoring, broad range of health care settings, sports and fitness During or after surgery or procedures that use sedation.
- To see how well lung medicines are working.
- To check a person's ability to handle increased activity levels.
- To see if a ventilator is needed to help with breathing, or to see how well it's working.

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Thank You