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Patient Monitoring System Using Arduino

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ABSTRACT: In this project we will be Interfacing MAX30100 Pulse Oximeter Sensor with Arduino. The MAX30100 Sensor is capable of measuring Blood Oxygen & Heart Rate. We can use any display like a 16x2 LCD Display to view the value of SpO2 and BPM. The blood Oxygen Concentration termed SpO2 is measured in Percentage and Heart Beat/Pulse Rate is measured in BPM. The MAX30100 is a Pulse Oximeter and heart rate monitor sensor solution. It combines two LEDs, a photodetector, optimized optics, and low-noise analog signal processing to detect pulse oximetry and heart-rate signals. You can use this sensor with any microcontroller like Arduino, ESP8266, or ESP32 and easily measure the patient's health parameters. This cheap DIY Pulse Oximeter sensor just cost around 5\$ and can be used in multiple applications if you are a beginner or an Electronics enthusiast.

KEYWORDS: Heartbeat, pulsebmeter, Connected component labelling.

I. INTRODUCTION

MAX30100 is a heart pulse rate monitor sensor. This sensor consists of two Light Emitting Diodes (LEDs), (one emits infrared light and other emits red light) modifiable optics, low noise signal processor which detects heart pulse rate signal. The MAX30102 Sensor shines both the light through the skin and measures the reflection with the photodetector. This method of pulse detection through light is called Photoplethysmogram. The working of the sensor can be divided into two parts one is heart rate measurement and another is blood oxygen level measurement. The project, let's introduce the main component of this project. The MAX30100 sensor is a simple module that communicates in the I2C interface with the microcontroller. It provides the SpO2 and pulse information to the connected microcontroller. In simple terms, this sensor is used for identifying oxygen saturation. Hence, this module can be used for monitoring the pulse rate and oxygen saturation level of the blood in a non-invasive form used for identifying oxygen saturation. Hence, this module can be used for monitoring the pulse rate and oxygen saturation level of the blood in a non-invasive form.

II. RELATED WORK

Patient monitoring refers to the continuous observation of repeating events of physiologic function to guide therapy or to monitor the effectiveness of interventions, and is used primarily in the intensive care unit and operating room. A patient monitor is a device used to record, measure and display multiple biometric values such as heart rate, blood pressure, body temperature, SpO2 and more. The patient monitoring device can be used to monitor the health conditions of infants as well as adults

Heart Rate: Typically, the resting heart rate of a healthy adult is between 60-100 beats per minute.

Blood Pressure: Blood pressure numbers in the range 120/80 are considered to be normal.

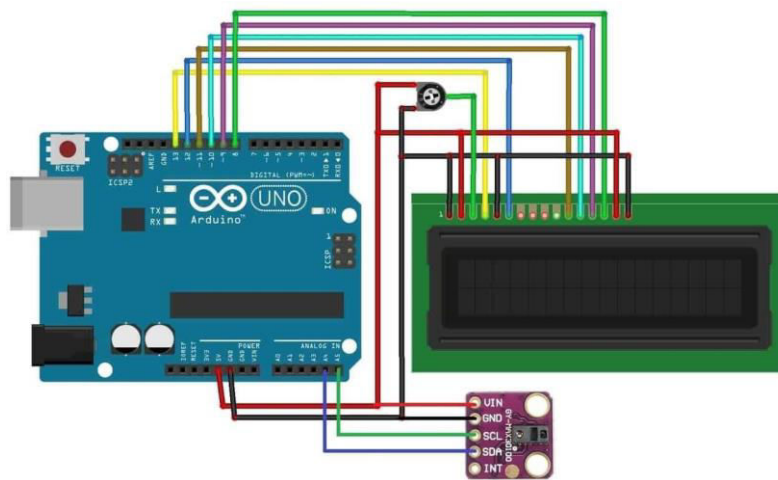
Body Temperature: Temperature is reported in degrees Fahrenheit or degrees Celsius. It can be anywhere from just under 98 degrees F to a little over 99.

Oxygen Saturation (SpO2): It is the measure of the amount of oxygen in the patient's blood. The SpO2 is normally 95 or higher.

Respiratory Rate (RR): A resting adult typically breathes 12 to 16 times a minute. It is reported in breaths per minute.

III.METHODOLOGY

The device has two LEDs, one emitting red light, another emitting infrared light. For pulse rate, only infrared light is needed. Both red light and infrared light are used to measure oxygen levels in the blood. When the heart pumps blood, there is an increase in oxygenated blood heart relaxes, the volume of oxygenated blood also decreases. By knowing the time between the increase and decrease of oxygenated blood, the pulse rate is determined. levels for both light sources and stores them in a buffer that can be read via I2C communication protocol.

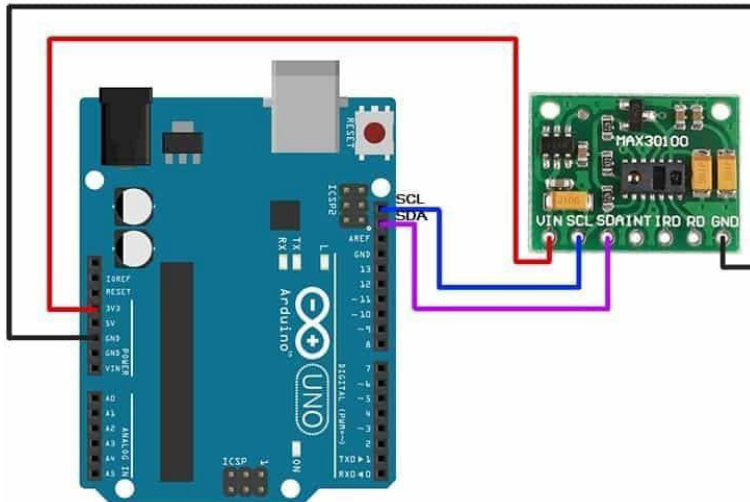


LCD display connection

All Arduino boards need electric power to function. A power supply is what is used to provide electric power to the boards and typically can be a battery, USB cable, AC adapter or a regulated power source device. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly but instead use a backlight or reflector to produce images in color or monochrome.

IV. EXPERIMENTAL RESULTS

ARDUINO CONNECTION



HARDWARECOMPONENTS

- Arduinoboard
- 16*2 LCDDisplay
- MAX30100 PulseOximeter
- Bread Board
- Connectingwires
- Potentiometer

SOFTWARE EQUIPEMENTS

- Programming platform: ArduinoID
- Programming language: EmbeddedC

MAX301000 PULSEOXIMETER

The MAX30100 is an integrated pulse oximetry and heart- rate monitor sensor solution. It combines two LEDs, a photodetector, optimized optics, and low- noise analog signal processing to detect pulse oximetry and heart.

MAX30100 SENSOR

Connect the Vin pin of MAX30100 to Arduino 5V or 3.3V pin, GND to GND. Connect the I2C Pin of MAX30100, i.e SCL & SDA to A5 & A4 of Arduino. Pulse oximetry is also used to check the health of a person with any condition that affects blood oxygen levels, such as:

- Heartfailure.
- Chronic obstructive pulmonary disease(COPD)
- Anemia.
- Lungcancer.



SOURCE CODING/PROGRAM

The source Code/program for interfacing MAX30100 Pulse Oximeter with Arduino is written in C program for Arduino IDE. This code will display the value in serial monitor. Copy this code and upload it to ArduinoBoard

```
#include <Wire.h>
#include "MAX30100_PulseOximeter.h"
#define REPORTING_PERIOD_MS 1000
PulseOximeter pox; uint32_t
tsLastReport = 0;

void onBeatDetected()
{
    Serial.println("Beat!");
}

{
    Serial.begin(115200); Serial.print("Initializing pulse
oximeter..");

    if (!pox.begin())
    {
        Serial.println("FAILED"); for(;;);
    }
}
```



```
else
{
    Serial.println("SUCCESS");
}
pox.setIRLedCurrent(MAX30100_LED_CURR_7_6MA);

pox.setOnBeatDetectedCallback(onBeatDetected);
}
void loop()
{
    pox.update();
    if (millis() - tsLastReport > REPORTING_PERIOD_MS) {
        Serial.print("Heart rate:"); Serial.print(pox.getHeartRate());
        Serial.print("bpm      /SpO2:");
        Serial.print(pox.getSpO2());
        Serial.println("%");

        tsLastReport = millis();
    }
}
```

IV.CONCLUSION

We have implemented an automatic text detection technique from an image for Inpainting. Our algorithm successfully detects the text region from the image which consists of mixed text-picture-graphic regions. We have applied our algorithm on many images and found that it successfully detect the text region.

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