Ventilator Using Blood Oxygen Sensor

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Abstract- *In this project we will make a ventilator using blood oxygen sensor with a microcontroller board Arduino Uno R3, this project is based on pair of MAX30102 Pulse Oximeter that consists of a pair of high-intensity LEDs (RED and IR, both of different wavelengths) and a photodetector. The wavelengths of these LEDs are 660nm and 880nm, respectively.The working of MAX30102 can be divided into two parts: Heart Rate Measurement and Pulse Oximetry.*

Keywords- Arduino Uno R3, MAX30102 Pulse Oximeter, Breadboard

I. INTRODUCTION

Human lungs utilize the opposite pressure produced by the compression movement of the stomach to suck in air for relaxing. An incongruous movement is utilized by a ventilator to swell the lungs by siphoning type movement. A ventilator component should have the option to convey inside the scope of 10 30 breaths each moment, with the adaptability to manage rising augmentations in sets of two. along with this, the ventilator should have the ability to manage the air volume drove into the lungs with every breath. Last however presently least is that the setting to control the time length for inward breath to exhalation proportion. Aside from this the ventilator should have the option to screen the patient's blood oxygen level and breathed out lung strain to keep away from over/under gas tension at the same time. The ventilator we here plan and foster utilizing Arduino envelops of these prerequisites to create a solid yet reasonable DIY ventilator to aid seasons of pandemic. We here utilize a silicon ventilator pack coupled driven by DC engines with 2 side push system to push the ventilator sack. We utilize an electric switch for exchanging and a variable pot to direct the breath length and thusly the BPM an incentive for the patient. Our framework utilizes a blood oxygen sensor along with a delicate tension sensor to watch the compulsory vitals of the patient and show them on a little screen. Likewise, a crisis ringer alert is fitted inside the framework to sound a ready when an abnormality is identified. The whole framework is driven by an Arduino regulator to acknowledge wanted results and to help patients inside

II. AIM & OBJECTIVE

Creating a ventilator using blood oxygen sensor using an AT328P microcontroller involves a combination of hardware and software.

III. INFORMATION

A ventilator using blood oxygen sensor using the Arduino uno r3 microcontroller is a device designed tomonitor their heartbeat of patents and provide them a reliable support system.

Here's a basic description of such a system

Tidal volume: it is the volume of air delivered to the lungs with each breath by the ventilator - typically 500ml at rest.
BPM (Breaths per minute): this is often the set rate for delivering breaths. Range is 10 – 30.

Inspiratory: Expiratory ratio (IE Ratio): refers to the ratio of inspiratory time: and expiratory time.

Flow rate: is that the most flow at which a set tidal volume of breath is deliver by the ventilator

Peep (Positive end-expiratory pressure): it's the pressure within the lungs above gas pressure that exists at the top of expiration.

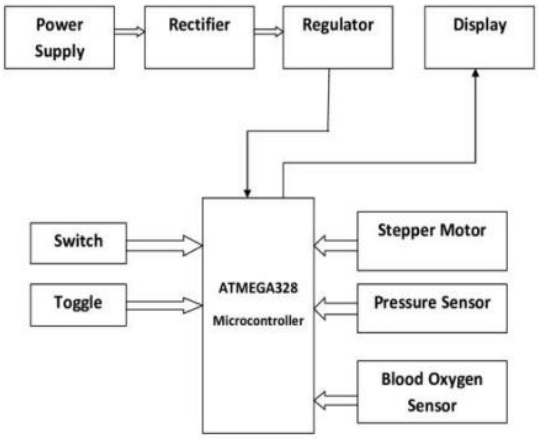


Fig1-circuit diagram

IV. COMPONENTS

Arduino Uno R3 :-

The **Arduino Uno R3** is a versatile microcontroller board that serves as an excellent starting point for electronics and coding enthusiasts. Here are the key specifications and features of the Arduino Uno R3: **Microcontroller**: The Uno R3 is based on the **ATmega328P** microcontroller. **Digital I/O Pins**: It has **14 digital input/output pins**, of which **6 can be used as PWM outputs**. **Analog Inputs**: The board provides **6 analog input pins**. **Clock Frequency**: The Uno R3 operates at a **16 MHz** clock frequency, which synchronizes internal functions.

USB Connection: It includes a USB **connection** for programming and communication.**Power Options**: You can power it via a **USB cable**, an **AC-to-DC adapter**, or a **battery**.**Reset Button**: The board features a **reset button** for convenience.**EEPROM**: The ATmega328P also has **1 KB of EEPROM**, which retains data even when powered off.

MAX30102 Pulse oximeter and Heart rate sensor:-

The module features the MAX30102 – a modern (the successor to the MAX30100), integrated pulse oximeter and heart rate sensor IC, from Analog Devices. It combines two LEDs, a photodetector, optimized optics, and low-noise analog signal processing to detect pulse oximetry (SpO2) and heart rate (HR) signals.

The MAX30102, or any optical pulse oximeter and heart-rate sensor for that matter, consists of a pair of high-intensity LEDs (RED and IR, both of different wavelengths) and a photodetector. The wavelengths of these LEDs are 660nm and 880nm, respectively.

The MAX30102 works by shining both lights onto the finger or earlobe (or essentially anywhere where the skin isn't too thick, so both lights can easily penetrate the tissue) and measuring the amount of reflected light using a photodetector. This method of pulse detection through light is called Photoplethysmogram.

The working of MAX30102 can be divided into two parts: Heart Rate Measurement and Pulse Oximetry (measuring the oxygen level of the blood).

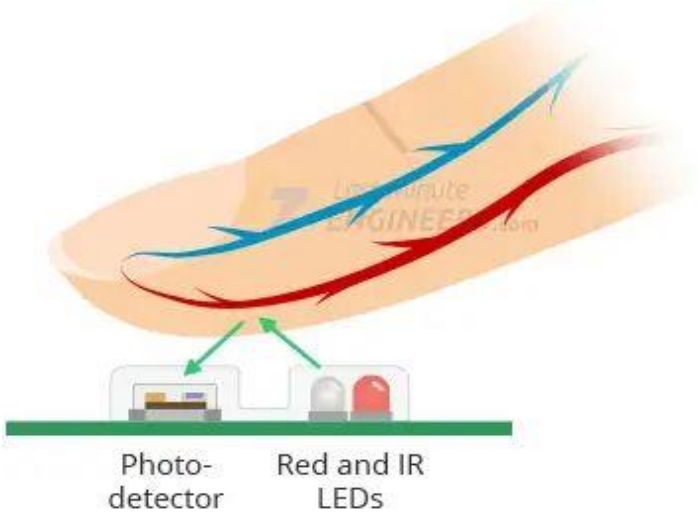


Fig-MAX30102 pulse oximeter

L298n motor driver :-

The L298N 2A Dual Motor Driver Module With PWM Control is an ideal module for driving DC motors and stepper motors. It can control up to 4 DC motors, or 2 DC motors with directional and speed control. Perfect for powering DC and Stepper motors used in robot arms, line-following robots, micro mice, and other applications.

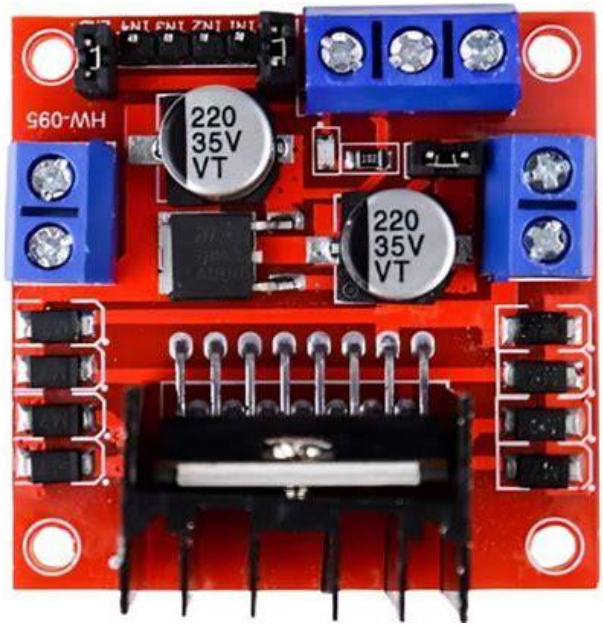
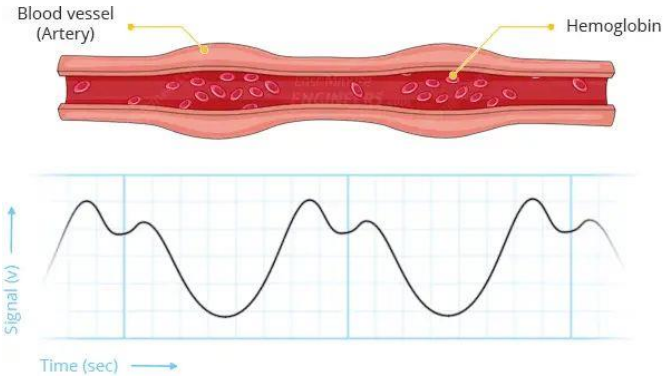


Fig: - L298N Motor Driver



V. CONCLUSION

This work is a reasonable strategy potential for crisis and Covid pandemic. It is an open-source ventilator configuration created utilizing disseminated fabricating. This paper is an itemized clarification of delivering minimal expense, open-source mechanical ventilators for patients. This is at the beginning phases of plan required further turns. Sure, this work will acquire more noteworthy consideration. There is a great deal of future work to be moved up to make it clinical grade equipment. It is a major hotspot for both the ongoing pandemic circumstance and crisis purposes and in any event, for regular use in low asset settings.

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