



**K.S. SCHOOL OF ENGINEERING AND MANAGEMENT**  
**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**Project Phase-II Review**

**on**

**Implementation of a Prototype Automatic Compression Mechanism for  
Bag Valve Mask**

**Project Team**

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# CONTENTS

SL No	DESCRIPTION
1	Introduction
2	Literature survey & Summary
3	Block Diagram
4	Flowchart
5	Hardware and Software Requirements
6	Interfacing & Testing
7	Results
8	References

# Introduction



1. A ventilator is a machine which is designed to provide the mechanism of breathing for a patient who is physically not able to breathe sufficiently.
2. Human body is made up of the proper combination of food and oxygen, the accurate amount of oxygen is vital factor for health and for survival of life.
3. Recent year in Covid 19 pandemic at second wave many people were died because of improper oxygen supply.
4. Because of the expensive of mechanical ventilator they couldn't afford the ventilation for the people.

# Literature Survey

## **1. A review of opensource ventilators for COVID-19 and future pandemics.**

Published by F1000 Research in the year 2020. There is clear technical potential for ventilator shortages during this & future pandemics using opensource ventilator that can be rapidly fabricated.

## **2. A Portable BVM-based Emergency Mechanical Ventilator.**

Published by IEEE 19th World Symposium on Applied Machine Intelligence and Informatics in the year 2021. The aim of the paper is to present developed ventilator based on BVM which is alternative to mechanical ventilator in critical situations like covid-19.

# Literature Survey...

## **3. Design & Implementation of Portable Emergency Ventilator for Covid-19 Patients.**

Published by Advances in Science and Engineering Technology International Conferences. In the year 2022. This project is based on Arduino mc to control a stepper motor, a pressure sensor, body temperature sensor and a pulse oximeter sensor. It is low cost compared to already existing ventilator. It was designed, implemented, and tested with very good results such as pulse oximeter sensor error was 1.02%.

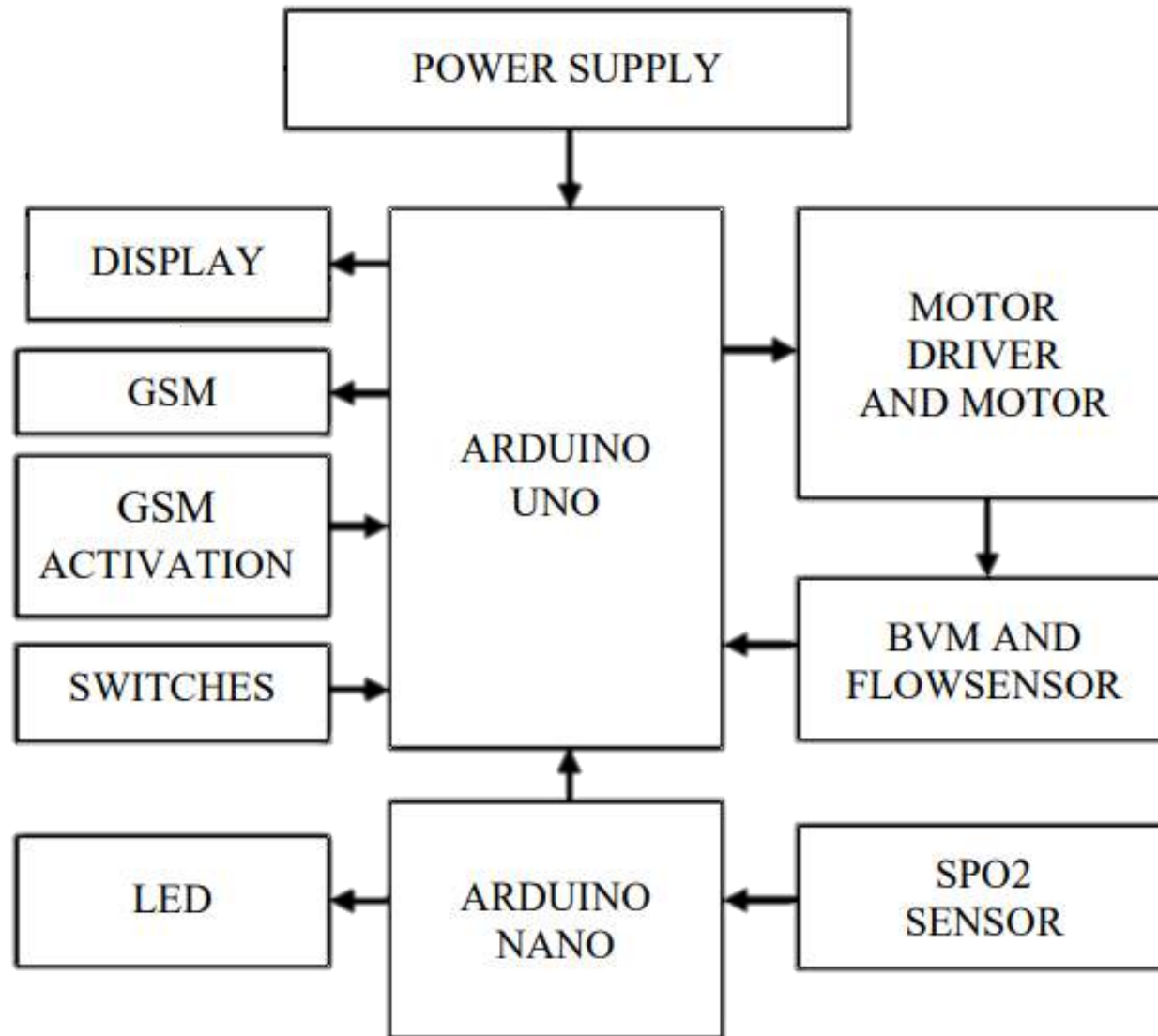
## **4. DIY Ventilator using Arduino with Blood Oxygen Sensing for Covid Pandemic.**

Published by International Research journal of engineering and technology (IRJET) In the month of July 2021. This paper have the three use full functions like tidal volume, bpm and IE ratio. The user or doctor can have the presets as they required for the patient. The DIY ventilator has 3 functions and they can be changed has per the requirements and it will be displayed in the lcd screen.

# Summary of Literature Survey

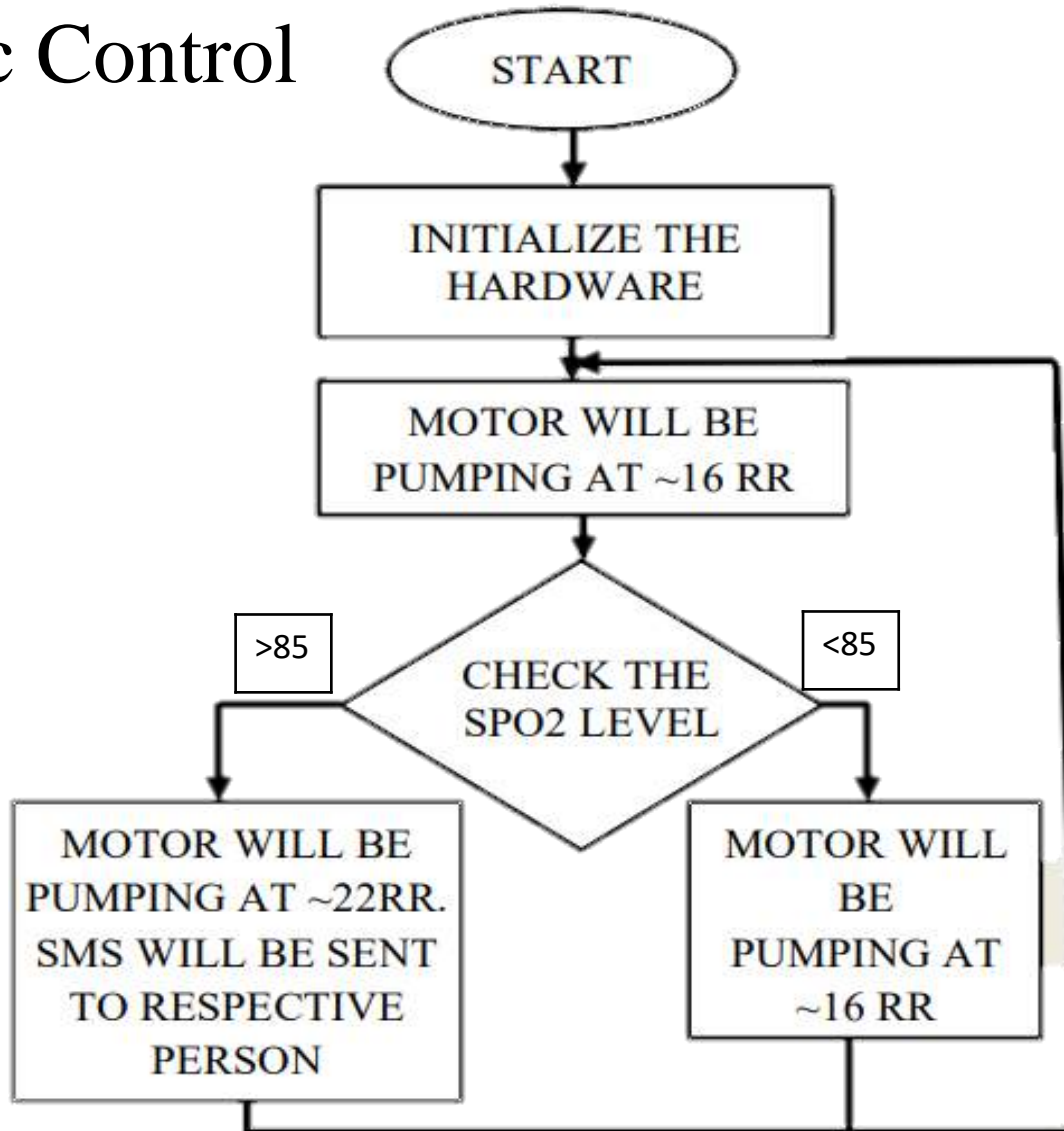
1. A literature Survey on automatic mechanical ventilator shows that there is clear technical potential for ventilator shortages during covid-19 & future pandemics.
2. The system is low-cost easy to assemble, portable ventilator to fight the Pandemic.
3. This produces the control & monitoring system for a mechanical ventilator.
4. The motion of the Stepper creates pressure & releases pressure on an AMBU Bag.

# BLOCK DIAGRAM



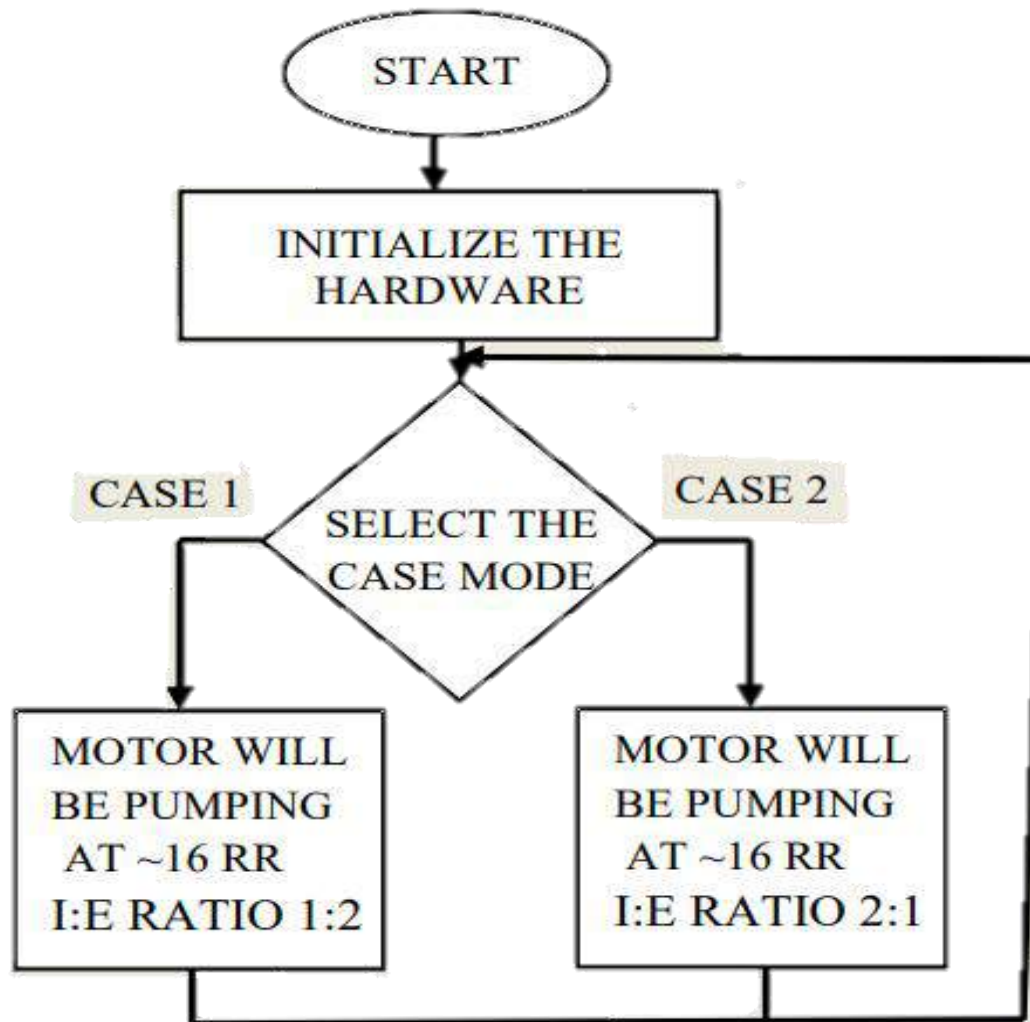
# Flowchart

## Automatic Control





# Manual control

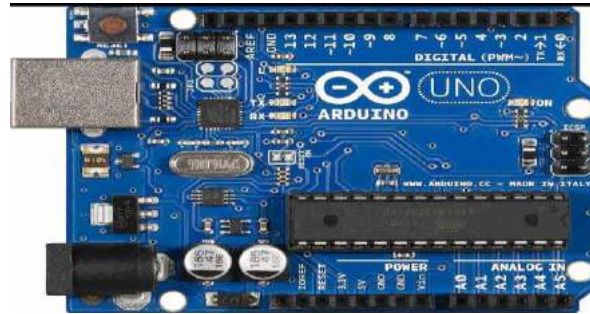


# Hardware Specification

## Hardware requirements

- Arduino UNO
- SpO2 Sensor
- AMBU Bag
- Flow Sensor
- Stepper Motor
- TB6600 Stepper motor Driver
- GSM (global system for mobile communication)
- LCD display
- Arduino Nano

## ❑ Arduino Uno



- It is an ATmega328P based Microcontroller.
- The Operating Voltage of the Arduino is 5V.
- Digital input and output pins-14.
- Analog i/p pins are 6.
- DC Current for each I/O Pin is 20 mA.
- DC Current used for 3.3V Pin is 50 mA.

## ❑ Spo2 sensor (MAX30100)



- Input power: 1.7 to 2.0 V
- Temperature range: -40 to +85 °C
- Current: 0mA to 50mA .

## ❑ Bag Valve Mask (Automated Artificial Manual Breathing unit)



- A bag valve mask (**BVM**), sometimes referred to as an **AMBU** bag, is a handheld tool that is used to deliver positive pressure ventilation to any subject with insufficient or ineffective breaths.
- It consists of a self-inflating bag, one-way valve, mask, and an oxygen reservoir.

## ❑ Flow Sensor (YF-S201)



- Working Voltage: 5 to 18V DC
- Max current draw: 15mA at 5V
- Working Flow Rate: 1 to 30 mL /Sec

## ❑ Stepper Motor ( Nema 17 )



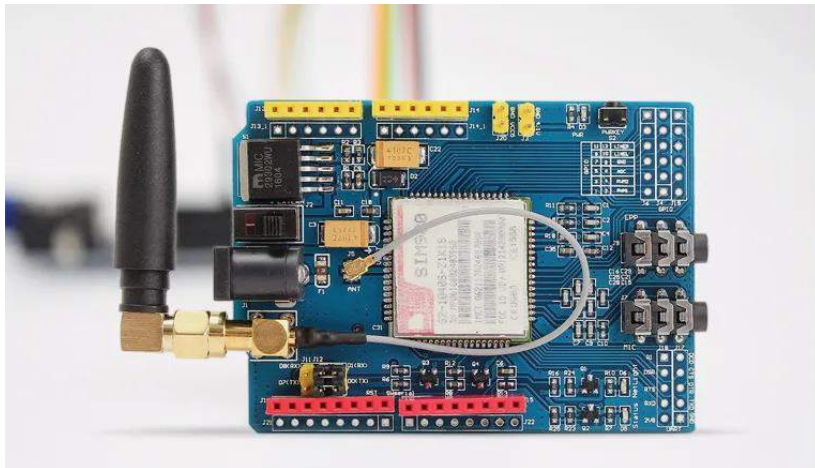
- Voltage: 12V DC
- Current: 1.2A at 3A
- No. of Phases: 2
- 4-wire, 8 inch lead
- 200 steps per revolution, 1.8 degree

## □ Tb660 Motor Driver



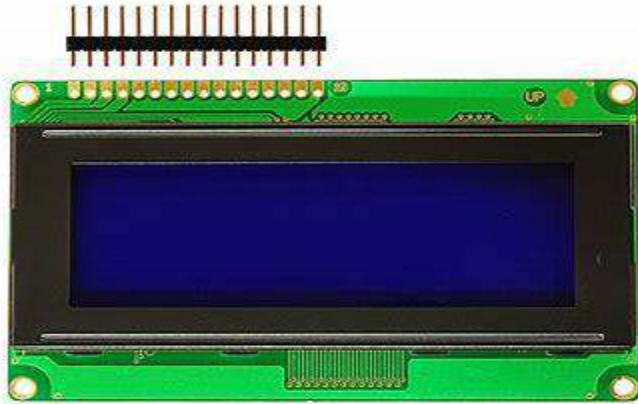
- Input Current: 0~3A
- Output Current: 0.5~4.0A
- Control Signal: 3.3~24V
- Power (MAX): 160W

## □ GSM 900



- Frequencies
- Uplink = 890-915 MHz
- Downlink = 935-960 MHz
- Power Requirement = 4.5v-12v
- Current Requirement = <590mA

## ❑ 20x4 LCD Display



- Type: LCD I2C Display
- format: 20x4 lcd
- + 5 V power supply
- SCL
- SDC

## ❑ ARDUINO NANO

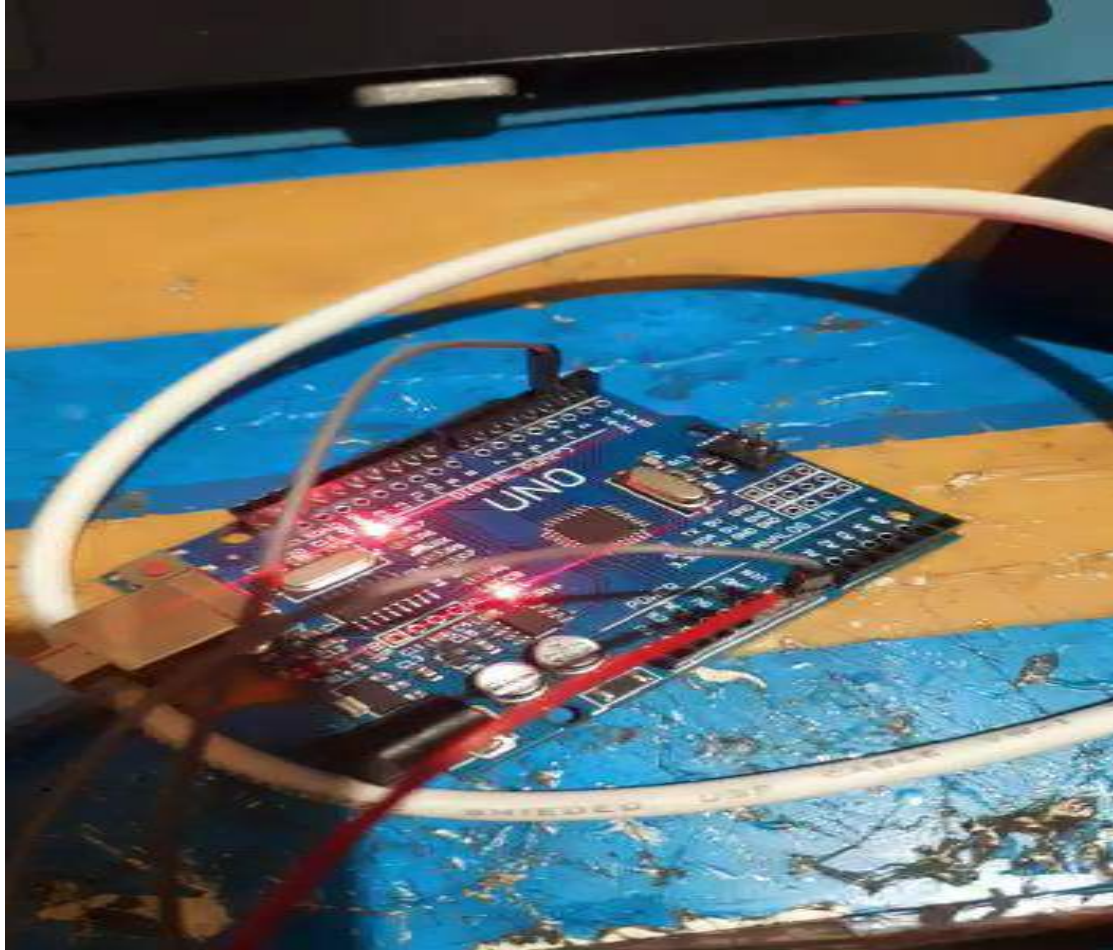


- Microchip ATmega328P
- Operating voltage: 5 volts
- Input voltage: 5 to 20 volts
- Digital I/O pins: 14
- Analog input pins: 8



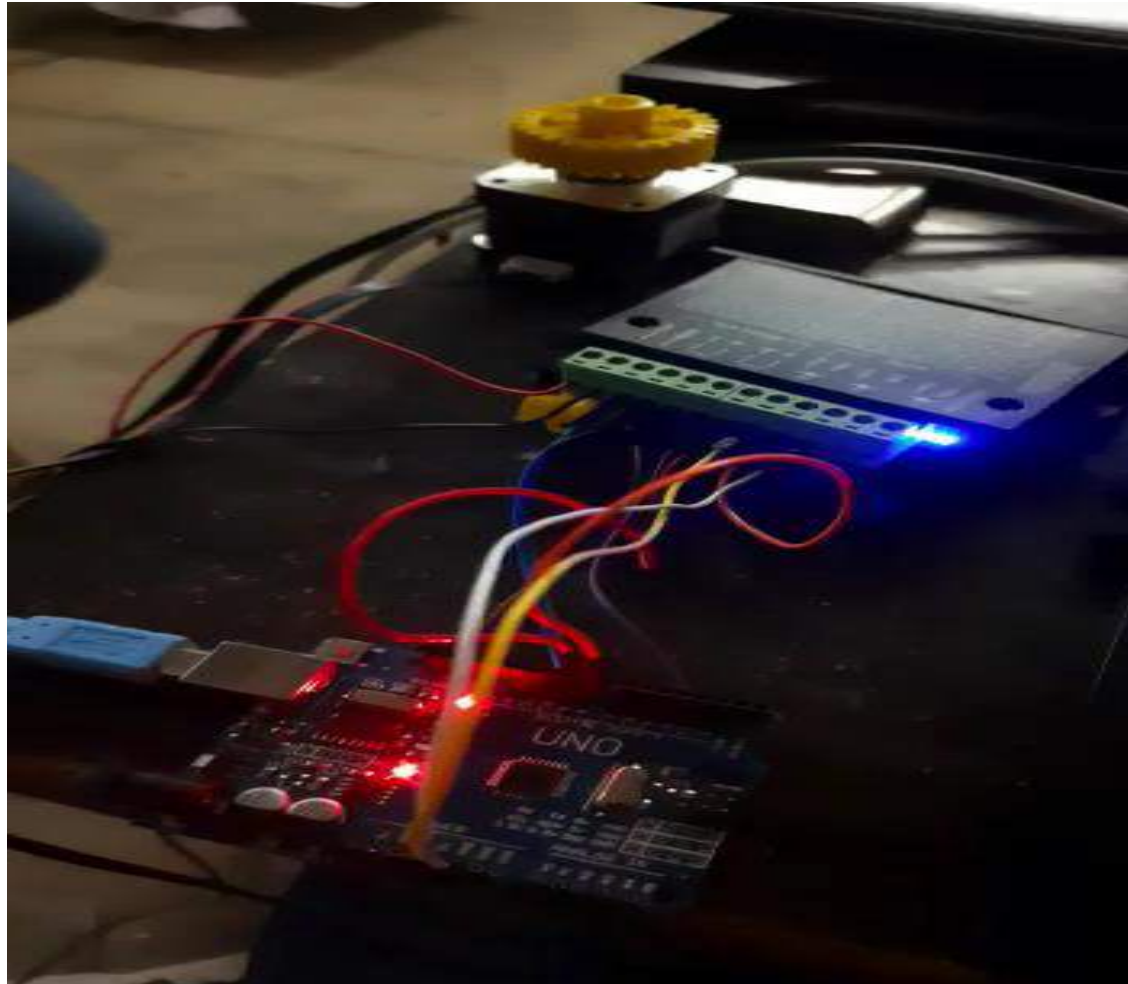
# Interfacing & Testing

## 1. Interfacing of Flow Sensor





## 2. Interfacing of Stepper Motor

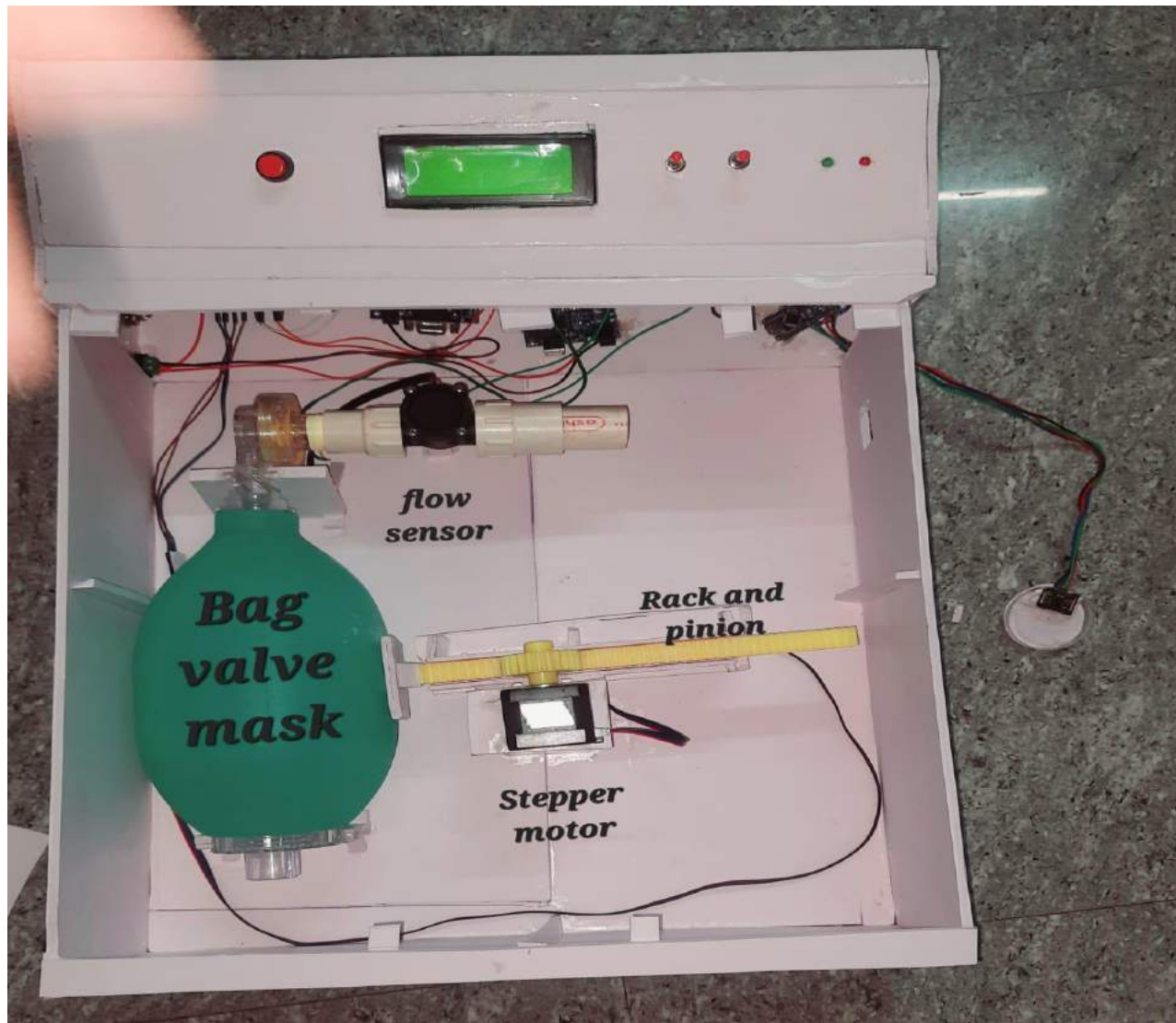


### 3. Interfacing of spo2 Sensor

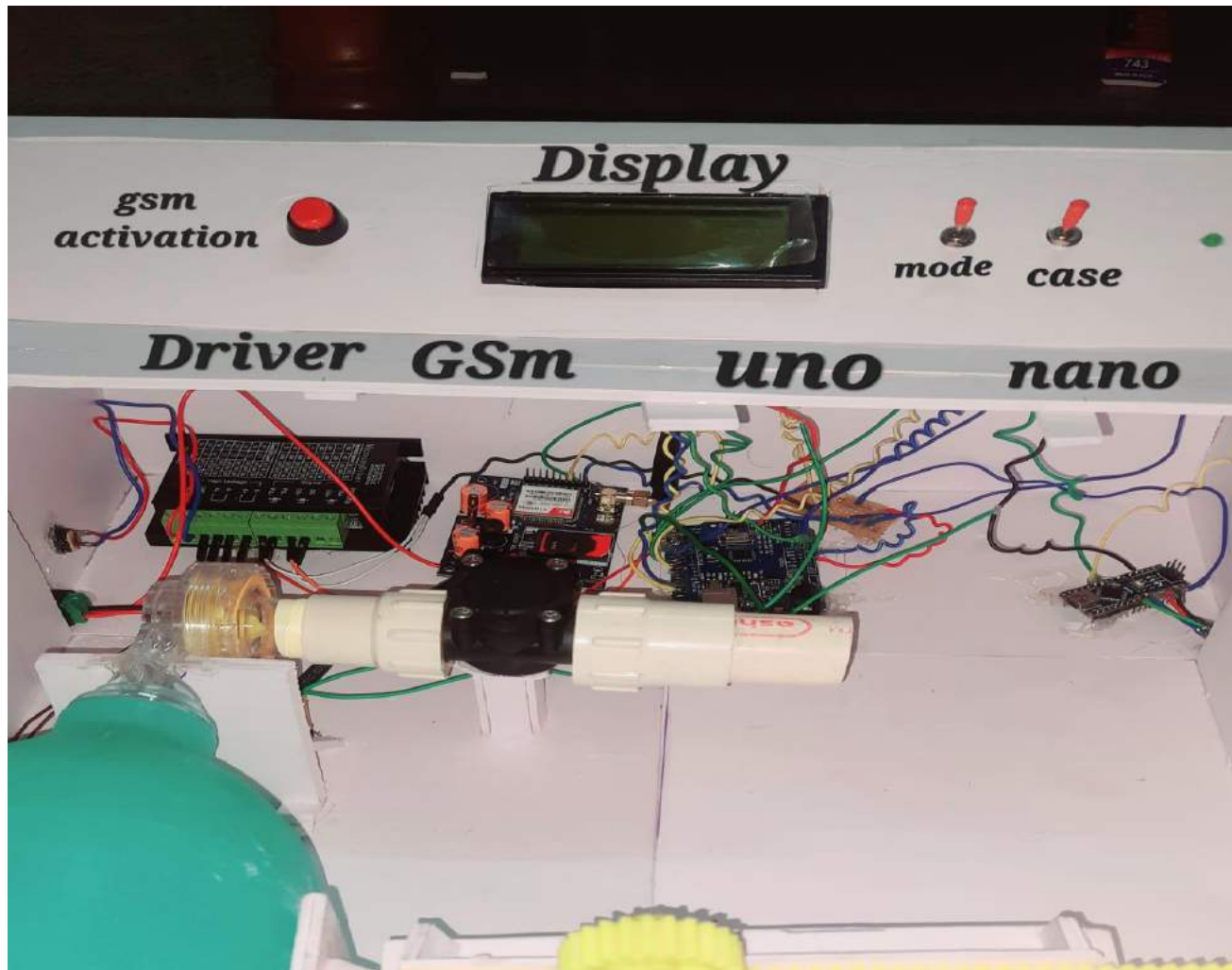


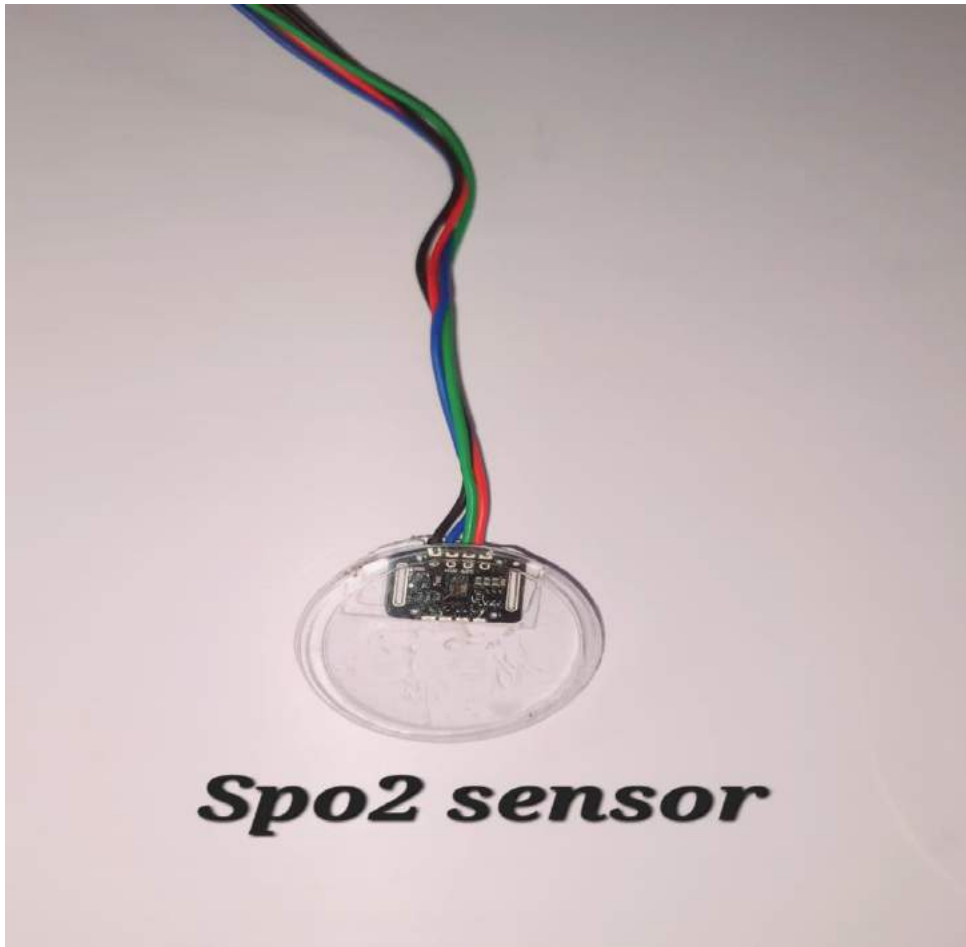
# RESULTS











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Thank You!

Any questions?

