DIY-Ventilator Budget

# Design and functionality

The proposed design of the ventilator is shown in Figure 1. It is a **pressure-controlled** ventilator that can run in both **Assistive** breaths and **controlled** breaths for invasively, and as a **C-PAP** or **Bi-PAP** non-invasively. The design uses an air blower to generate flow and then uses a flow meter and flow regulator to blend this air with Oxygen to allow the operator to control the **FiO2**. Then uses a low-pressure regulator to control the pressure of the air flow. The air then goes through a **humidifier** (also controlled by the operator where they can specify desired temperature and humidity. The humidifier uses a commercial water heater and a humidity/pressure. The air is connected to a Y-piece to let air go to patient and monitor the exhaled tidal volume. The air is then delivered to the patient through a standard and mask (either invasive or non-invasive).

A screenshot of a cell phone

Description automatically generatedA close up of text on a white background

Description automatically generated*Figure 1: Design of Ventilator*

An Arduino board controls the device and the operator uses a smartphone app to learn more about the machine and the settings, and to set the appropriate settings (as shown in Figure 2) and send them to the machine over Bluetooth.

*Figure 2: Settings tab on interface*

# Budget

## Parts to Buy

*Table 1: Budget for the parts to be bought*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Part Name | Manufacturer | Part Number | Price | Quantity Needed | Total |
| Low Pressure Regulator | Parker | OEM-EP | $ 150.00 | 1 | $ 150.00 |
| Proximal Flow Sensor | Sensirion | SFM3300-AW | $ 300.00 | 2 | $ 600.00 |
| Fan Blower | Sanyo Denki America | 9CR0612H001 | $ 45.00 | 1 | $ 45.00 |
| Arduino Board | Arduino | UNO | $ 40.00 | 1 | $ 40.00 |
| Bluetooth Module | DSD Tech | HM-10 | $ 12.00 | 1 | $ 12.00 |
| Emergency Stop Button | SODIAL® |  | $ 7.00 | 1 | $ 7.00 |
| Wires + Misc |  |  | $ 20.00 | 1 | $ 20.00 |
| Humidity/Temperature Sensor | AZDelivery | DHT22 | $ 6.00 | 1 | $ 6.00 |
| Immersion Heater | Graigner | WWG2E756 | $ 8.00 | 1 | $ 8.00 |
| Standard Mask |  |  |  | 1 | $ - |
| Standard Tube |  |  |  | 1 | $ - |

## Parts to Print

*Table 2: Budget for the parts to be printed*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Part Name | Manufacturer | Part Number | Avg Filament Price (per kg) | Approximate Weight (kg) | Total |
| Pressure Chamber | you | pressure\_chamber | $ 25.00 | 0.2 | 5.00 |
| Blender Chamber | you | blender\_chamber | $ 25.00 | 0.2 | $ 5.00 |
| Humidifier Chamber | you | humidifier chamber | $ 25.00 | 0.1 | $ 2.50 |

## Total Budget

This totals up to **$900.5**.