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CAM SHAFT VENTILATOR

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ABSTRACT :

A ventilator is a life-saving machine that helps people breathe when they can't do it on their own. This happens when someone's lungs aren't getting enough oxygen or can't get rid of carbon dioxide. The ventilator works like a breathing machine, pumping air into the lungs. Doctors use it when someone:

Is under anesthesia

Has a breathing problem due to an illness

There are different types of ventilators, and the doctor chooses the right one based on the person's condition. The ventilator is a crucial machine that helps save lives.

Keywords: Ventilator, Breathing machine, Oxygen, Carbon Dioxide, Lungs, Doctor, Anesthesia, Illness.

INTRODUCTION :

Our machine is very helpful during pandemic situations like COVID-19. This disease has caused a lot of health problems, especially affected the lungs and made it hard to breathe. The lungs work by using the diaphragm to breathe in air. A ventilator helps by pumping air into the lungs. It's like a breathing machine.

Our ventilator can:

1. Breathe 10-30 times per minute
2. Adjust the air volume for each breath
3. Control the time for breathing in and out
4. Monitor the patient's oxygen levels and lung pressure

We made this ventilator to be reliable, affordable, and easy to use, especially during pandemics.

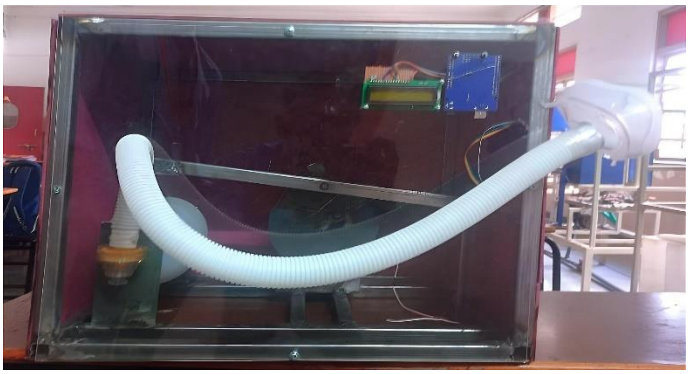
METHODOLOGY :

1. Research Design: Experimental, quasi-experimental
2. Sampling Method: Convenient, purposive sampling
3. Data Collection: Patient records, ventilator data, surveys
4. Data Analysis: Descriptive, inferential statistics
5. Tools: SPSS, Excel, ventilator software Research Approach:

1. Quantitative: Numerical data, statistical analysis
2. Qualitative: Observations, interviews, thematic analysis

MODELING AND ANALYSIS :

Figure 1: Model Of Cam Shaft Ventilator



In this experiment, we used a special bag called a silicon ventilator bag. It's moved by a DC motor that pushes the bag to help it breathe. To make the bag inflate and deflate, we used a cam shaft mechanism. This converts the motor's round motion into up-and-down motion.

Here's how it works:

1. The motor rotates and pushes one end of the arm up.
2. The arm is connected to a seesaw-like mechanism.
3. When one end goes up, the other end presses against the bag.
4. The speed of inflation and deflation depends on the motor's speed.

We also added some controls:

1. A Speed controller to turn it on and off, increase or decrease of speed.
2. A variable pot to adjust the breath length and speed.
3. A blood oxygen sensor and body temperature sensor, heart beat sensor to monitor the patient's vitals.
4. A mini screen to display the vitals.
5. A supply of DC batteries for supply of motor.

All of this is controlled by a special circuit to help patients breathe in emergencies

Project components

1. DC MOTOR
2. Silicon Ventilator Bag
3. Arduino UNO
4. Oxygen Sensor
5. Heart Beat Sensor

DC MOTOR

A **DC motor** is an electrical motor that uses direct current (DC) to produce mechanical force. The most common types rely on magnetic forces produced by currents in the coils. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

Silicon Ventilator Bag

A **bag valve mask** (**BVM**), sometimes known by the proprietary name **Ambu bag** or generically as a **manual resuscitator** or "self-inflating bag", is a hand-held device commonly used to provide positive pressure ventilation to patients who are not breathing or not breathing adequately. The device is a required part of resuscitation kits for trained professionals in out-of-hospital settings (such as ambulance crews) and is also frequently used in hospitals as part of standard equipment found on a crash cart, in emergency rooms or other critical care settings

Arduino UNO

The Arduino Uno is a series of open-source microcontroller board based on a diverse range of microcontrollers (MCU). It was initially developed and released by Arduino company in 2010. The microcontroller board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by a USB cable or a barrel connector that accepts voltages between 7 and 20 volts, such as a rectangular 9-volt battery. It has the same microcontroller as the Arduino Nano board, and the same headers as the Leonardo board. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

Oxygen Sensor

A blood oxygen sensor is a simple test that checks how much oxygen is in your blood. It helps show how well oxygen is reaching parts of your body that are far from your heart, like your arms and legs. A small device, like a clip, is placed on a finger, toe, or earlobe. This device uses light to measure the amount of oxygen in your blood**.**

RESULTS AND DISCUSSION :

After setting up and successfully testing our DIY ventilator several times, it works well. It provides between 15 and 30 breaths per minute, and we can adjust the breathing rate in steps of 2. It supplies the right airflow needed for COVID-19 patients with pneumonia. The ventilator also keeps track of the patient's blood oxygen level and the pressure in their lungs when they breathe out, so it prevents giving too much or too little air pressure.

CONCLUSION :

This paper talks about a simple and lightweight ventilator designed to help patients who can partially breathe on their own. The goal is to keep the design minimal but efficient, so the patient feels as comfortable as they would with a regular ventilator. The device uses a soft silicone ventilator bag, which is squeezed by a DC motor. The motor uses a "camshaft mechanism" — basically, a rotating oval-shaped part — to turn the motor's spinning motion into an up-and-down motion.

One side of the cam pushes up on a pressing arm, which works like a seesaw. When one end of the arm goes up, the other end presses down on the ventilator bag, making it inflate and deflate. How fast the bag fills and empties depends on how fast the motor spins.

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