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LOW COST VENTILATOR WITH HEALTH MONITORING SYSTEM

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ABSTRACT

The global crisis caused by the CORONA virus pandemic hospital and Health care facilities are reporting shortages of vital equipment's. As makers it's our responsibility to combat the shortage by constructing make shift open source substitute devices our country might be in a lockdown but our ingenuity isn't! One important device for witch demand has ramped up is ventilators for patients who need assistants with their birthing due to the respiratory effects of COVID-19. Basically a ventilator is a machine that provides breathable air in to and out of lungs, to deliver breaths to a patients who is physically unable to breath or breathing insufficiently. A die ventilator may not be efficient as that of a medical grade ventilator but it can act as good substitute if it has control. Low cost ventilator with health monitoring these project purpose is to design of ventilator with health monitoring witch can be easily manufactured and intrigued in to the hospital Environment to support patients. The worldwide medical community currently faces a critical shortage of medical equipment to address to the COVID-19 pandemic. For that type of condition, these Low cost ventilator With Healthy Monitoring is suitable because of these have a various functions like it is economical also easy to use, light weight as well as easy to manufacturing, those all presented in these paper.

1. INTRODUCTION

The Low Cost Ventilator with Health Monitoring is a device used for medical emergency situation, it also take in first aid box, any medical emergency which has required for a human breath oxygen there is a very must option, also theses is light weight, easy to operation, economical, easy to manufacturing.

Human lungs use the reverse pressure generated by contraction motion of the diaphragm to suck in air for breathing. A contractor motion is used by a ventilator to inflect the lungs by pumping type motion. A ventilator machine must be able to deliver in the range of 10-30 breaths per minute, with the ability to adjust rising increments inset of two. Along with these the ventilator must have the ability to adjust air valve pushed in to the lungs in each breath. The last but now the least in the setting to adjust the time duration for ratio inhalation to exhalation ratio.

A part from these ventilators must be value to monitor the patient blood oxygen level and exhaled lungs pressure to avoid over under air pressure simultaneously. The ventilator we he design and develop using Arduino encompasses all these requirement to develop a reliable yet affordable DLY ventilator the help of time pandemic. We here used use a silicon ventilator bag couple driven by DC motor with 2 side push machine or push the ventilator bag. We used a toggle switch for switching and variable pot to adjust a breath length and the BPM valve of the patient. Over system make a use of blood oxygen sensor along with sensitive pressure sensor to monitor thaw necessity vitals of the patient and display on mini screen. Also an emergency buzzer alert is fitted in the system to sound and alert as soon as any anomaly is detected.

The entire system is a driven by Arduino controller to achieve desired result and to assists patient in covid pandemic and other emergency situation.

2. EXISTING SYSTEM

A usual traditional method contains oxygen cylinder which has sucked oxygen gas which gives to the patient by a mechanical machine which works by chemical procedure. It contains so many parts as well as additional oxygen gas which are not available and suitable in emergency condition.

3. PROPOSED SYSTEM

A system proposed for emergency condition which contains Ambu bag and other senser which of an emergency condition like Ventilator without a oxygen cylinder, it suck oxygen form a atmosphere. It also contains IOT based ECG monitoring which gives natural electrical in impulses and hearts rhythm.

4. PROPOSED METHODOLOGY OF SOLVING IDENTIED PROBLEM

There has so many problems occurred when a design a problem ventilator system, main parts hardware which contains mechanical, Electrical system and senser which fix proper for the accurate working and second problem accurate in sensor system is a important parameter.

A) MECHANICAL SYSTEM

The whole mechanical system classified into main parts first one is designing and second manufacturing there we used some specialized parts like Ambu bag, bearing holder, motor holder and pulley holder . These all components are used in device are really and cheaply available.

B) ELECTRICAL SYSTEM

The electrical system is a beain of the system is a brain of the system is a brain of the system which play main role of the ventilator system. The system contains stepper motor, Adriano Uno, power supply and ultrasonic sensor which has been so smooth device operation

C) MOTORS

These system contains a ambu bag which is heart of the system which suck the oxygen from atmosphere and for these ambu bag movement we used a arms for push the bag and for these we used arms and there as a desired speed for a accurate pressure and for that we attach a stepper motor which has been a proper design.

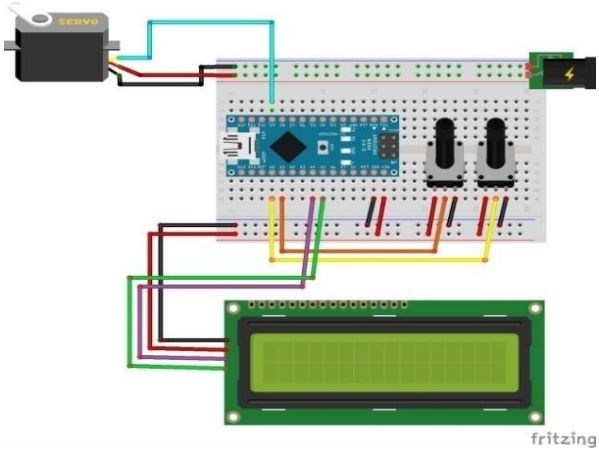
D) SENSOR

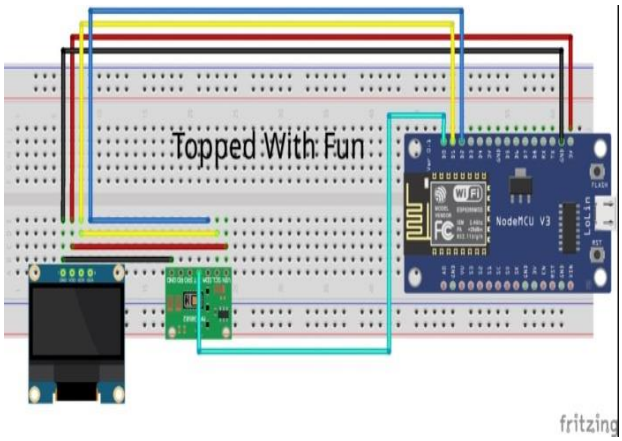
There is important sensor which is ultrasonic sensor and pressure sensor we are employing a semiconductor base pressure sensor and during the operation there, even mild errors on positioning of arms can accumulate over multi cycle of operation.

5. PROCEDURE FOR MAKING

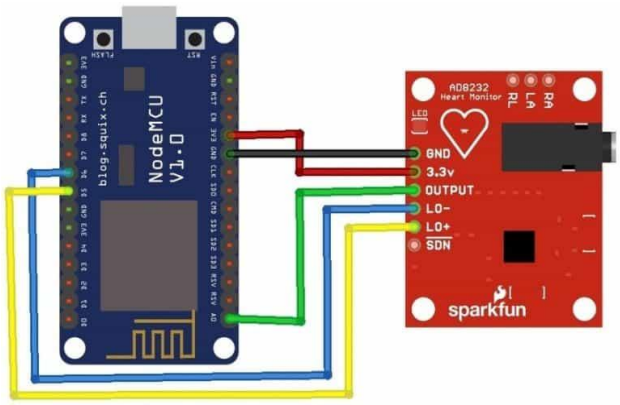
1. We collect some more information above the project through the IEEE paper.
2. Get started to collecting the information above the various components which requires for the project.
3. For the whole assembly first we generate the actual circuit diagram and check working by using various apps, the following.
4. fig shows circuit diagram for ventilator
5. After conforming a proper circuit diagram, we start to collect the required components.
6. After we collect the required components we start to build the actual project.
7. We also start to represent the programming of the various sensor witch has in a next topic.
8. We start to build a proper circuit, we are now on that a position.

Following fig shows Circuit diagram for BPM and SPO2 monitoring.





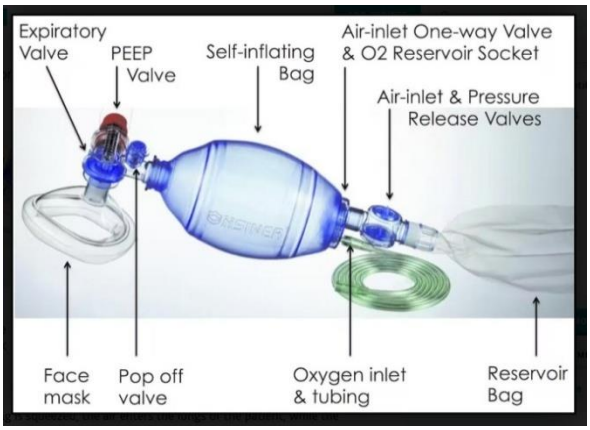
Following fig shows Circuit diagram for ECG



6. RESOURSES AND CONSUMABLE REQUIRED

The following components as well as sensors required for the ventilator system.

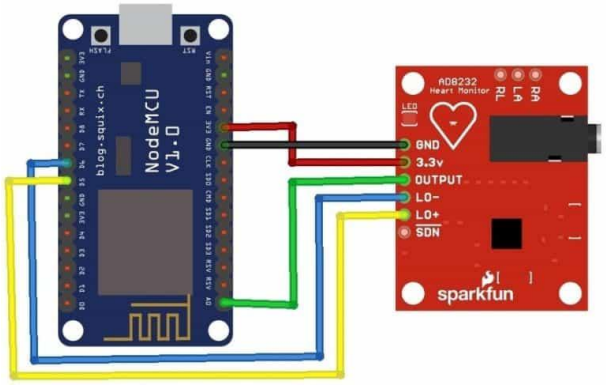
1. AMBU BAG



When the bag squeezed, the air enters the lungs of the patient, while the non-versible breathing valve prevents backfiring of the exhaled air. Then the AMBU BAG self dispences by a sucking air from the valve from it a back side there ambient air can be used as ‘fuel’, or an Oxygen cylinder can be connected. In the letter case, it is possible to connect a tank.

To collect excess oxygen, witch was not used by the patient.

2. ECG SENSOR



Heart diseases are a becoming a big issue for the last few decades and many people die because of a certain health problems. Therefore, heart disease can not be taken lightly. so there should be a technology that can a monitor the heart rate and heart behavior of the patient regularly. By analyzing or monitoring the ECG single at the initial stage the various heart disease can be prevented.

This is the reason why I am presenting you with this great IOT project. In this project, I will show we how you interface AD8232 ECG sensor with NODEMCUE SP 8266 board and monitor the ECG form on a serial plotter screen. Similarly you can send the ECG wave form the over the IOT could plat form and monitor the signal online from any part of the word using the PC or the simply using the smart phone. There is no need for staying in the hospital to monitor heart activity/ behavior just because you can monitor it online from any where . Thus it can be said advancement in a patient health monitoring system.

The IOT platform that, I am gonna use here is UBIDOTS. Ubidotes is an IOT platform empowering innovators and industries to prototype and scale IOT projects to production. Use the UBIDOTS platform to send data to the could from any internet enabled device. We can them configure actions an alerts based on your real- time dada and unlock the value of your data through usual tools.

3. NODE MCU

Node mcu is an a open source platform based on ESP8266 which can connect object and let data transfer using the wi-fi protocol. In a adition, by a providing some of the important features of a microcontroller such as GPLO,PMW and ADC etc. it can solve many of the projects needs alone.

4. SERVO MG996

The MG996R is essentially an upgraded version of the famous MG995 servo, and a features upgraded shock proofing and a redesigned PCB and IC control system that make it much more accurate than its predecessor. This high torque standard servo can rotate approximately 120 degrees (60 in each direction).

5. ADAPTER

They are switch mode power supplies which means the output is regulated to 5V (No more 14V outputs). These have a standard USB 'A' connector for the output so we can power your Arduino, Raspberry Pi, etc. through a USB cable. Any device than uses a USB cable for a charging or power can be powered with this supply.

6. MAX 30100 SENSOR

The MAX 30100 operates from 1.8v and 3.3 v power supplies and can be powered down through software with negligible stand by current, permitting the power supply to remain connected at all times.

7. OLED DISPLAY

OLED displays are electronic visual panels that harness organic light emitting diode (which, of course, is what the acronym OLED stands for) for their core illumination power.

***Approximately expenditure**

Sr.no	Activity	Expenditure
1.	Material	5500
2.	Fabrication	2000
3.	Testing and consultency	1000
4.	Consumable	1000
	Total	9500