

Re-ventilator Project blog: day 13, 3/31/20

Hi Everyone,

We are currently on our 13th day of developing a ventilator that can effectively save lives and make an impact on the COVID 19 Pandemic. Thanks again for all the help, questions and valuable insights.

On Monday our team had a very good discussion with Dr. Botta, with Dr. Botta explaining the specific particulars of using a ventilator in the treatment of a COVID 19 ARDS Patient. Some of the highlights of our discussion:

- There exists the ARDS Net Protocol, which is the standard protocol for treating ARDS patients.
 - The Respiration rate is quite high 35-40 Breaths per minute.
 - Tidal volumes are on the low side.
 - Pressure levels are also lower: less than 30cm H₂O.
 - The PEEP level can be up to 25cm H₂O.
 - The Inspiration to Expiration Ratio (I/E) can be as high as 2:1 (2 units inhalation, 1 part exhalation).
- We discussed sensor positioning in the system.
- We also talked about how to add O₂ to a system simply and what was really required for O₂ insertion. Dr. Botta gave us a number of avenues to pursue.
- We also discussed the relative merits and particulars between volume control and pressure control.

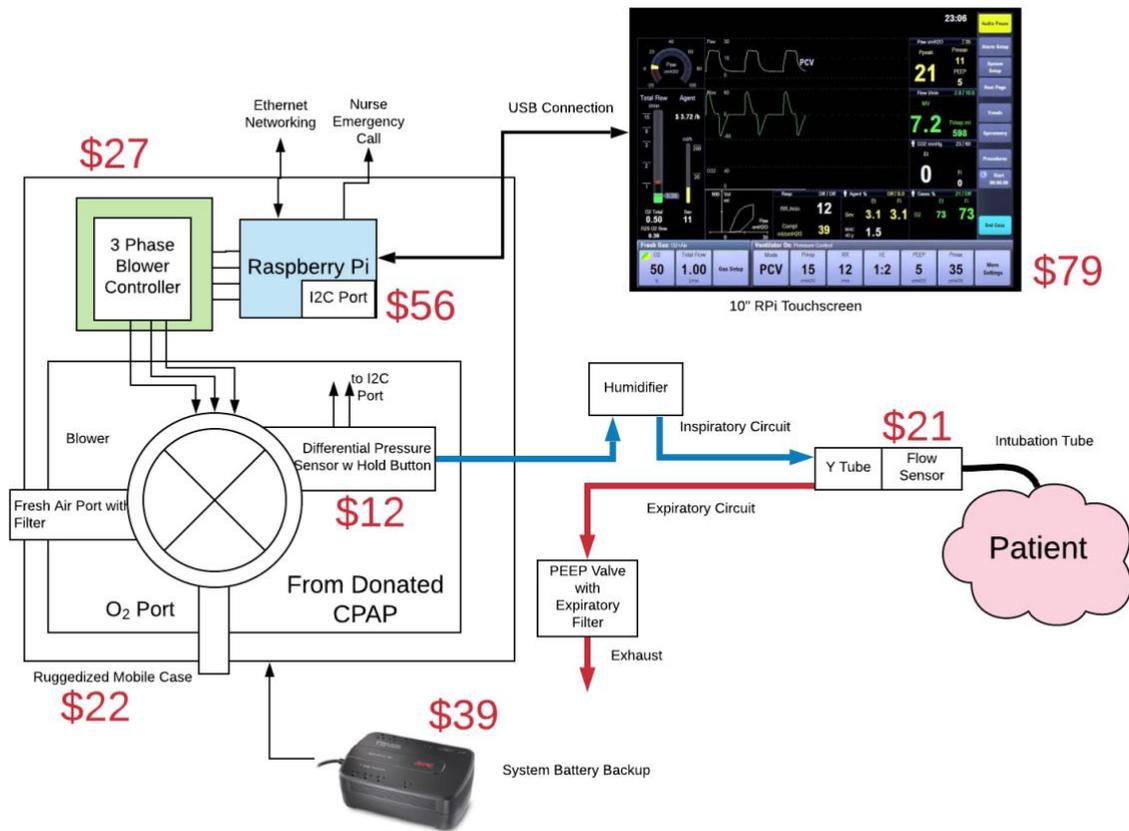
We feel that it is very important to try to understand the application as good as or better than the user of the ventilator. We are also talking to a respiratory therapist to bring on our team to help us better understand the different types of breathing circuits.

We made excellent progress on the technical side today. We got the blower running with the RC motor driver controller and then controlled it with the Raspberry Pi computer.

- We demonstrated that there is sufficient power in the fan to create the proper pressure in the system.
- We demonstrated a <2ms rise time in the fan speed using the computer control.
- We integrated the flow controller with the computer as well through the I²C port and were able to make flow measurements.

We are now into developing and writing the software to link to the GUI and the controller. The use of the Raspberry Pi allows us to use only a touch screen for the user input. The revised schematic is shown below.

In the figure we have listed prices for the major components. From this the estimated cost for the major components is a little over \$200.



As most of you probably have been notified, we have set up a Go Fund Me page to receive donations. These funds will mostly go to buying parts and equipment, and paying for some EE and software development time. Anything you can do here would be appreciated.

The Colorado Springs Gazette is going to be doing a story on our efforts and hopefully the wires will pick it up and we'll have more attention.

The greatest need at this time is to collaborate with a group that can test our completed prototype. Perhaps a Med School or equivalent.

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