

Rapidly manufactured Ventilator System

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Guidance

Rapidly manufactured ventilator system specification

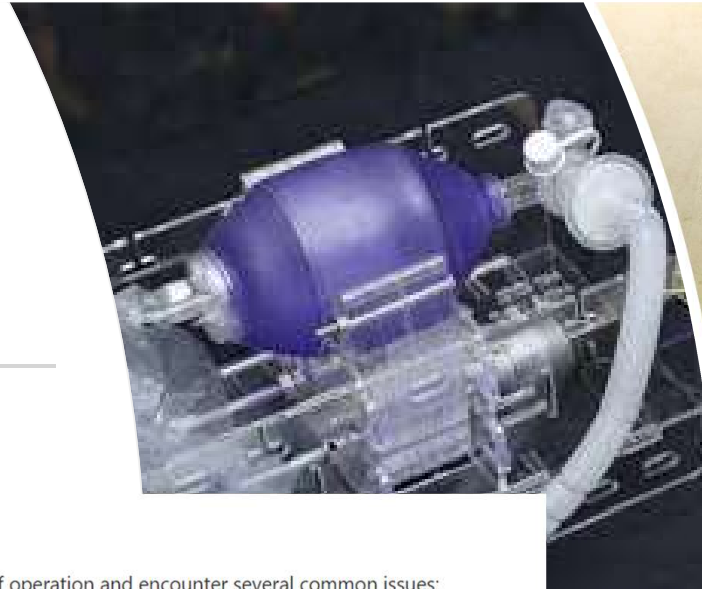
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Open-source projects: based on BVM

Caution (Medical Info from frontline specialist discussions)

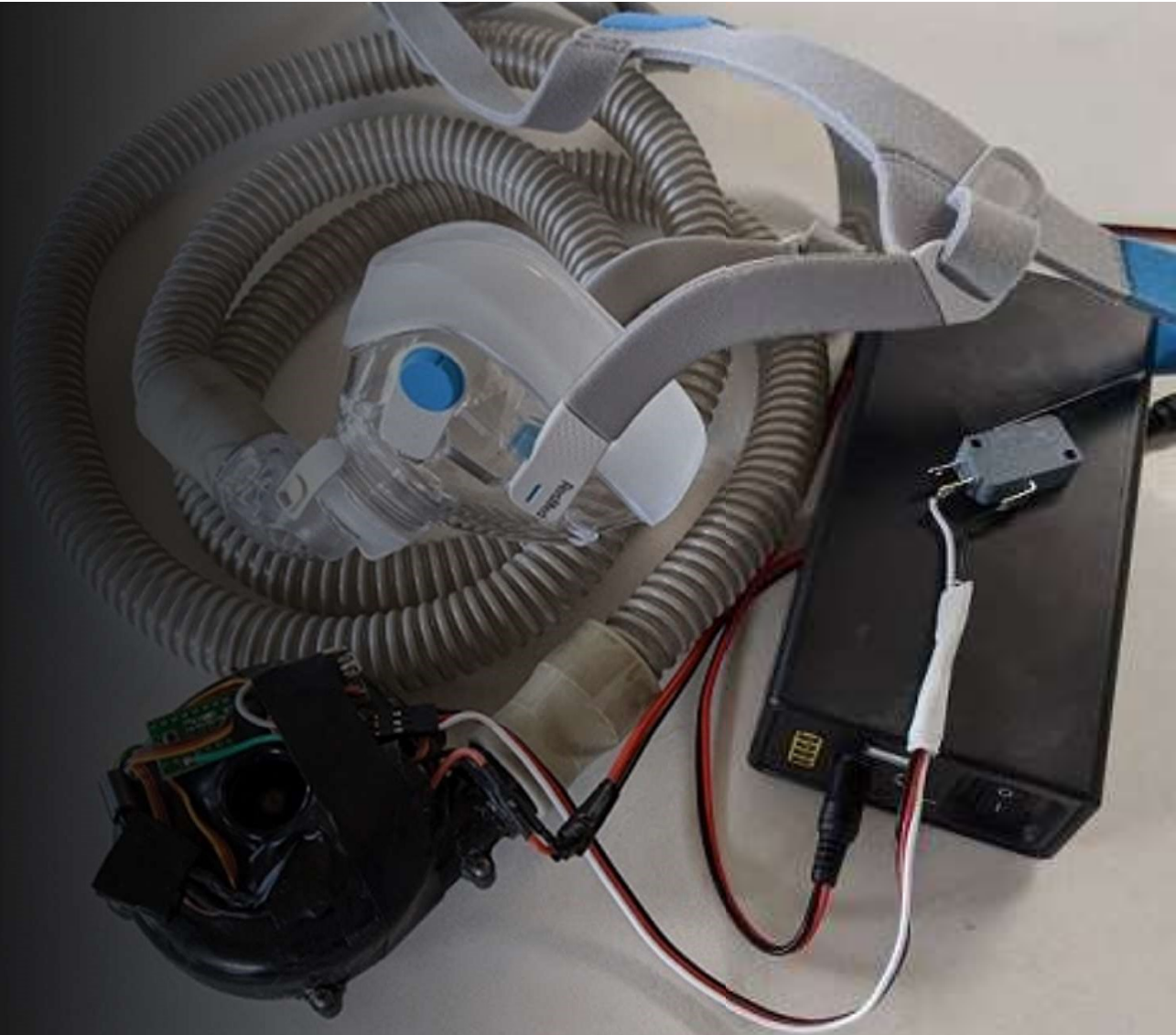
- The Ambu-Bag (and similar compression ventilators) are designed for <10 hours of operation and encounter several common issues:
 - the valves get sticky with condensed liquid
 - dangerous levels of CO2 accumulate
 - reusable Ambu-Bag systems are not common, meaning the ones available are less sturdy.
- When there are a lack of ventilators (like in the COVID-19 crisis), the built-in, tank-fed oxygen systems are routed into the bag, making it difficult to track the balance of gasses over time.
- Professionals are sitting bedside, tending to the manual ventilator setups.

- <https://opensourceventilator.ie/faq>



Low-Cost Open-Source Ventilator-ish Device or PAPR

<https://github.com/jcl5m1/ventilator>



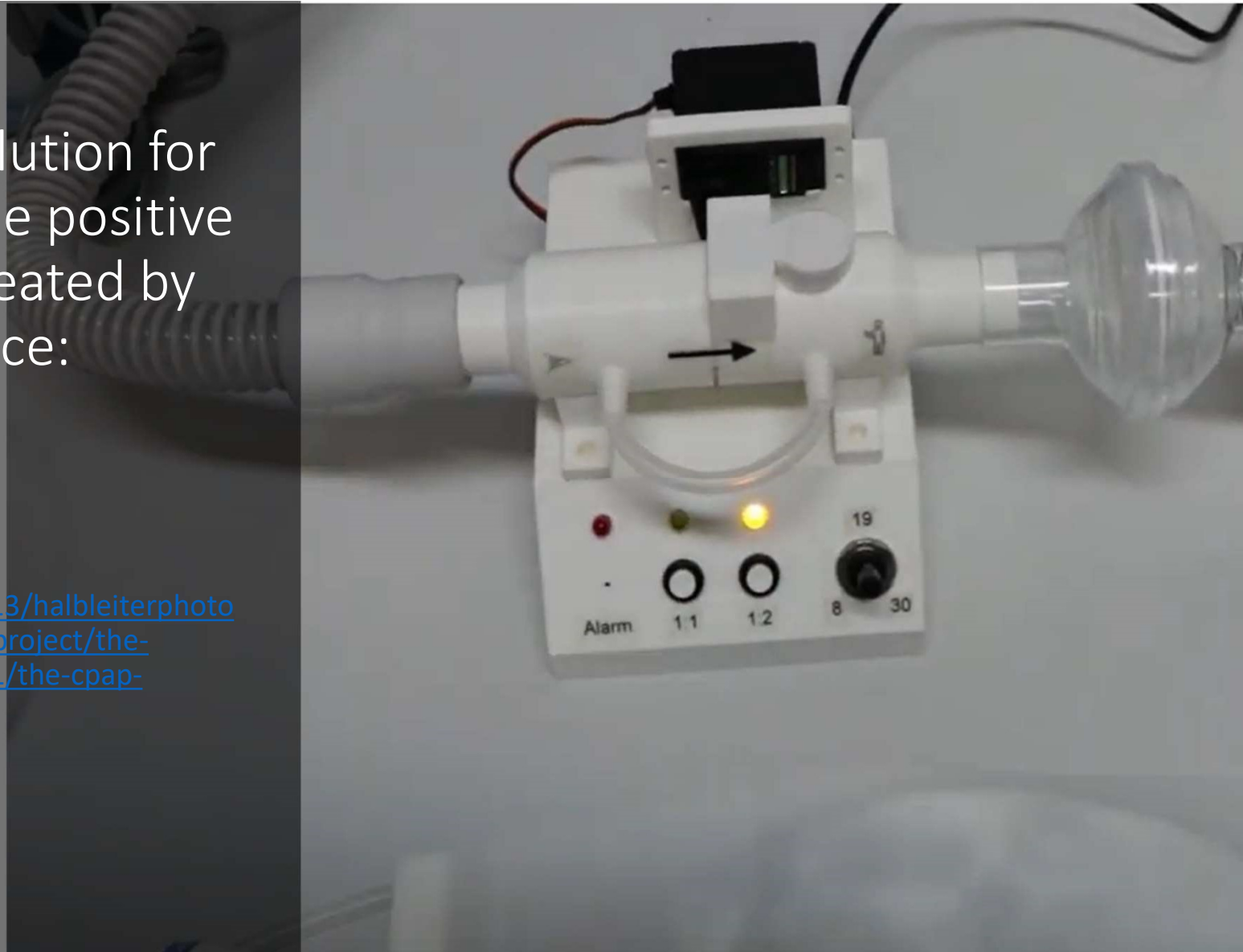
Speaking to doctors working on COVID-19 patients

- The covid-19 patient needs higher flow rate than usual treatment.
 - Flow rate 30-40l/min of air and oxigene (from 30% FiO₂ to 60-70%)
Note: Flowmeter in the Italian hospital have a range 0-15l/min. And also venturimeter (to create the mix o₂ and air) are not design for such a high flow
- The covid-19 patient needs a treatment with a constant positive pressure of 5-10mbarg AND breathe cycles with pressure rising the level to 20-25 mbar.
- No need for synchronizing the breath rate of the patient to the
- They may need a peek pressure of 2mbar higher than the plateau pressure of 20-25 mbar (to be confirmed)
- They really need something!!!

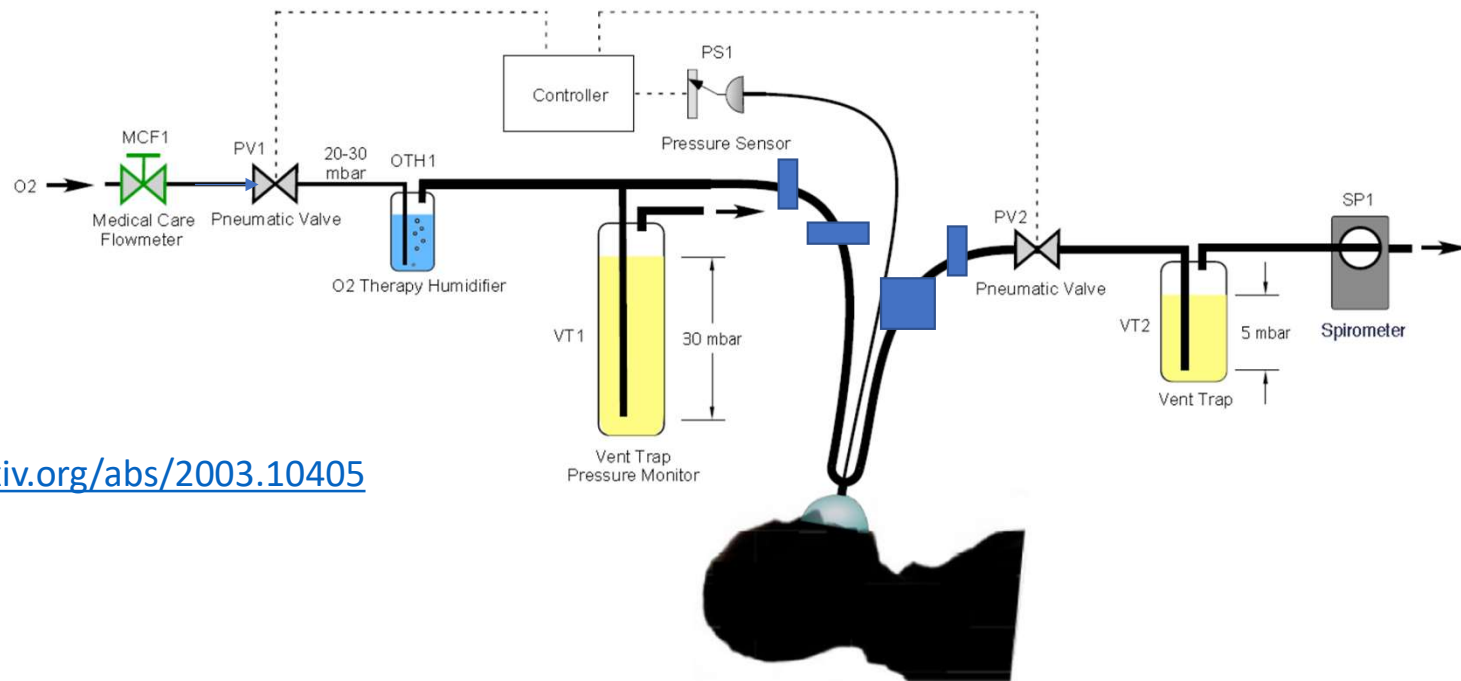


A simple solution for changing the positive pressure created by a CPAP device:

- <https://www.uni-marburg.de/de/fb13/halbleiterphoto/nik/the-breathing-project/the-breathing-project-1/the-cpap-solution>



MVM Mechanical Ventilator Milano



<https://arxiv.org/abs/2003.10405>

FIG. 1. Conceptual design and P&ID of MVM. Note: 1 mbar corresponds to the pressure of a H_2O columns of 1 cm height.

MVM Mechanical Ventilator Milano

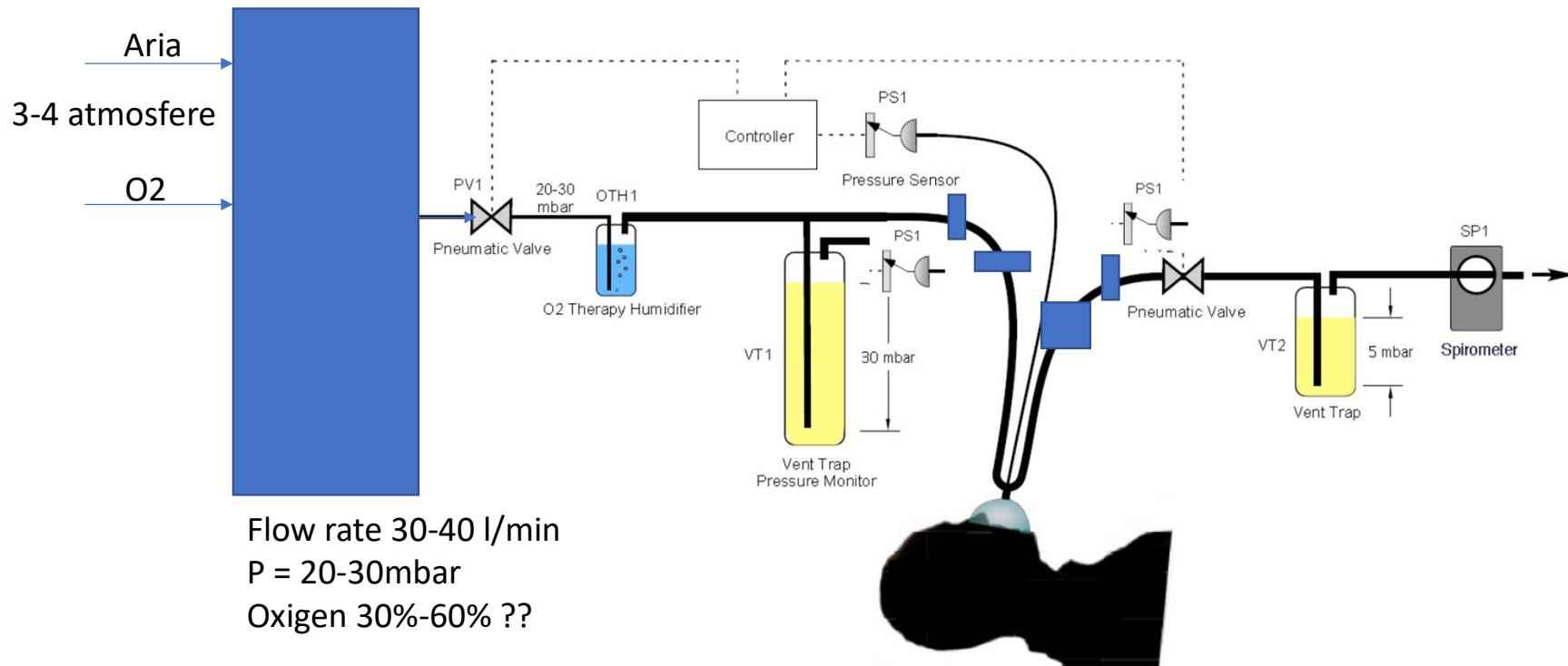


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