

A Low-Cost Ventilator for All

Need

Countries with more fragile medical systems, for example in low and middle-income countries, need low-cost ventilators to raise the capacity of their healthcare systems¹. They are likely to be left out of the current surge in ventilator development for COVID-19 due to international shortages and prohibitive costs.

Approach

We are a team of engineers, a product designer and medical advisors who are designing, prototyping and testing a low-cost ventilator to meet the unique needs of the current COVID-19 crisis. We are getting a head start on a next-generation ventilator that builds on the current fast-paced developments, especially open-source, to create a modular and user-driven product concept.

After an analysis of around 40 different open-source projects, we chose to develop an emergency-use ventilator that is meant to be used in emergencies, like the COVID-19 crisis, when there is no other ventilation means. The ventilator works by the automated and controlled compression of a standard "Ambu bag", or inflating bag. We base our design on the open-source, E-Vent project from MIT that served as inspiration. We improve the mechanical design in terms of buildability, compactness and robustness as well as add a new, intuitive product interaction and design. The controls and electronics of the ventilator are completely designed and implemented at ETH.

We are interested in customizing the design for the needs of partner countries, knowledge transfer to these countries and/or co-development opportunities.

Key Design Goals:

- low-cost, i.e. under 5000 CHF
- use-case driven
- multiple ventilation modes
- intuitive, simple product interaction
- improved buildability, compactness and robustness, e.g. ~80% standard parts
- maximum modularity and adaptability, e.g. for local supply chains
- robust and easy to maintain
- open

¹ <https://www.nytimes.com/2020/04/18/world/africa/africa-coronavirus-ventilators.html>

Please visit our website for more information, pictures and a video: www.breathe.ethz.ch
For all inquiries, please contact: Prof. Kristina Shea, kshea@ethz.ch, Project Lead



Product Visualization



Functional Prototype