

# OPENVENT-BRISTOL

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# A SIMPLE LOW-TECH VENTILATOR, ON A NOT- FOR-PROFIT BASIS



• DARREN LEWIS  
OpenVent-Bristol, Project Lead

WE AT OPENVENT-BRISTOL ARE A VOLUNTEER ENGINEERING GROUP WHO CAME TOGETHER IN RESPONSE TO THE COVID-19 CRISIS.

OUR AIM IS TO CREATE A SIMPLE 'LOW-TECH' VENTILATOR TREATMENT OF COVID-19 FOR DEVELOPING COUNTRIES ON A NOT-FOR-PROFIT BASIS.

OUR KEY FOCUSES ARE ON SAFETY, USE OF READILY AVAILABLE COMPONENTS AND PROCESSES AND OPEN SOURCING OUR WORK; WE WILL MAKE ALL DESIGNS PUBLICLY AVAILABLE FOR THE WORLD TO BENEFIT FROM OUR LEARNINGS. THERE WILL BE NO COPYRIGHTS, PATENTS OR SECRETS.



## BASED ON AN AMBU-BAG

Ambu-bags exist readily in most countries healthcare systems with pre-existing medical approval for manual ventilation. OpenVent-Bristol mechanically squeezes the bag.



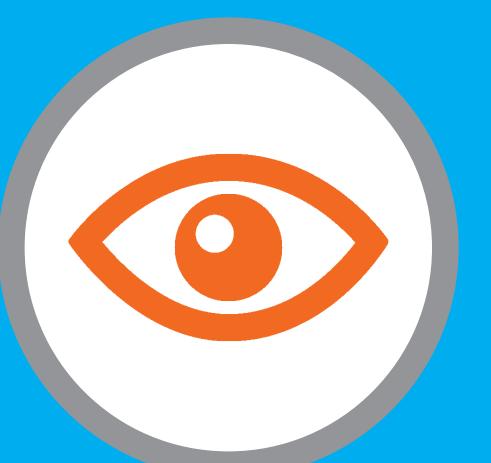
## RAPID MANUFACTURE

Made from readily available materials and production processes to enable rapid manufacture at low cost



## CAN BE USED ANYWHERE

Not dependent on compressed airline which may not be available in hospitals with less resources (oxygen is separate)



## VISUAL MONITORING

Bag compression can be monitored through transparent panel for feedback

**Advantages  
of our design**

# KEY ACHIEVEMENTS



## TESTING

Our device has been tested to the "ventilation" requirements by the National Physical Laboratory (NPL) in London using their test lung, with good results. It was tested to the [MHRA V4 RMVS REQUIREMENTS](#).



## INTERNATIONAL RECOGNITION

Our 1st open sourced design was adopted by [HELPFUL ENGINEERING](#), a large US based volunteer engineering group.



## SUPPORT & ASSISTANCE

We have received interest and assistance from AmboVent - Israel based open source ventilator.



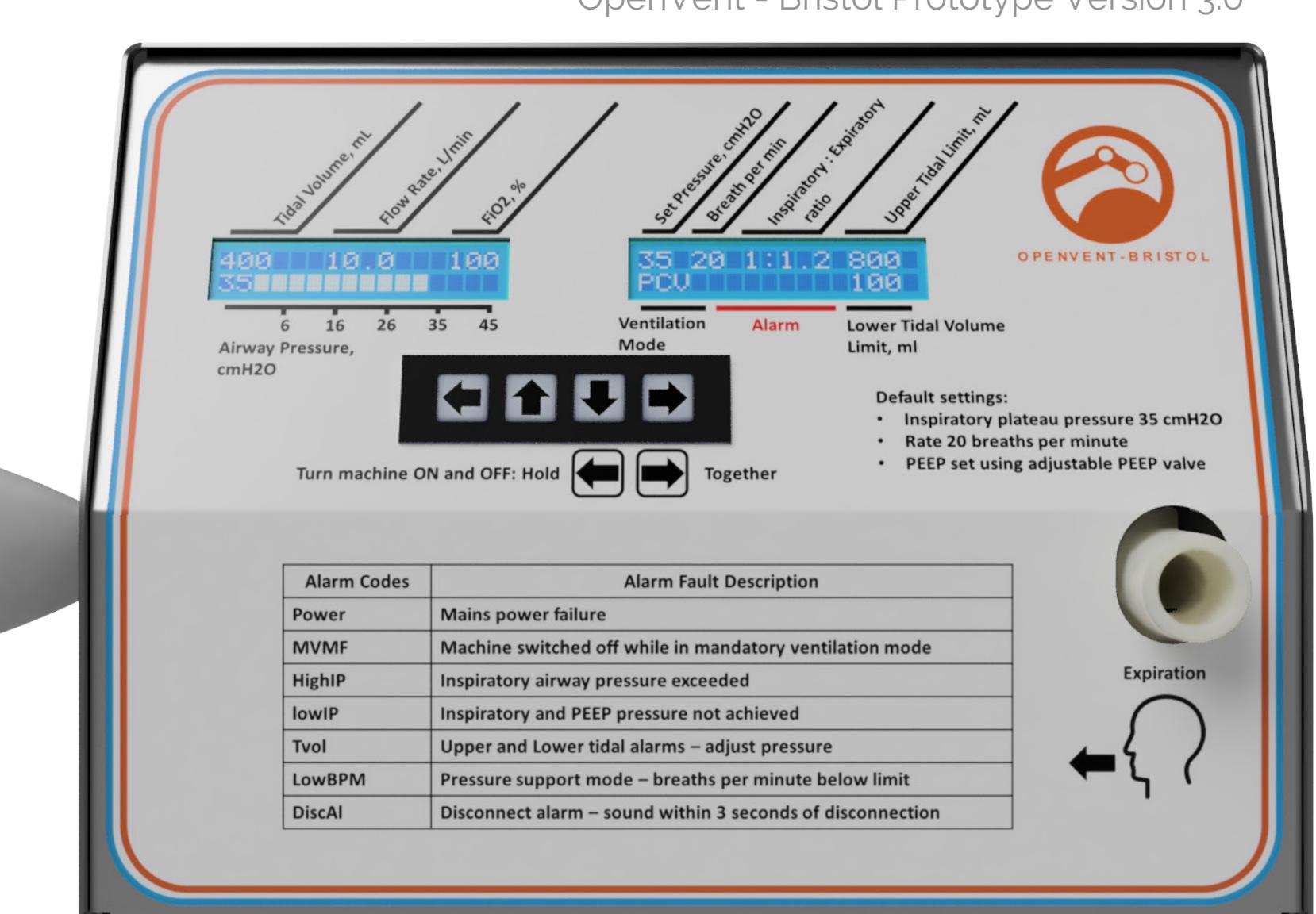
## DOMESTIC & FOREIGN INTEREST

Contact from multiple countries around the world who are interested in manufacturing, buying and using our device including; Saudi Arabia, Ukraine, Israel & the UK.



## FINAL PROTOTYPE

We are currently designing our third, and hopefully final prototype, which we hope will meet all the MHRA requirements. Our Version 2 design can be found [HERE](#).



# TEAM



## DARREN LEWIS

Project Lead & Mechatronics

Darren is a Design Manager working in Dyson's New Product Concepts team in R&D. With 10 years industry experience developing complex electro-mechanical systems into products, Darren has an extensive multidisciplinary engineering skill set in mechanical, electronic & software engineering.



## ROSS GOODWIN

Mechanical

Ross is an Associate Principle Engineer working in Dyson's motor development team. He has over 10 years of experience developing high speed turbomachinery to meet performance, durability, safety and functional requirements. Ross's engineering skill set includes structural and thermal simulation, design for manufacturer, and experimental testing of complex electro-mechanical systems.



## DONALD ROBSON

Software

Donald is an Embedded Development Engineer at Graphcore, with a varied career encompassing mechanical design, mechatronics and firmware development. During his time at Dyson he influenced a number of flagship products in environmental control, floorcare and lighting.



## ANGUS THOMSON

Electronics

Angus is the founder of CircuitBuilder - a web-based platform designed to simplify the process of creating custom electronics. He has nearly 20 years experience working across a wide range of industries, from consumer electronics to defence, in companies ranging from 2 people to 200,000.



## SAM RILEY

Verification

Sam is a Safety Critical Programmable Elements Certification Engineer. He works as part of MoD Software and cyber security Certification team, working to assure the safety and airworthiness within aviation.



**listening to &  
learning from  
the experts**



## CONSULTANTS

Lead consultant anesthetist working  
in a UK Intensive Care Unit



## NURSES

2 nurses who are working to treat  
COVID patients in Intensive Care



## MANUFACTURERS

P3 Medical; who manufacture  
ventilation devices  
(e.g. intubation tubing)

# TIMELINE

2020



# OpenVent-Bristol

## Version 3.0

### CONSTRUCTION

Laser cut sheet stainless steel for good strength, water drip resistance, bio compatibility and quickly scalable

### LCD USER INTERFACE

To display measured values and set values for example; airway pressure, tidal volume, I:E ratio & ventilation mode

### VISUAL AIRWAY PRESSURE MONITOR

Airway pressure displayed with horizontal bar graph

### MEMBRANE BUTTON PANEL

To minimise crevices for germs to hide

### AMBUBAG / BMV

Based on an Ambubag, which are already medically approved for manual ventilation and are readily available in most countries health

### VISUAL MONITORING

For visual feedback of bag compression

### SIMPLE MECHANISM

1 moving part, simply an arm mounted to a motor

### PEEP VALVE

Adjustable PEEP valve, to maintain positive pressure at all times

### AIR OUTLET

Standard 22mm tapered push-fit air outlet, compatible with existing tubing

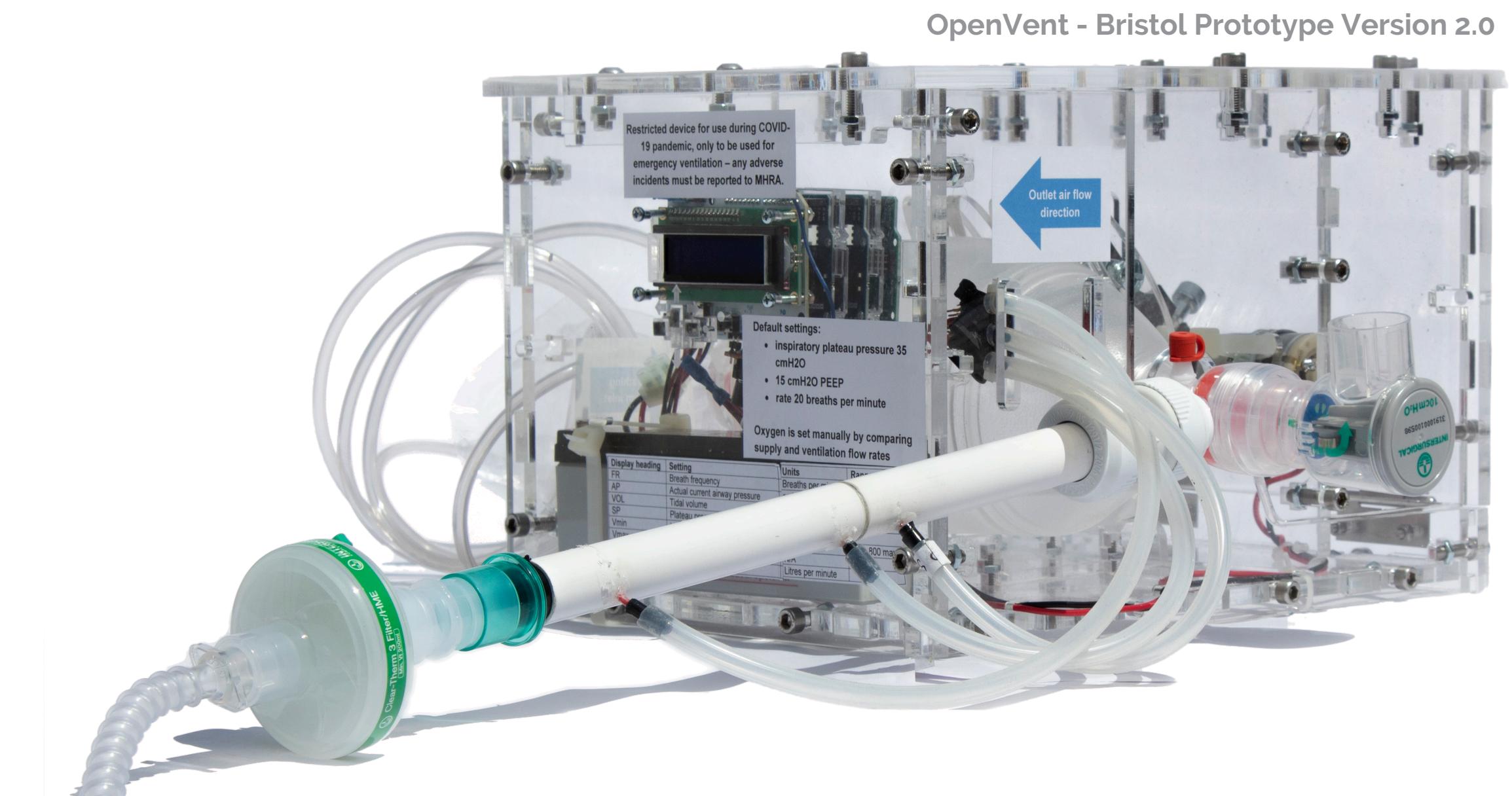


# Funding our project

*"So far we have been relying on funding from family and friends via our [GoFundMe](#) page, however funds from this have dried up and I am now funding the project myself, however I am unable to continue doing this."*

DARREN LEWIS  
Project Lead

Our lack of financial support is restricting our progress from Version 2.0 to Version 3.0. We require funds to produce our next - and likely final - batch of prototype ventilators, and to get these further tested at NPL.



- All costs are approximate and subject to change once final supplier quotes are received"

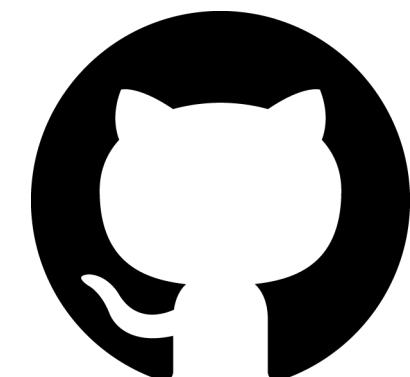
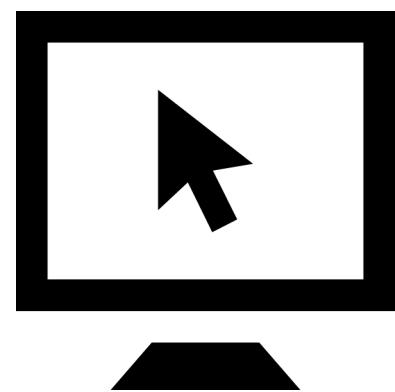
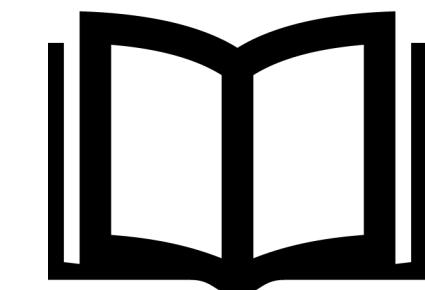
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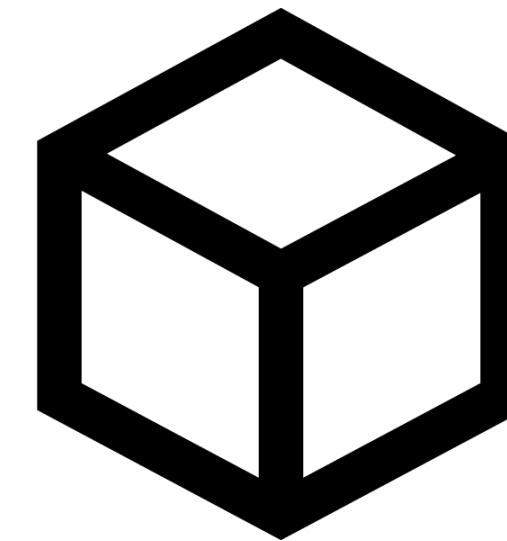
**With your support  
your organisation can  
benefit from**

**Part of the OpenVent-Bristol website  
dedicated to you including logo and  
brand message**

**Special thanks in publications of  
the open source design, including  
web based documentation, GitHub,  
youtube videos and any future  
academic conference papers**



# Sponsorship can consist of



## PARTS

to help us build our ventilators



## SERVICES

to aid and advise our work



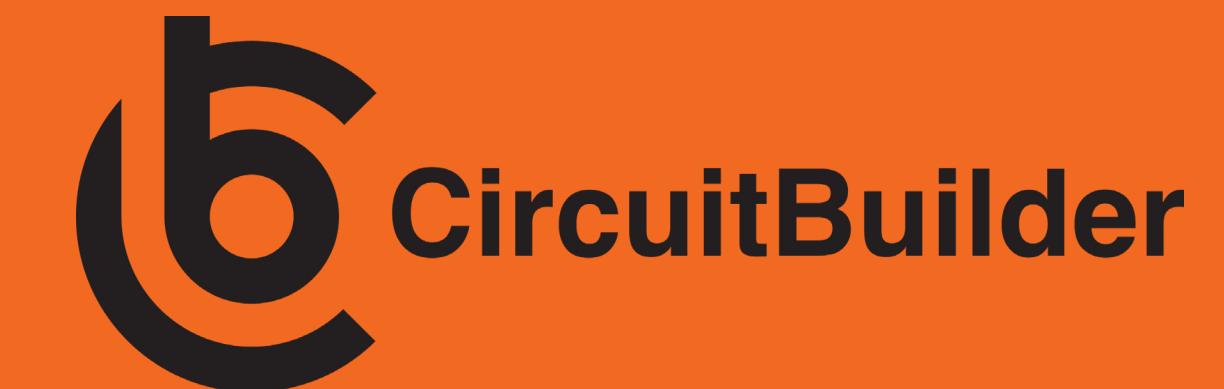
## FUNDING

to financially support our project

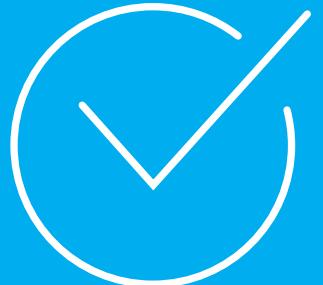
## CURRENT SPONSORS

At this stage we currently have one sponsor on the project, and are looking to bring more companies on board with us. Sponsorship is really important to us as it can help in so many different ways, and is never a 'one-size-fits-all' relationship. We are delighted to be supported by our sponsor CircuitBuilder.

CircuitBuilder is a brand new way to create professionally designed circuit boards. Upload your requirements, see a detailed breakdown of costs and watch in real-time as your project progresses to completion



## COMPETITIVE



There are many great engineering teams out there working on open source ventilators. This is a huge positive for example:

- To increase chances of success
- To provide buyers with more choice
- Component availability will limit how far one design can be deployed



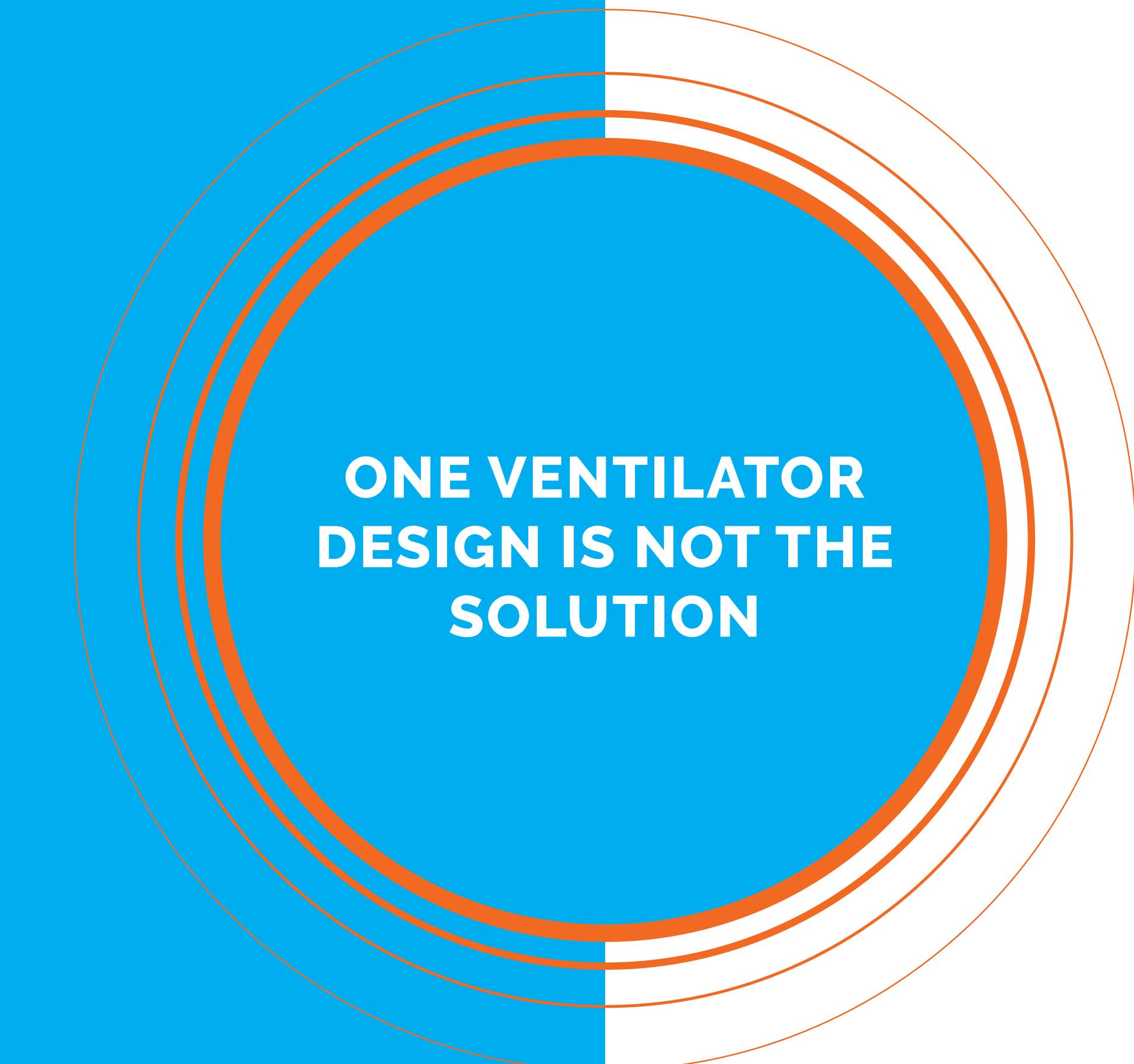
## INTELLIGENT

There is an increasing need for an adaptive ventilation mode where the system senses the person trying to breath before delivering air



## SAFETY MEASURES

PCV (Pressure Controlled Ventilation) mode is recognised as safer than VCV (Volume Control Ventilation) mode, reducing likelihood of lung damage through over pressure.





**OPENVENT-BRISTOL**

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