

Personal Respirator Southampton



Please see the Warning and Disclaimer after this slide.

Warning

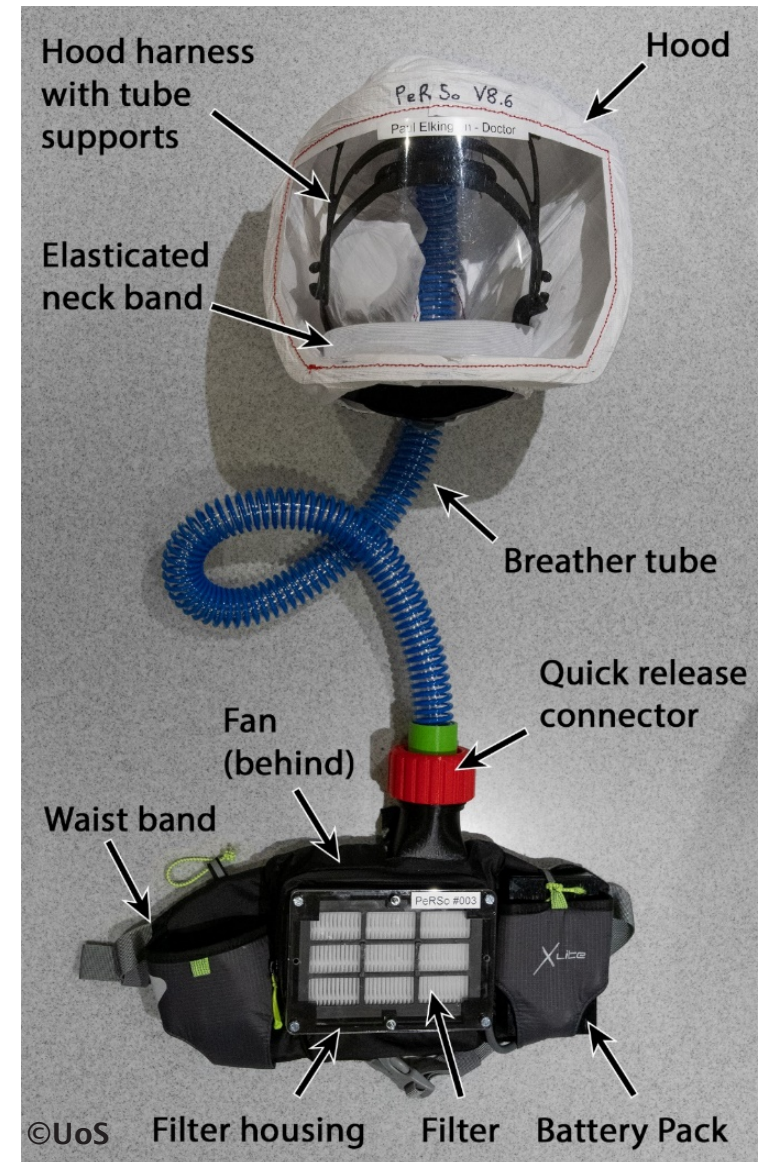
- **PeRSo is a prototype and this Specification is for information purposes only. It has not been properly tested for safety, efficacy or durability whether for single, multiple or repeated use. We have not obtained CE certification, regulatory approval or validated PeRSo units as a whole, and/or the constituent components, so as to comply with the relevant Standard for personal respiratory equipment. Final quality assured PeRSo units intended use is in a health care setting. PeRSOs should not be used in an industrial or manufacturing environment, drilling, welding, close to flames, chemicals or fumes or otherwise where existing, if similar looking, products would be more suitable.**
- **Individuals should not rely on the information in this specification and attempt to self-assemble their own PeRSo. They should seek to purchase a quality assured PeRSo device from a reputable manufacturer who provides safety warnings, use instructions, gives product liability assurances, guarantees and has effective product liability insurance in place. There is an increased risk of contamination by individuals untrained in specialist donning, doffing and cleaning protocols. Any individual's use of self-made PeRSo is entirely at their own risk.**
- **Manufacturers taking forward the production of PeRSo do so at their own risk. Manufacturers will need to develop their own manufacturing specification and undertake or obtain the necessary quality assurance, regulatory approvals, CE marking and/or compliance to the appropriate Standard prior to supplying or selling any PeRSo or releasing onto the market. Manufacturers should also undertake their own intellectual property freedom to operate checks and have in place appropriate product liability insurance.**
- **Organisations using PeRSo or related devices should establish careful protocols for “donning”, “doffing” and cleaning to prevent these devices being a source of contamination to individuals.**

Disclaimer

Except as represented here the Specification for the PeRSo Prototype is provided “AS IS”. The University of Southampton gives no assurance, guarantee or warranty, express or implied, that any PeRSo device manufactured or assembled following this specification: will be safe to use; will be of merchantable quality; will be fit for any particular purpose; will protect individuals from contracting COVID-19 or any other infectious disease or virus whilst using it; or that individuals using it will not suffer personal injury or death. The University of Southampton does not warrant or in any way assert that the manufacture, sale or use of PeRSOs will not infringe the intellectual property of any other person or organization. The University of Southampton hereby disclaims any and all warranties, express or implied, and excludes, to the maximum extent permitted by law, any and all liability for any loss, harm, damage, injury or death suffered by any person caused by, or resulting from, their reliance on the information, designs and Specifications provided.

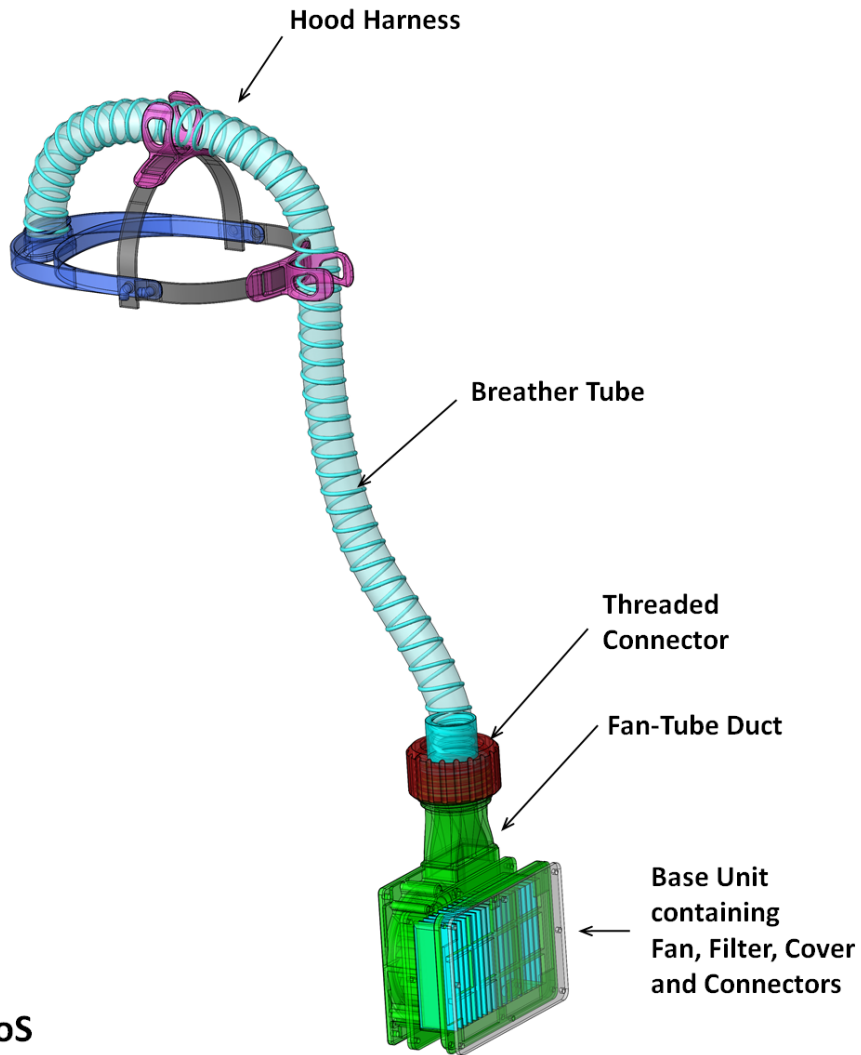
Overview

- PeRSo is a prototype Powered Air-Purifying Respirator (PAPR) designed to address acute shortcomings in PPE availability during the COVID-19 pandemic.
- It incorporates a combination of inexpensive and widely available components parts and has been developed to minimise the number and complexity of manufacturing steps.
- The intention is that derivative versions could be developed in low resource settings with minor modification, where disease transmission could be rapid amongst high population densities.

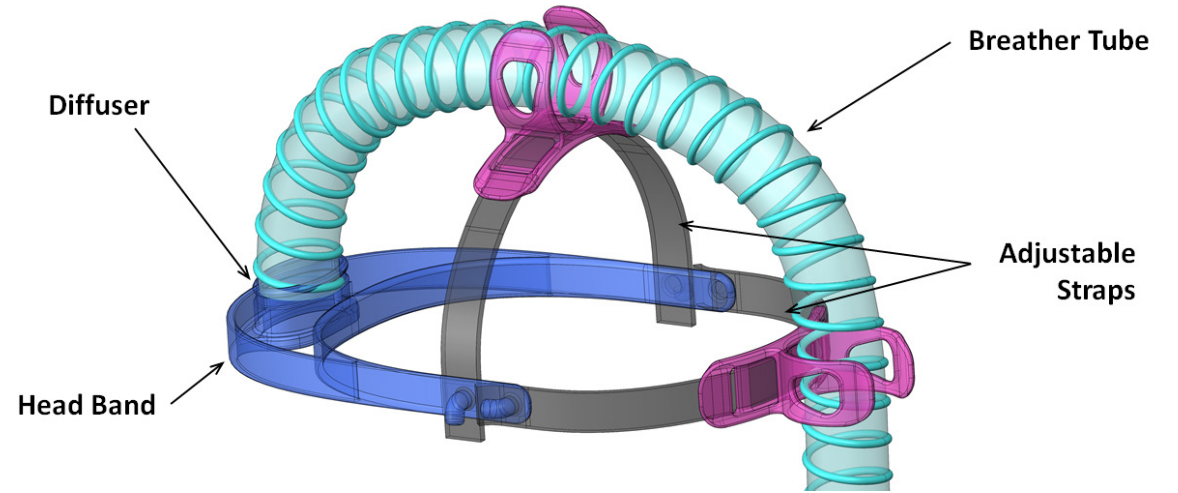


Key Components

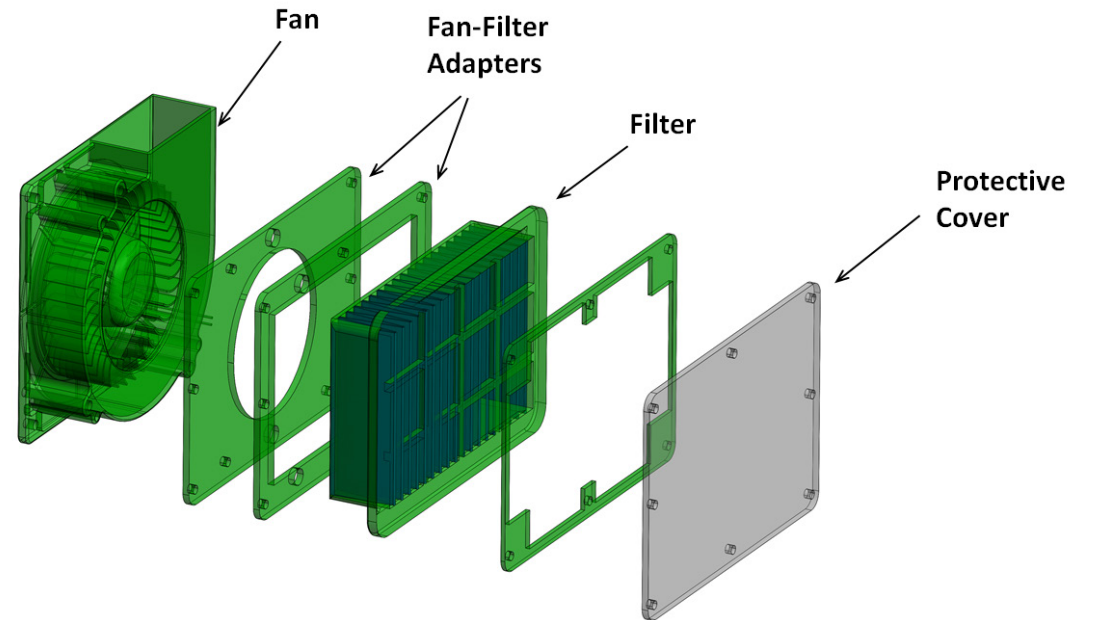
a)



b)



c)



Hood and Harness

- Designed for clear communication, visibility and comfort over a long shift
- Hood and visor materials must be selected for easy cleaning and minimal visual obstruction
- Careful placing, decontamination and removal procedures are essential to avoid contamination after use.



Specification List

Component	Description & Example Embodiment
Waterproofing/Cleaning	System must be water resistant to cleaning with 1000ppm chlorine, for example spraying cloth with solution and wiping down.
Filter & Housing	High-Efficiency Particulate Air (HEPA) filter, ideally H13 or H14; potentially sourced from a vacuum cleaner, dehumidifier or equivalent ; Pre-filter for large particles; Robust protective cover to avoid knocks, puncture and moisture ingress during cleaning.
Fan	Centrifugal fan delivering >170 l/min [1,2] at the system backpressure, depending on choice of filter, breather tube and tubing in headgear.
Power supply	Rechargeable batteries or battery pack; Minimum 4 hour runtime, ideally >12hrs; Example: 1.5W fan running at 7.5V is 0.2A; 2.4Ah NiMH batteries give a runtime 12hrs; On/off switch, protected for cleaning and to avoid accidental power-off; Ideally includes a low-power warning with >15min runtime.
Blower Unit Housing and waist band or backpack	Airtight assembly to mount filters to fan; runner's belt bag or backpack; Covered using a cleanable or disposable cowl.
Breather tube	Low mass and high flexibility to provide minimal impedance to head movements and strain on neck muscles; Either cut to length for user or length-adjustable, Ideally medical grade material (e.g. polyurethane, PVC); Typical inner diameter 25-32mm.
Connectors	Screw or bayonet type; potentially with internal helix matching thread formed by reinforcement on breather tube. Ideally universal connection between blower unit and breather tube so blower unit can be exchanged between users between shifts after decontamination
Head harness	Comfortable use for an 8 hour shift, avoiding direct contact with facial skin; Adjustable to different head sizes and shapes; Allowing support of breather tube; Easily attachable and removeable mounting of hood
Hood	Hydrophobic material, (e.g. Tyvek, Vent3 polypropylene breather membrane); latex-free; Taped or stitched transparent polymer visor (e.g. PVC, polycarbonate), optically clear and resistant to fogging; Probably multiple use but single-user, with label showing user's name and role to aid identification. For a positive pressure device the hood, face/neck seal and tube connector do not need to be air-tight, as the clean airflow would prevent ingress of contaminants

[1] Code of Federal Regulations 42 Part 84: Approval of Respiratory Protective Devices. Washington DC: Office of the Federal Register; 2019

[2] EN 12941:1998+A2:2008 Respiratory Protective Devices - Powered Filtering Devices Incorporating a Helmet or a Hood - Requirements, Testing, Marking. London: British Standards Institution

Status of regulatory approvals, certification and compliance to standards

- The regulatory approval & CE marking is a rapidly moving space given the COVID-19 epidemic. Any manufacturer would need to satisfy themselves of the applicable requirements (including international).
- The University has developed this to a prototype level, TRL4. It has undertaken some preliminary tests and obtained user acceptance feedback.
- The prototype design has not yet been tested or certified to meet any Standard (e.g. British Standard BS EN 12941:1998+A2:2008)
- Any manufacturer will need to develop their own manufacturing specification and undertake or obtain the necessary quality assurance, regulatory approvals, CE marking and/or compliance to the appropriate Standards.

For more information

- The Times, 1 April 2020
<https://www.youtube.com/watch?v=LOwVs8aDxgw&feature=youtu.be>
- BBC South Today, 1 April 2020
<https://youtu.be/t3yVrU19idg>
- PeRSo webpage – this is updated regularly.
<https://www.southampton.ac.uk/perso>
- PeRSo Open Specification paper, 6 April 2020
<https://doi.org/10.31224/osf.io/rvcs3>
- If you still have questions or are interested to take this forward, please contact perso@soton.ac.uk and we will get back to you. Please note, due to the high volume of enquiries, there may be a delay in responding.

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