



Ventilated Hood (#230)

Project pitch

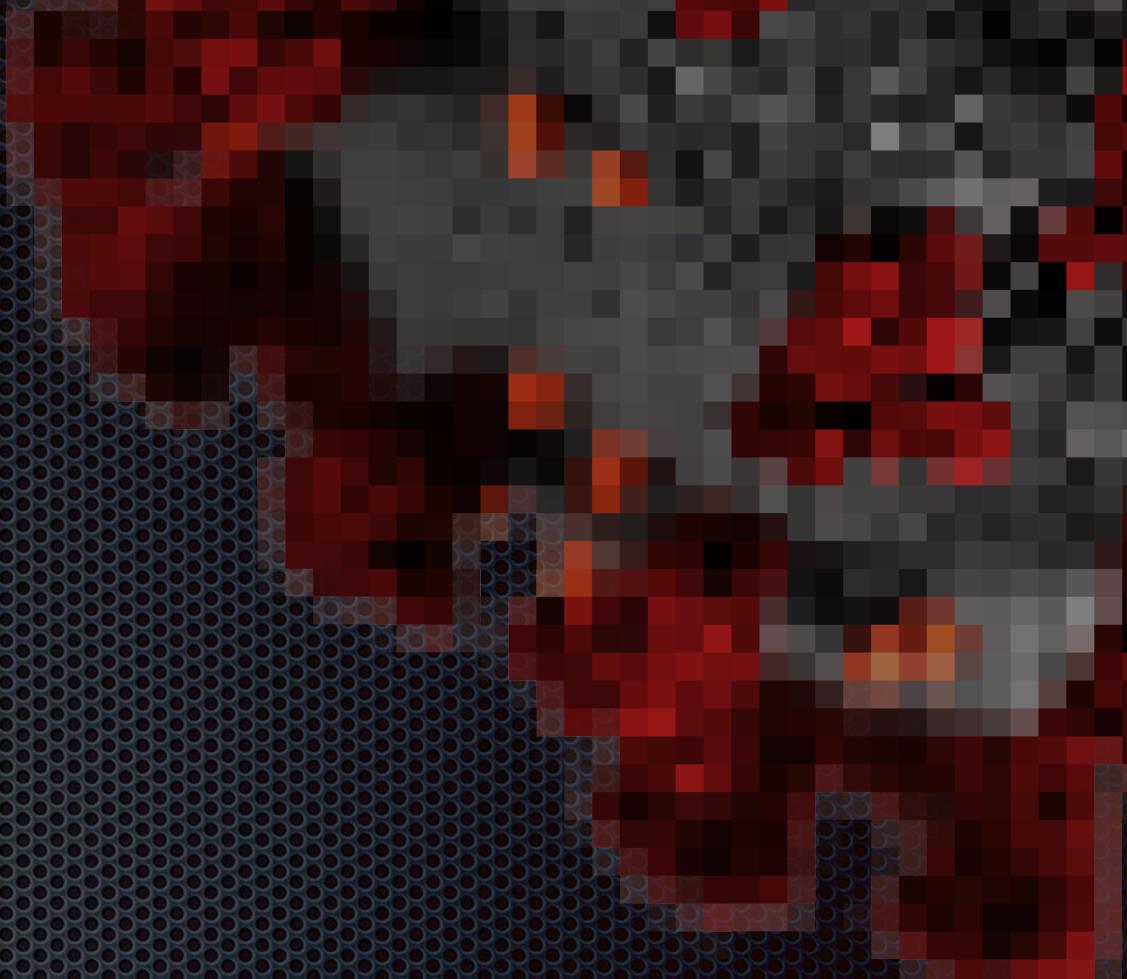
Ralph Lawrence Wunderlin. 06. April 2020 (Update: Added MIT License)

ONLINE HACKATHON
03.04.–05.04.2020
#VERSUSVIRUS

Executive summary

- Personal protection equipment is not sufficient and in short supply
- Provide medical staff with the protection they need not just what we have
- Greatly reduces risk of contamination for the medical staff
- Decontamination after leaving the red-zone can be implemented

This is a spin-off of project #103 How to get local and reusable masks



The more staff we loose, the more resources are stretched

The more staff we loose, the more casualties we will have

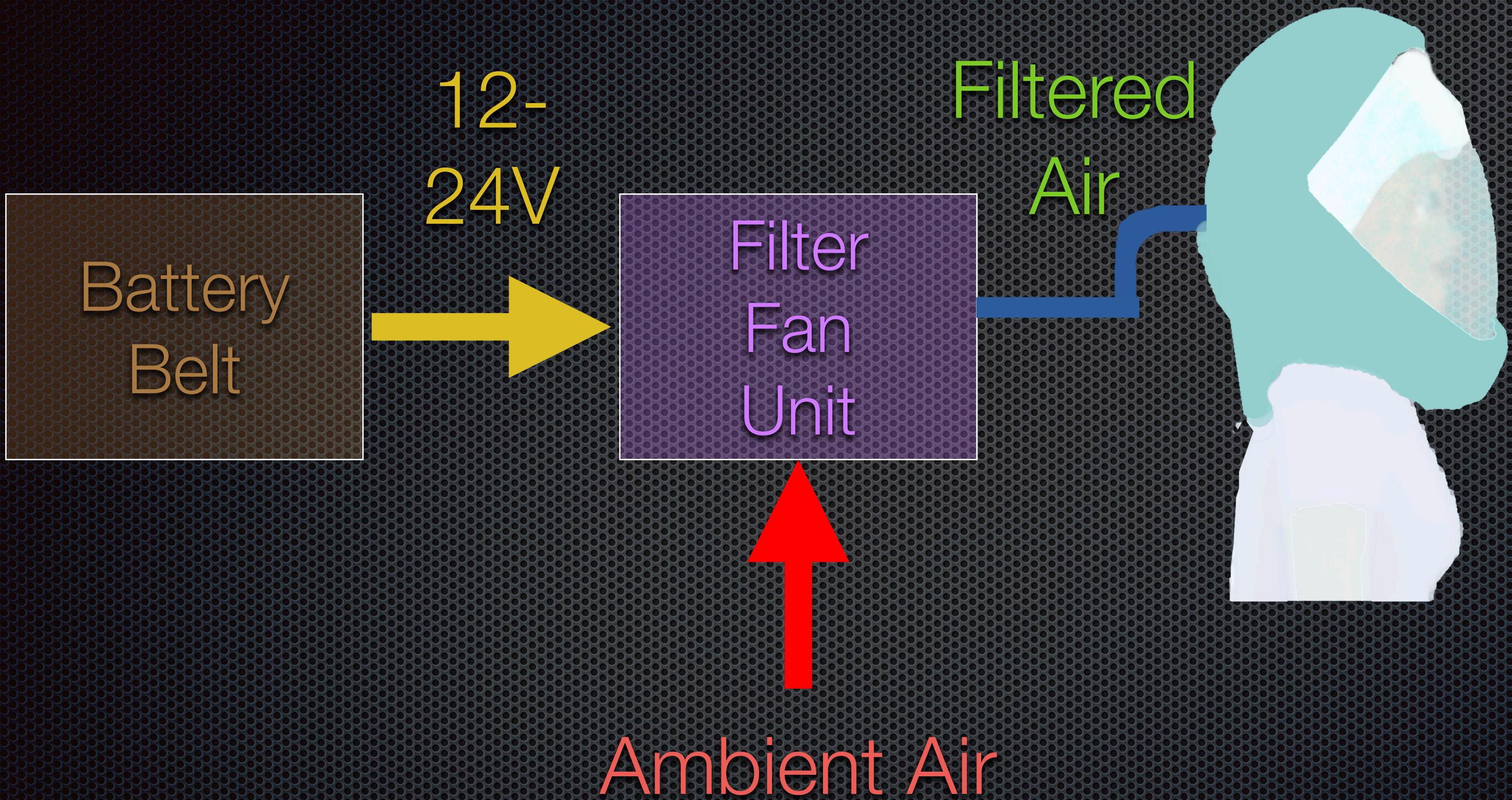
Hundreds have died from CoViD-19 in CH, none had a relative with them in their last moments.

The staff are all the patients have

The staff is all WE have



Overview



Facts

- **More and more Front-Line Helpers are being infected:**
 - China: About **6%** of all CoViD-19 cases were helpers
 - Italy: Over **10%** of all CoViD-19 cases were helpers
 - Spain: Over **16%** of all CoViD-19 cases were helpers
 - Germany: Over **2'300** Helpers infected, at least one hospital shut down due to infected staff
 - Switzerland: More than **2.6%** of the CoViD-19 patients are healthcare workers and doctors
- **In Switzerland PPE for medical staff is driven by availability instead of capability**

Progress so far

- Concept on paper and presented to team on Saturday morning
- Escalated to Antje Krüger (Lead/Category Mentor Hospital)
- Call Antje/Ralph: Spin off - Saturday 14:20 - GO with #230
- Thanks to the #103 team-members who supported me!
- Deliverables by Sunday 18:00:
The presentation and requirements ready for basic design

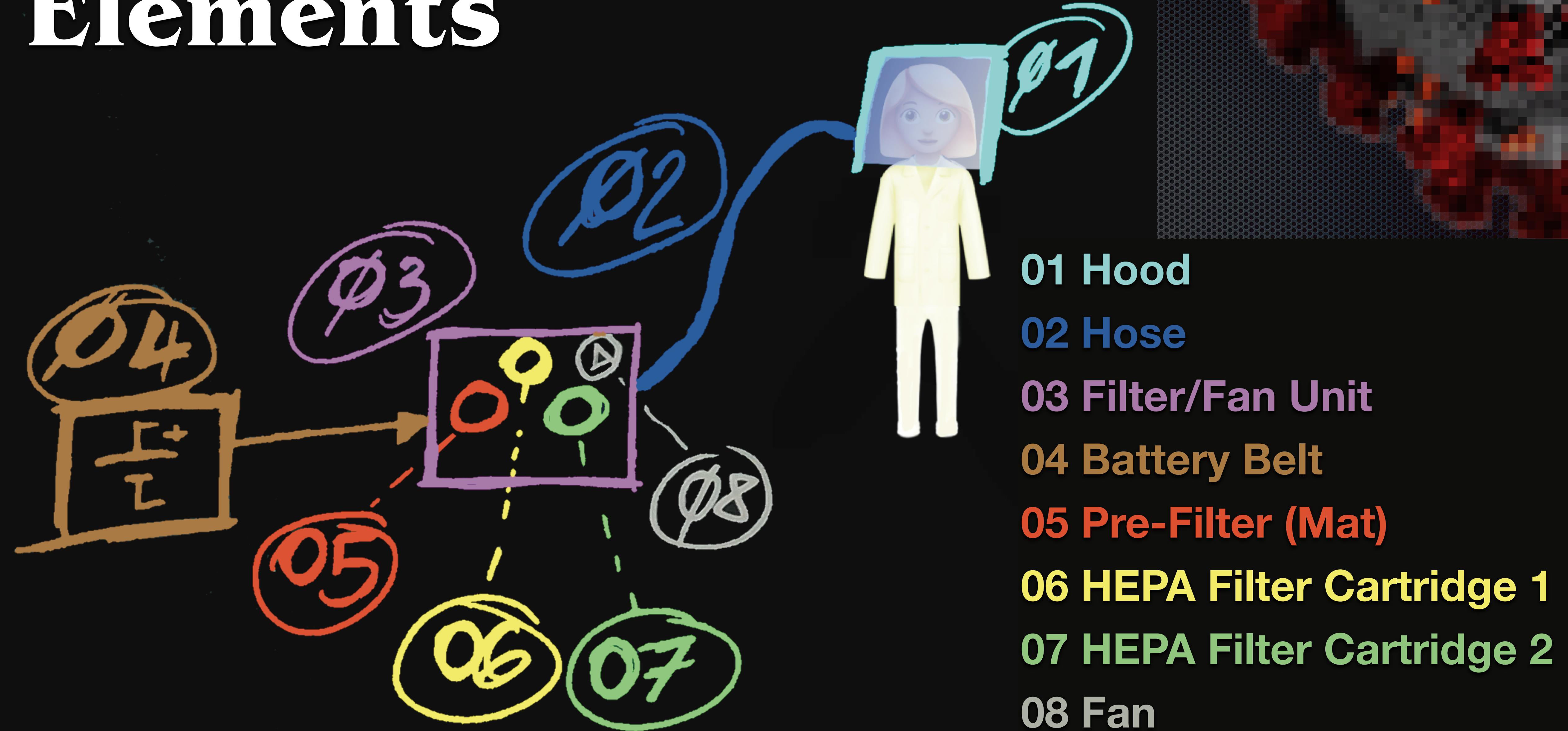
Why

- **SARS-CoV-2 is transmitted by droplets & aerosol. Mucus tissue is the entry point (Mouth, Nose, Eyes)**
- **De-Contamination is not implemented (Shower/Wiping down)**
- **With current PPE:**
 - **High risk of transmission**
 - **Masks are inadequate**
 - **Mask handling is critical (Gowning, During use, Removal)**
 - **Neck or other open skin is visible**

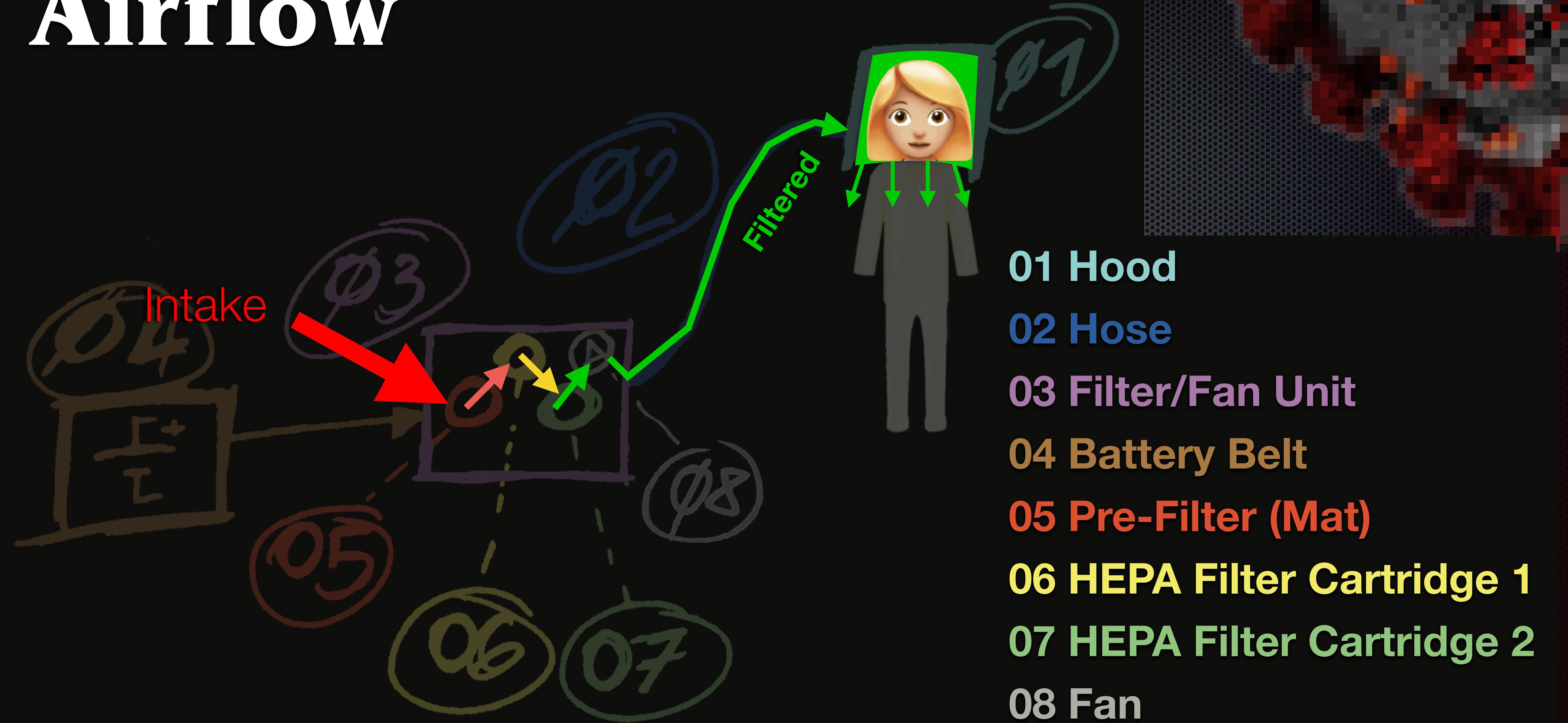
What can we do?

- Develop re-useable, washable hood (decontamination shower possible)
- Develop lightweight active filter unit with a pre-filter and two HEPA's (two HEPA's for cleaning and safety)
- A battery pack with rechargeable batteries (standardized)
- Use as many standard components as possible, 3 different filter capsules shall be possible
- There are commercial products (3M Jupiter), but they are not available in numbers - so we need our own, and it must accept at least 3 different types of filter cartridges

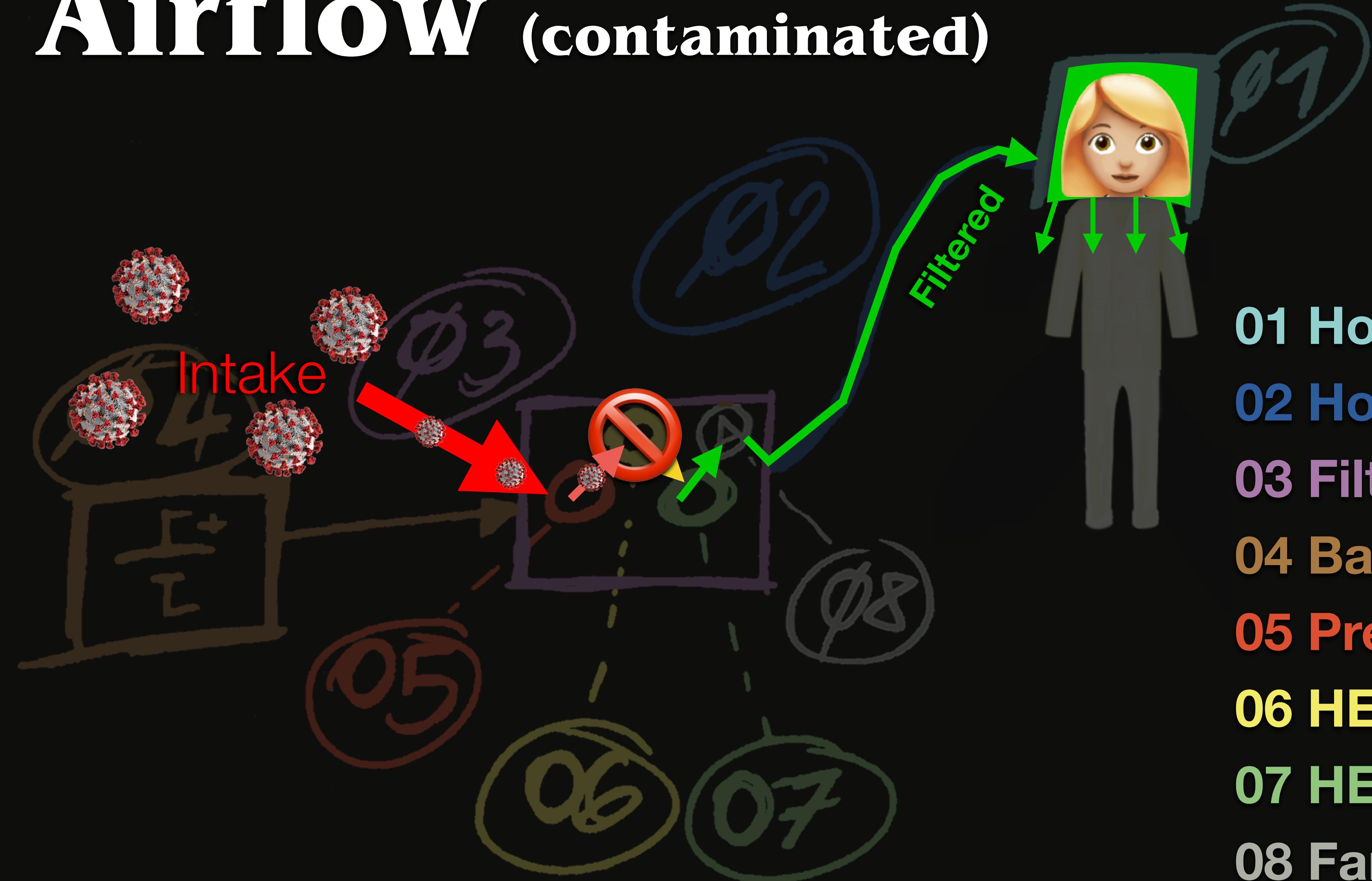
Elements



Airflow



Airflow (contaminated)



- 01 Hood
- 02 Hose
- 03 Filter/Fan Unit
- 04 Battery Belt
- 05 Pre-Filter (Mat)
- 06 HEPA Filter Cartridge 1
- 07 HEPA Filter Cartridge 2
- 08 Fan

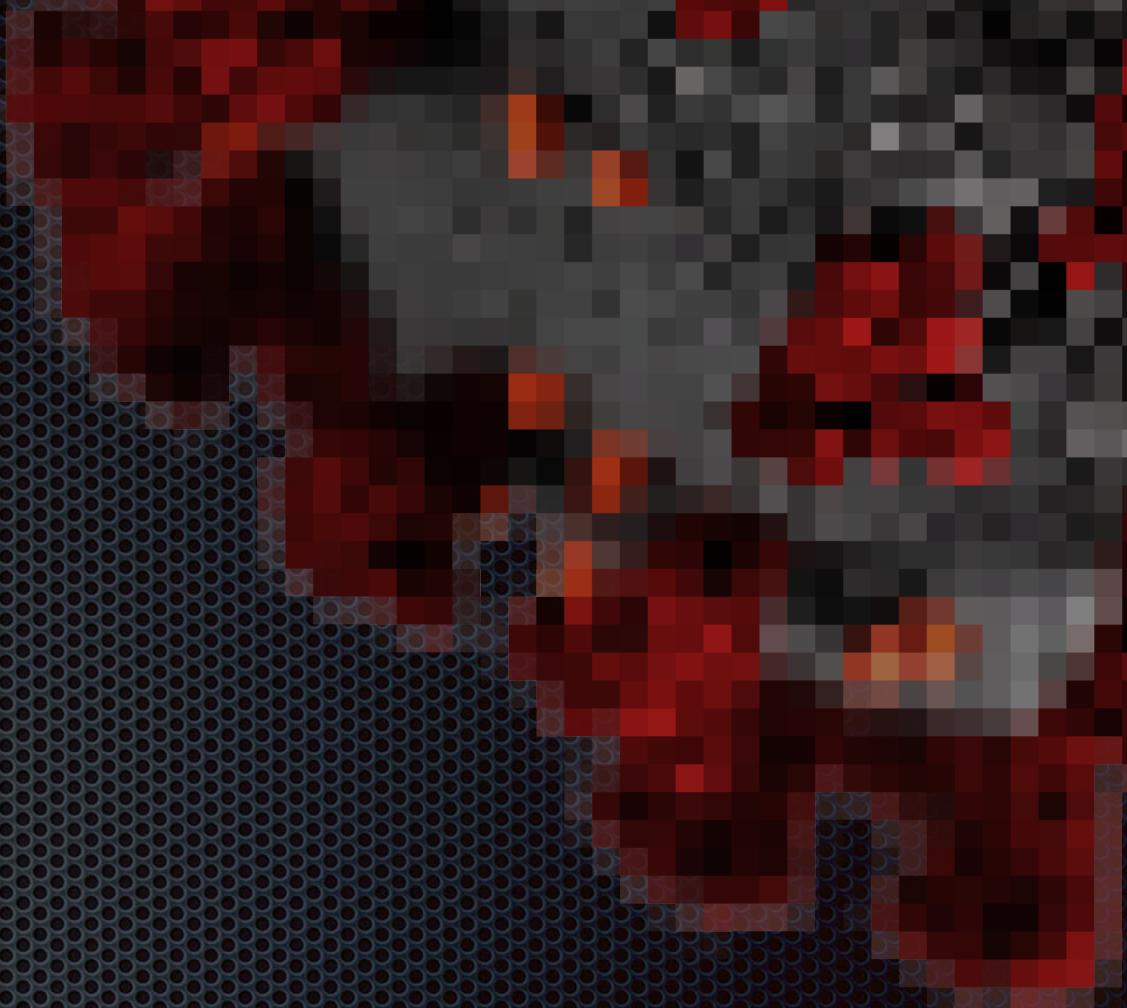
How

- Brake down in to Work-Packages
- Battery Belt / Filter-Fan Unit / Hood
- Use standard parts (e.g. 18650 batteries, box-HEPA's, etc)
- Who: Small design team, experienced System Engineers, Electronics Engineers, 3D-Designers and Support (Procurement, Compliance)
- Rapid prototyping and first batches could even be partially 3D-printed as this is an urgent project
- Move on to pressure moulded plastic parts as soon as available, test thoroughly
- Use alternatives for hood (textile clean-room hood, „snorkel“)

Requirements

For a first detailed list of requirements:

[Ventilated Hood-Requirements-01.pdf](#)



**„Tu erst das Notwendige, dann das Mögliche,
und plötzlich schaffst du das Unmögliche.“**

–Franz von Assisi

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