

University of Calgary

ENEL 300

ELECTRICAL ENGINEERING DESIGN

Ion-Man 369 User Manual

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1. Getting started

The Ion-Man 369 series mask is a portable face mounted filtration device that takes advantage of electrostatic effects to deliver the user with clean purified air. In combination with its main feature, which is electrostatic filtration, this device comes with various features including; an audible air quality warning system, various modes of operation (always on, smoke detect trigger), and rechargeable lithium ion batteries. To get started with the mask, begin by adjusting the face straps to the open position. Place the mask over your face and ensure a tight seal between the rubber boundary and bare skin. Then proceed to tighten the straps to a comfortable level. The mask is now ready to use.

2. Main Features

Air quality sensor and audible warning system to detect three different air quality levels.

Level 1: Moderate Air Quality

The warning system (a speaker) will emit 1 short beep to indicate this threshold has been passed.

Level 2: Poor Air Quality

The warning system will emit 2 sequential beeps to indicate this threshold has been passed.

Level 3: Bad Air Quality

The warning system will emit 3 sequential beeps to indicate this threshold has been passed.

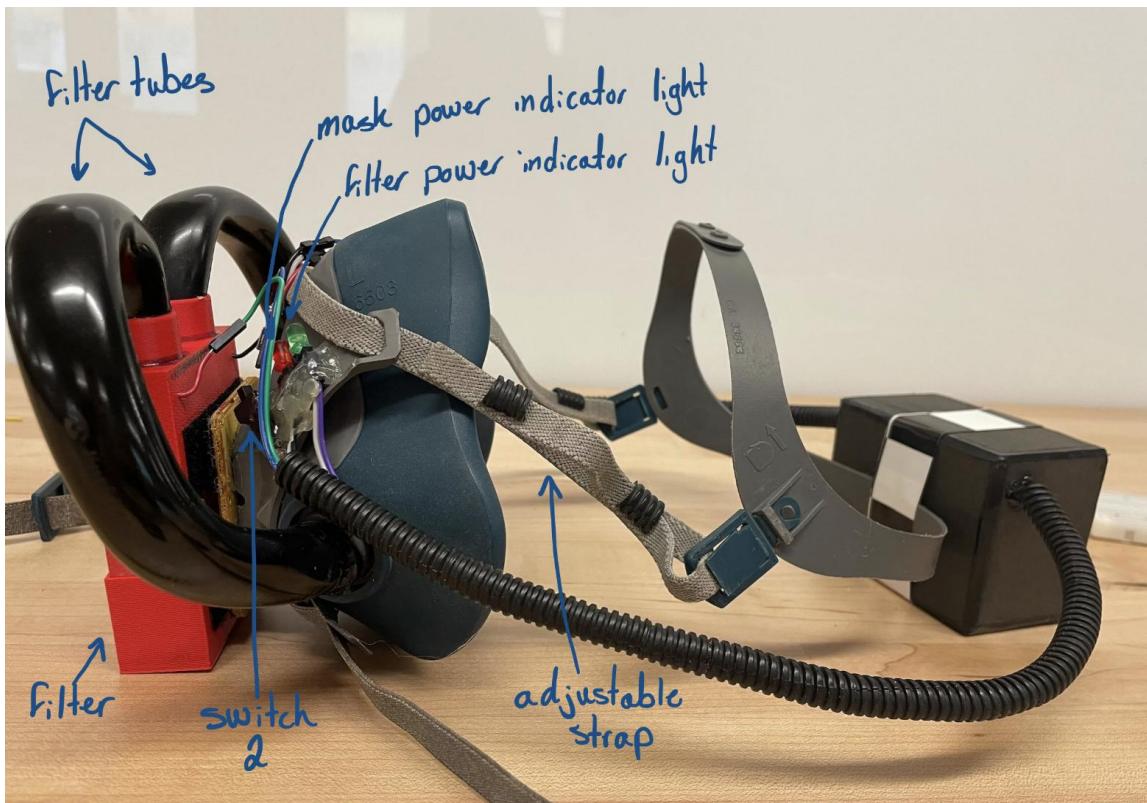
Two things of note:

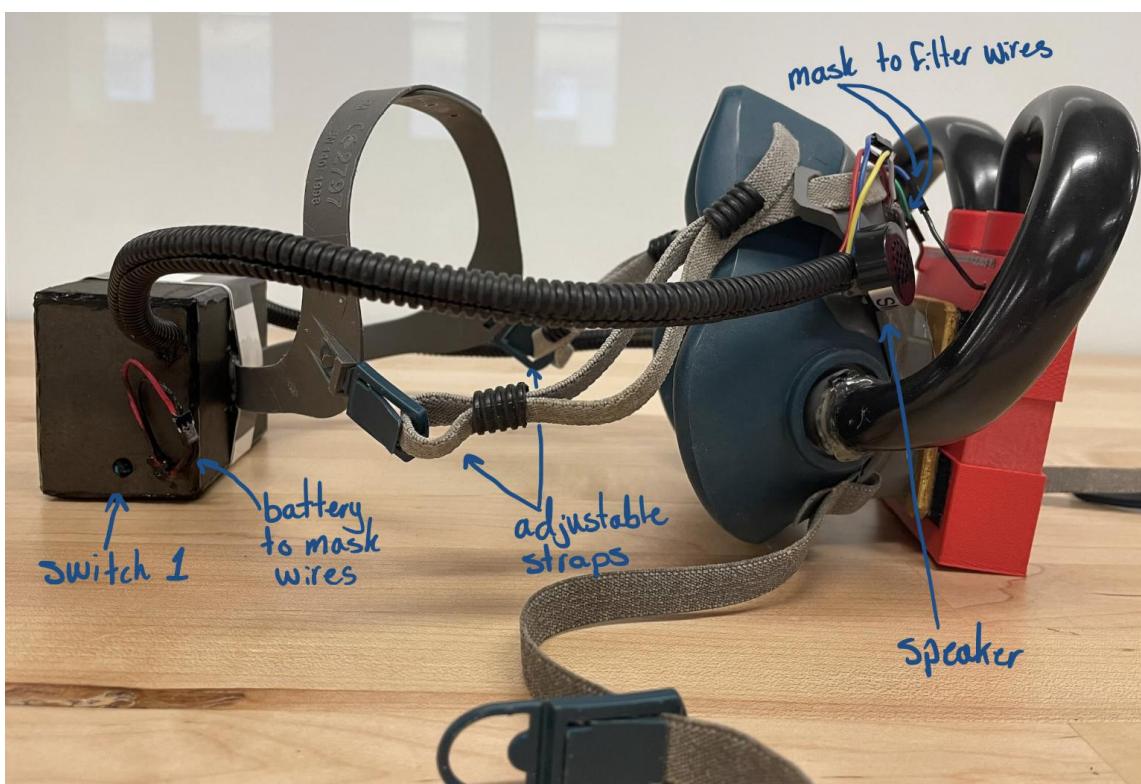
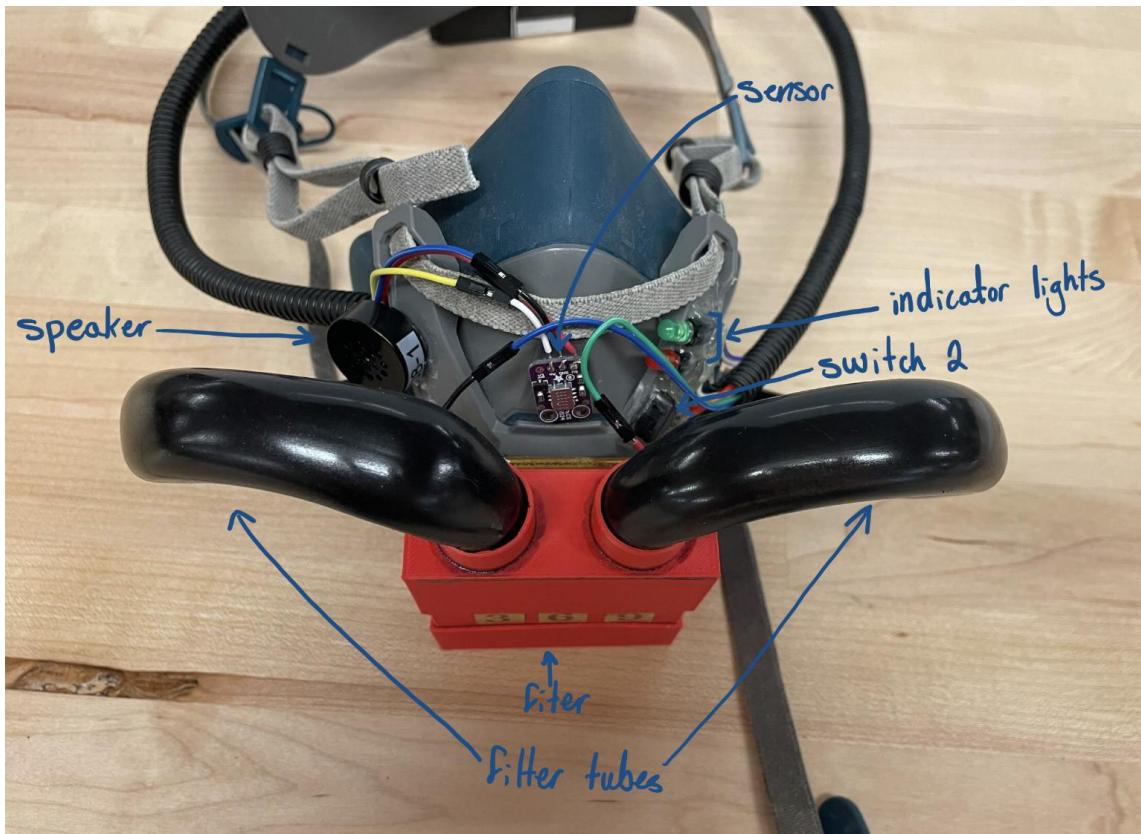
1. If a beep sequence gets repeated that means that the air quality has gone below that threshold and then passed back above it. Meaning that if you heard the mask emit 3 sequential beeps and then hear that same sequence again a period of time later, the air quality would have passed into Level 3, back to Level 2 or 1, and then back up to Level 3.
2. If the mask is turned on in an area with Poor or Bad air quality the beeps for previous levels will be heard as the sensor system reads the air quality. For example if you turn on the main power to the mask in an area with Level 3 air quality the speaker will emit 6 total beeps as it passes each threshold.

Active air filtration technology. A detachable filter at the front of the mask actively filters the air by catching small particles as they pass through. It has both manual and automatic air filtration modes which are discussed further in Section 3: User controllable Features.

Rechargeable battery. The mask consists of a charging system responsible for charging the lithium ion battery. This is implemented on board using a BMS (battery management system) chip which only requires the user to plug the charging cable into its designated charging port located on the back of the mask.

Labeled of Mask Images





Switch On/Off Positions

Switch 1, on when pressed in, off when sticking out.

Switch 2, on when the switch is closer to the indicator lights, off when the switch is closer to the filter.

The above diagrams show both switches in **off** position.

3. User Controllable features

1. The main user controller feature of this mask is its modes of operation, of which there are two; always on (manual), and smart detect trigger mode (automatic). To begin mode select, the mask must first be powered on by switching Switch 1 into the on position. This will also activate smart detect mode. The smart detect feature is a power saving mode in which the filter is off until the sensor senses that the air quality has passed the “Poor Air Quality” threshold at which time it is automatically engaged. Switching Switch 2 into the on position will turn on the filter until Switch 2 has been moved back to the off position. There are 2 LED indicators. The first is a red LED which indicates the main power to the mask is on. The second, a green LED, indicates filter operation. On being that the filter is currently functional, and off being that the filter is not actively engaged.
2. Adjustable straps.

4. Cleaning and Maintenance

4.1 Charging

Step 1: Turn off all switches (both indicator lights should be off) and position the mask so that you have a clear view of the wires on the black box at the back.

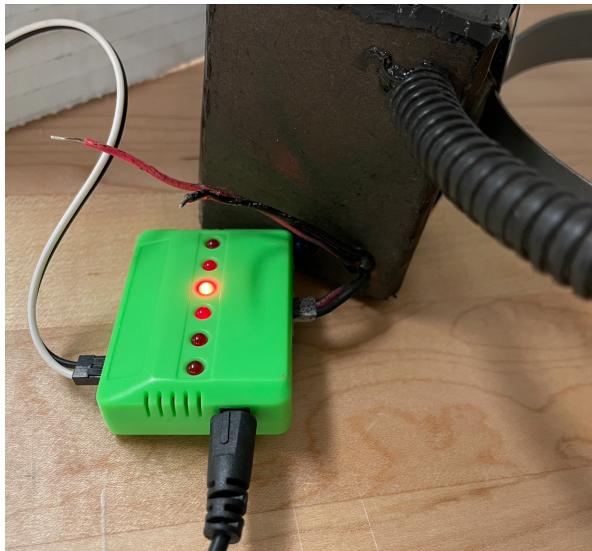


Step 2: Disconnect the wires.

Note: when the battery is finished charging and needs to be reconnected to the mask ensure that you reconnect the wires **red to red** and **black to black**.



Step 3: Connect the battery to the charger.



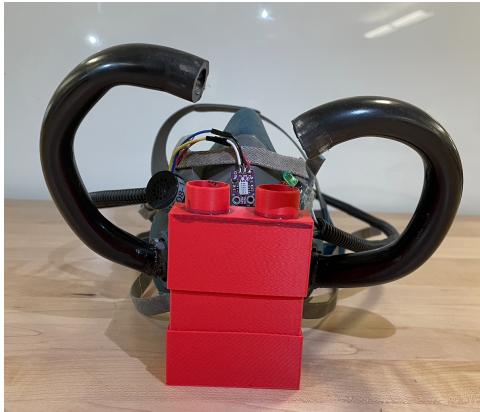
Reverse these steps to reconnect the battery to the mask.

4.2 Detaching the filter

Step 1: Turn off all switches (both indicator lights should be off) and position the mask.

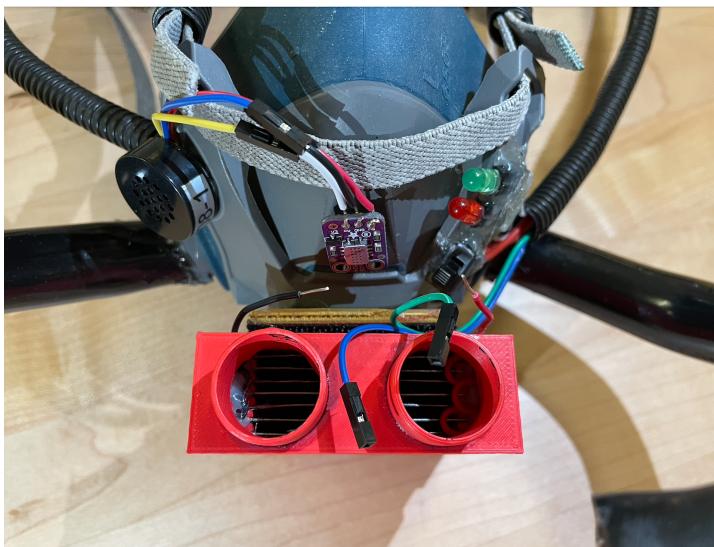


Step 2: Detach the hoses by gently pulling them out of the filter.

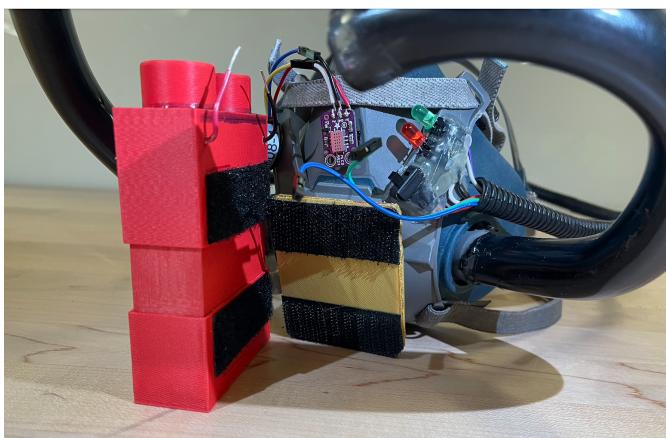


Step 3: Detach filter wires from the wires coming from the mask.

Note: When reattaching the filter it does **not** matter which wire goes to which.



Step 4: Detach the filter compartment from the mask by pulling the red block away from the mask.



Step 5: Remove the bottom of the filer, if wanted, for better cleaning.



To reattach the filter follow the above steps in reverse order.

4.3 Cleaning

Over time, the plates located within the main filter compartment will become coated with small particles that have been collected from the air. A buildup of particles impedes filter functionality and so will require regular cleaning. To clean the filter, first place the mask over something that can collect any particles that fall off of the filter and then follow the above instructions for detaching the filter. At this stage most of the larger particles will fall out of the filter. To remove the rest of the fine particles blow compressed air through the filter or wash it using water. If you choose to use water to clean the filter ensure that it is fully dry before reattaching it to the mask.

4.4 LED replacement

The mask also comes with replaceable LEDs. If an indicator light burns out on the mask simply pull it out of the mask and replace it with a new one. When doing this ensure that the longer side of the new LED goes into the same wire slot as the longer side of the LED that was removed was in.

5. Safety Protocols

The Ion-Man 369 series mask is equipped with built in safety protocols. These safety protocols include proper insulation and protection of the filter plates which store a

significant static charge; proper material construction and durability; and short circuit over current protection within the BMS.

The following are safety protocols any user of the Ion-Man 369 must follow in order to ensure safe use of the mask:

1. Before recharging the battery or detaching the filter ensure that **both switches** are in the **off** position.
2. **Do not** use the mask in rainy or snowy conditions.
3. **Do not** touch the ends of the wires that connect the filter and the mask.
4. Ensure all mask components are completely dry before turning on the mask's power.