PROTOCOL FOR 3D PRINTING MASKS

DRAFT DOCUMENT, STILL UNDER TEST

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This protocol is for using the FDM 3D printing process for creating face masks that aim to be similar in performance to N95 masks. For questions / comments / concerns please leave a comment.

Items needed:

- **Filter:** AC/HVAC filter with a MERV 13 or higher. MERV ratings must higher than 13 can filter out particle sizes up to 0.3 microns, which is the same as the N95 mask.
- **Face sealant**: Foam Sealant tape**.** To make a seal around the edges of the mask.
- **Fastening strap**: Velcro / Hook & Loop fastening strap or other strapping material.
- **Print material:** PLA or similar filament
- **Print File:** Jeremy Simon's 3D .stl file

Tools needed:

- 3D Printer
- Scissors

Protocol:

1. **Download:** Jeremy Simon's 3D .stl file of a dual port mask

2. **Print:** 20% infill with NO support rafts according to the copper 3D protocol. Use any filament, Copper 3D's filament claims to be antimicrobial. Print the following quantities for a single mask:
   1x Dual Filter Mask
   2x circular honeycomb
   2x threaded filter cap

3. **Disassemble AC/HVAC Filter:** Carefully cut the cardboard housing of the filter and remove the internal material. ANY PUNCTURED, CUT, OR DAMAGED MATERIAL MUST BE DISCARDED.

4. **Cut filter:** Using scissors cut 4x filters to a 55 mm - 2" diameter.

5. **Create mask shape:** Heat the Dual Filter Mask plastic using a hair dryer, heat gun, or hot water until the plastic is soft enough to be bent (approximately 55 - 60°C / 131 - 149°F). Bring together nose wings and lower jaw wing making a mask shape.

6. **Thermoform mask to face**: Again heat up the Dual Filter Mask until the mask is pliable, place on face, and make adjustments to fit the curvature of your face.

7. **Install filter:** install 2x filters into the filter pockets of mask with honeycomb and threaded filter cap. The order of installation is: filter, honeycomb, threaded filter cap. Ensure that there are NO GAPS between the filter and the and the mask.

8. **Apply foam tape to edges of mask**: apply foam tape around all edges of the mask, ensure there is a good seal to face.

9. **Apply foam tape to front of mask:** where the lower jaw wing meets the front of the mask apply foam tape to create an airtight seal.

10. **Test fit:** fit mask to face and breathe. Ensure there are no leaks around the front and edges of mask.

11. **Create head band:** Thread one appropriately 20mm / 3/4" sized fastening strap through the fastening holes on the mask.