

DIY-face-masks (Work In Progress)

French version

A selection of reusable face masks to make yourself easily. We don't want to make a single design or perfect design but we want to provide a set of design depending of the capabilities of the user.

Homemade face mask are not to substitute to surgical, N95, FFP2/FFP3 masks, but they may help to prevent the propagation of a virus.

Selection of raw materials/fabrics

The selection of raw materials can be performed based on the filtration efficiency and hydrophobic capabilities.

Filtration Efficiency and Pressure Drop Across Materials Tested with Aerosols of <i>Bacillus atrophaeus</i> and Bacteriophage MS2 (30 L/min) ^a						
Material	<i>B. atrophaeus</i>		Bacteriophage MS2		Pressure Drop Across Fabric	
	Mean % Filtration Efficiency	SD	Mean % Filtration Efficiency	SD	Mean	SD
100% cotton T-shirt	69.42 (70.66)	10.53 (6.83)	50.85	16.81	4.29 (5.13)	0.07 (0.57)
Scarf	62.30	4.44	48.87	19.77	4.36	0.19
Tea towel	83.24 (96.71)	7.81 (8.73)	72.46	22.60	7.23 (12.10)	0.96 (0.17)
Pillowcase	61.28 (62.38)	4.91 (8.73)	57.13	10.55	3.88 (5.50)	0.03 (0.26)
Antimicrobial Pillowcase	65.62	7.64	68.90	7.44	6.11	0.35
Surgical mask	96.35	0.68	89.52	2.65	5.23	0.15
Vacuum cleaner bag	94.35	0.74	85.95	1.55	10.18	0.32
Cotton mix	74.60	11.17	70.24	0.08	6.18	0.48
Linen	60.00	11.18	61.67	2.41	4.50	0.19
Silk	58.00	2.75	54.32	29.49	4.57	0.31

Figure 1: Filtration Efficiency and Pressure Drop Across Materials Tested with Aerosols of *Bacillus Atrophaeus* and Bacteriophage MS2

We read different papers (such as Testing the Efficacy of Homemade Masks: Would They Protect in an Influenza Pandemic?) and we provide a table of the most efficient fabrics based on their filtering capabilities. The table might be updated based on new references or scientific papers. If you want to reuse fabrics from old clothes, check the composition and take by priority fabrics listed higher in the table below. A lot of face mask design allows to have different layers of fabric.

Priority	Fabric type	Reason
1	Non-recycled polyester fabrics	Hydrophobic
2	Recycled polyester fabrics	Hydrophobic (fiber less compact than virgin polyester)

Priority	Fabric type	Reason
3	Mixed/blend cotton - Poly Cotton	Partially hydrophobic
4	Acetate - 100%	Some good filtering capabilities but depending of the fabric quality
5	100% cotton	Cheap and accessible but less efficient than the above listed
10	Silk	Not recommended (too thin at fiber level) but still better than nothing

How to use and clean your masks

- Do not touch the mask and its fasteners while you are wearing it.
- While fastening your mask, only touch the elastics or the borders.
- A mask must be specific to each person. Do not lend or exchange it.
- The mask must cover nose and mouth (respiratory tracts).
- Wash at 60°C after each use.
- Dry the mask thoroughly including straps.
- Keep it in a dry place and not in contact with other clothes.

There are also alternative cleaning solution such as hydrogen peroxide but these solutions might not be accessible to everyone.

TODO

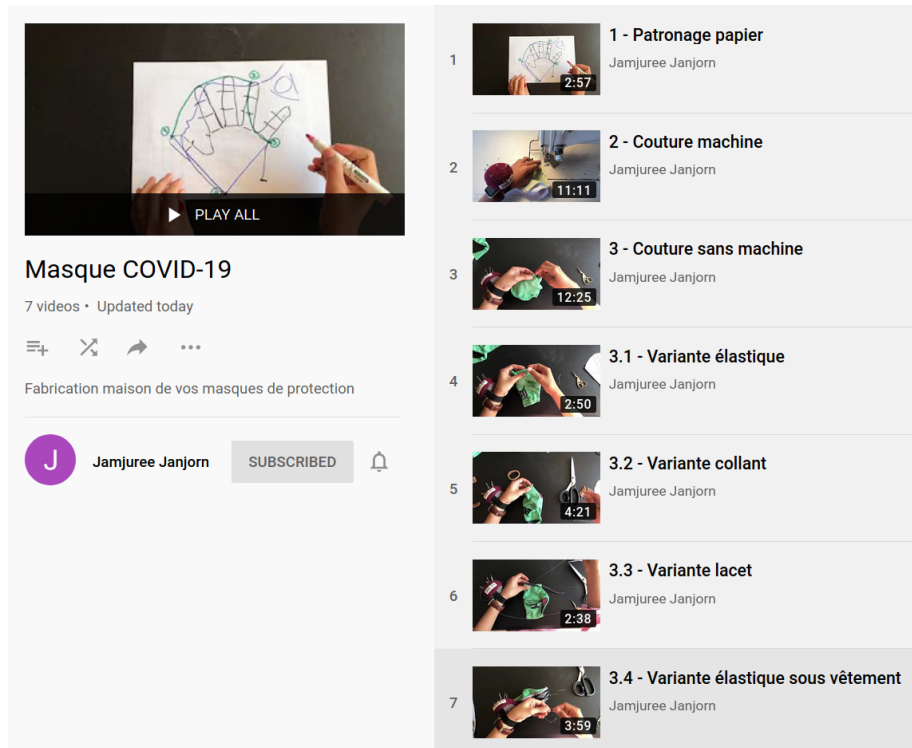
- Printable version of patterns and instructions for diffusion to public in rural areas (feedback needed on specific awareness in such area)
- Make a list of tools needed for sewing masks
- Feedback based on tested masks and respirability capabilities
- Locally availability and supply of fabrics from around the world

Designs



Design 1 - mask with sewing at nose/center level - sewing pattern made from the hand

Original design of masks by Julie Foucre. The video below describes all the steps to build your own masks with you have some sewing experience and the required equipments.



The face mask uses rubber bands for hair.

Design 3 - mask folded fabrics without sewing at nose/center level

Based on DIY Covid-19 Fabric Mask (with Filter Pocket) Sewing Tutorial, simpler than the previous ones to make but also requires an iron to make the folds and pliers to hold folds during sewing. Cover the face well but go up too much on the nose and let air pass up at the level of the wings of the nose. You can add a small metal clip to pinch the nose and avoid the mask to move.

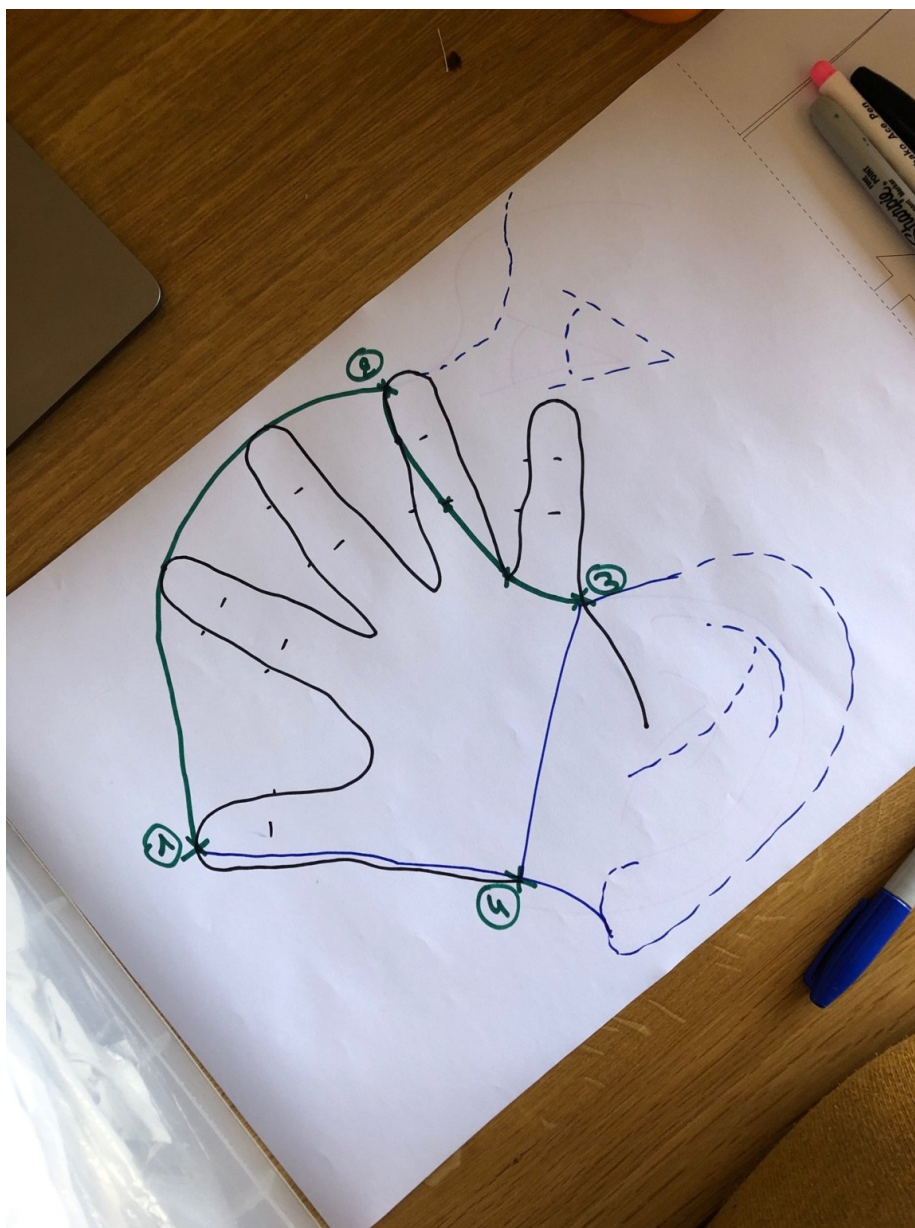
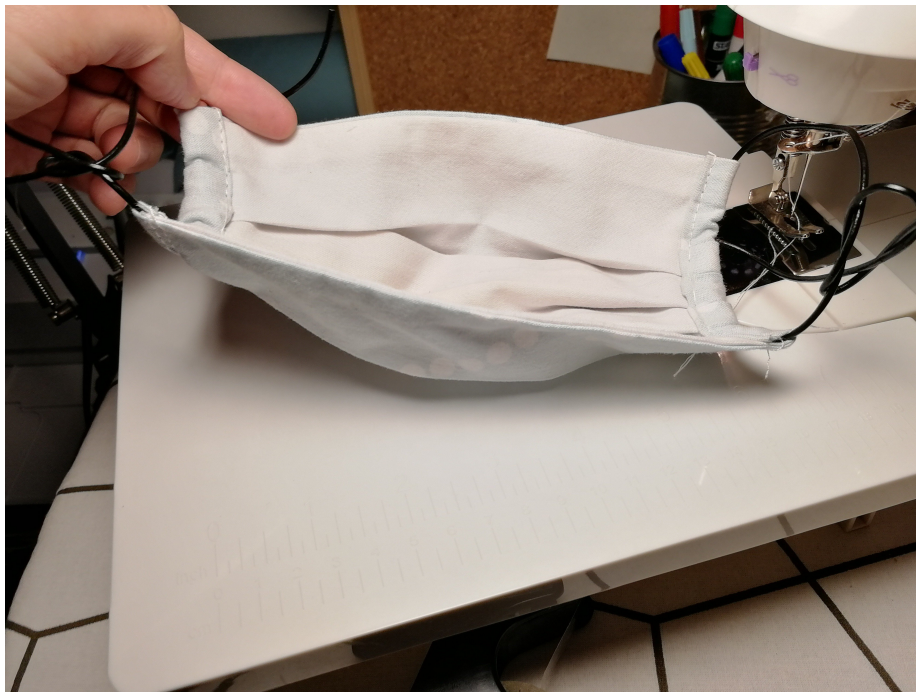


Figure 2: sewing pattern made from the hand



Figure 3: Face mask result from the pattern made from the hand





Contributing

Pull requests are welcome if any amelioration is made on the patterns, techniques and the project in general

It is also possible to directly ask on twitter via DM:

- All design and specific sewing questions to Julie Foucre
- If you know additional scientific references regarding fabrics or about filtering efficiency. Don't hesitate to DM adulau

Feel free to open issues to ask questions or add more references.

Feel free to add any patterns or design too, by pulling a request. Translation is also welcome, in target languages of the country you live in. Support low-cost open hardware, share and clone the repository. We list other open source initiatives, don't hesitate to share those with us.

We also keep track of failed design patterns. If you want to share your failed designs, we are also interested.

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References

The effectiveness of wearing mask in general public

- EN: Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19)
- COVID-19: Cloth Masks & Community Protection
- FR: Avis d'experts relatifs à la stratégie de constitution d'un stock de contre-mesures médicales face à une pandémie grippale
- FR: Port du masque : le gouvernement amorce un virage à 180 degrés

Face mask models

- Masque COVID-19 by Julie Foucre
- Simple No Pleat DIY Cloth Mask Tutorial for Beginners (Includes a Sewing 101)
- Coronavirus : téléchargez le modèle de masque barrière
- DIY Covid-19 Fabric Mask (with Filter Pocket) Sewing Tutorial
- Model from an hospital in France
- Fu face mask by freesewing
- BE: Make a face mask
- FR: Stop postillons
- US: Use of Cloth Face Coverings to Help Slow the Spread of COVID-19

Straps to support mask rubber bands

- Surgical Mask Strap Remix - Requires a 3D-Printer

Simple methods to build masks without equipments

- EASY STEPS/ DIY FACE MASK in 40 seconds / No Sewing Machine / No manual Sewing

Filtering and fabrics

- Testing the Efficacy of Homemade Masks: Would They Protect in an Influenza Pandemic?
- Air flow with and without a mask
- High efficiency airfilters (EPA, HEPA and ULPA) - BS EN1822-1:2009