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Mask Holder for social COVID and post-COVID times

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The new normality

We are living in unprecedented times. As people embrace the new normality, we are going back to our routines with a new inseparable accessory, the mask. With a growing interest in moving the economy and taking back our freedom, more and more people go to restaurants, bars, pubs, cinema theatres, etc. finding out that now that they do not have to wear their masks they have no place to keep them.

While many decide to place it on their arm or folded on their pocket, this is not the best solution to keep a hygienic element aimed at preventing contagions since our arms and pockets (filled with our phone, wallet, spare change) are in constant contact with the environment.

Furthermore, the life of a filter mask does not extend for days and days, in some cases barely reaching the 8 hours of 100% safe use so, we would prefer to extend this time as much as possible rather than reducing it when keeping the masks free on the table, kitchen counter, pockets, etc.

With the thought of giving back to the community and helping make the new normality as safe as possible for everybody, Drill Surgeries Ltd has partnered with EDTap (Electrodynamics Tap Limited) to provide an open hardware solution when handling all our masks during any social situation and in the house.

A general overview of the product

Our solution is a mask holder that can be easily installed at home (user owned) or the cafeteria/cinema/ restaurant / etc. (business owned) to comfortably hold and keep the users' mask clean, preventing them from placing it on unrecommended places.



To keep the masks and the device itself clean and sterilized, the mask holder presents a set of Ultraviolet type C LEDs and protective walls increasing the life-span of a common mask or filter.

Ideal for reusable, cloth, sponge and surgical masks.

With two different designs, these mask holders can easily be installed in any wall or table.

Components

Both designs present the same number of components with a difference of their attachment mechanisms.

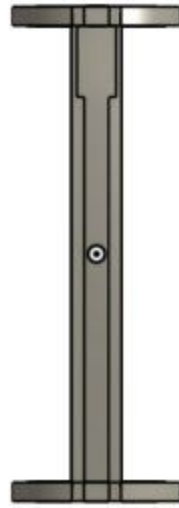
The key components to 3D print are shown first and later on the extra components needed for the safe and proper functioning of the device.

Main Body (3D printing)

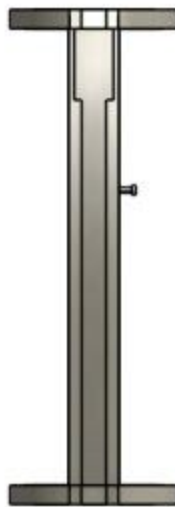
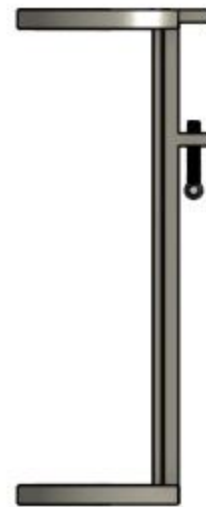
This piece will hold all the electronics for the sterilization of the mask¹ as well as the mask itself. As will be seen on the images, this “Body” features a square-like hook at the top and bottom of the design, protruding from the semi-circles which will be used to hold the mask in place and stretched for a better distribution of the Ultraviolet c light.

Here is where the main difference between the “Wall” and “Table” attachment versions resonate. The pictures below, shows the Wall attachment version which uses a strong-double sided tape (we recommend Gorilla Tape Balck [Nº ref. fabric. 3044000] with double thickness and resistance, proven optimal for any type of surface on interior and exterior environments).

¹ Sterilization provided by Ultraviolet c LEDs (diodes) with wavelength of 270nm. Sterilization levels have not been tested under laboratory conditions nor have been certified by any official body. Assumptions based on theoretical physics research and other publications.

**GENERAL VIEW****FRONT VIEW****RIGHT-SIDE VIEW**

Then, below is the design used to attach the device on a table, featuring a fastening jack-like mechanism to easily use the mask holder on tables of any thickness and material.

**GENERAL VIEW****FRONT VIEW****RIGHT-SIDE VIEW**

Lights and battery cover (3D printing)

Rectangular 3D printed piece aimed at hiding the electronics of the device while leaving exposed (through square holes on the cover) the Ultraviolet c light.



GENERAL VIEW



FRONT VIEW



RIGHT-SIDE VIEW

This one slides flawlessly through the open space at the top of the main body piece to facilitate the access to the batteries, wires and LEDs.



Protective transparent cover

This component will hold the totality of the mask, keeping it safe and protected.

The material we recommend is acetate paper, which is a piece of transparent plastic shaped, and almost as thin, as a piece of normal paper. The thickness of the acetate paper can vary but the 2 mm thin ones are optimal as barriers for the device.

In the “Main Body” piece there are rails on both sides to accommodate the acetate paper pieces and give them the shape shown below.



GENERAL VIEW



FRONT VIEW



RIGHT-SIDE VIEW

Ultraviolet c LEDs, Battery Holder and switch

The final components for the design of the mask holder are the electronics which include:

- The Ultraviolet c LEDs - we have prepared the design to accommodate six of them after calculating the optimal separation and angle of exposure of the light to the mask.
- The switch - this one will be placed on the top of the “Main Body” part and will be used to turn the Ultraviolet lights on and off. This one can be of any design of the users choice should they decide to replicate the device thanks to its CC by 4.0 license.
- The battery holder and the battery itself - due to the high energy demand of the Ultraviolet c LEDs, a battery of 9V is recommended, hence any design of a battery holder can be used as long as this one is no more than 2-4 millimetres wider than the battery.
- Wires and resistors will also be needed, see the section “Electric Circuit”.

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ULTRAVIOLET c LED



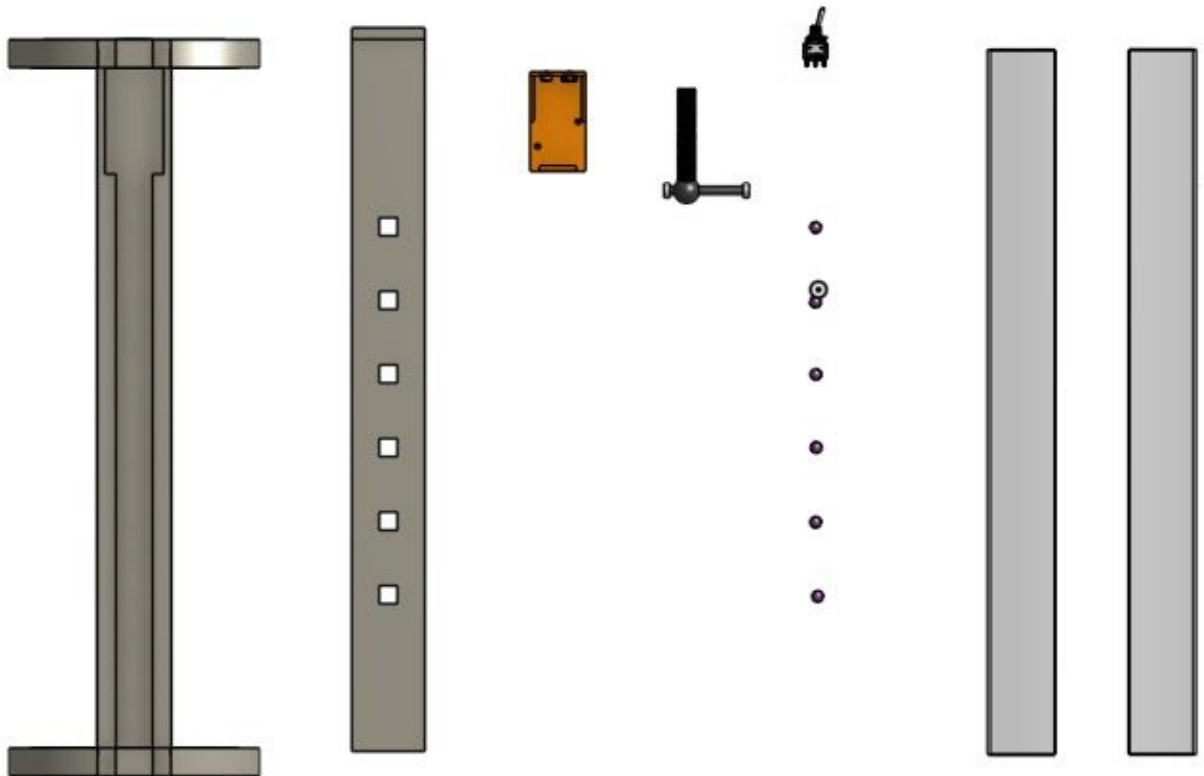
SWITCH



BATTERY HOLDER

VIEWS

- Every component (Table version additionally shows the screw for fastening jack)



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- Assembled mask holder on the table



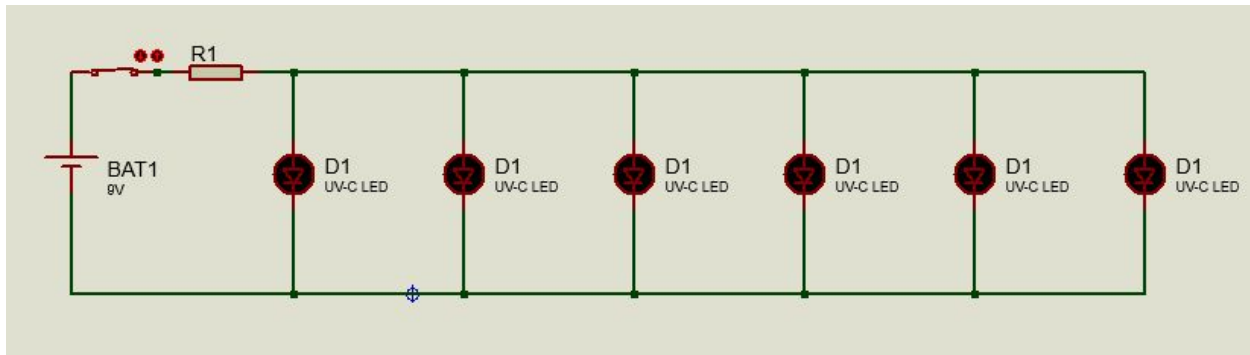
- Assembled mask holder on the wall



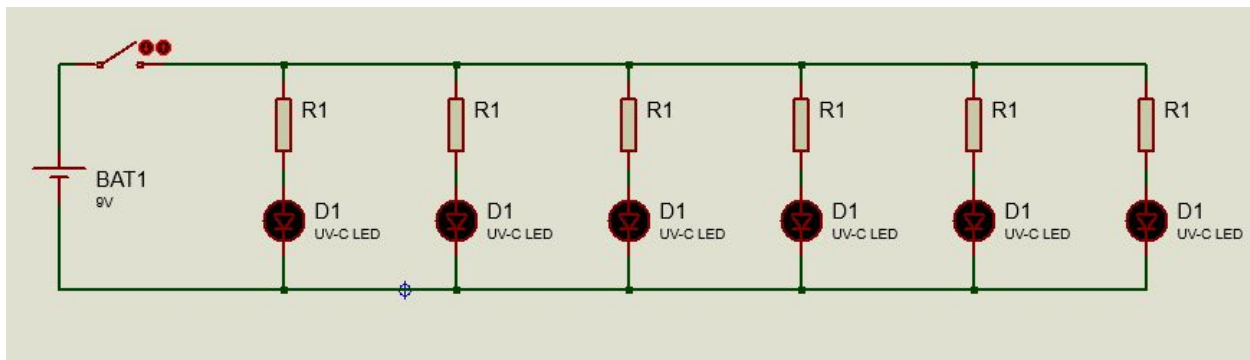
Electric Circuit

The wiring of the Ultraviolet c LEDs is described below following two different options, a simple/budget design featuring one single resistor (1) and a second design considering a wider array of resistors to improve safety and extend useful life (2).

As expected, the value of the resistors will be different for each design and their respective characteristics are expressed below.



(1) R1 -> Resistor 200Ω 1W 5%



(2) R1 -> Resistor 180Ω 1/4W 5%

The wiring and batteries will be hidden and safe on the space left at the “Main Body” piece and covered by the “Light and battery cover” piece. To hold the resistors and especially the LEDs in place we recommend using a hot silicone gun which does not damage the 3D printing nor the electronics.

Details

This device has been developed in partnership between Drill Surgeries Ltd. and EDTap (Electrodynamics Tap Limited) combining their respective expertise in medical technology and in the technology itself.

As a common commitment to giving back to the community, it has been decided to release the product as an open-source and open-hardware product, meaning any person worldwide will have access to the source files to replicate the device and use it as they better find suited under the **Attribution 4.0 International (CC BY 4.0)** - <https://creativecommons.org/licenses/by/4.0/>) license.

Appropriate credit will be given to:

- Drill Surgeries Ltd. - <https://www.drillsurgeries.com/>
- EDTap (Electrodynamics Tap Limited) - <http://edtap.io/>
- Also, include a link to where the materials are available and a link to the CC 4.0 license.

The publicly available material can be found at Drill Surgeries' dedicated page for this initiative:

- <https://www.drillsurgeries.com/mask-open-project>

In the meantime, both companies are working on a **pre-order** option so that individuals can have access to the benefits of this device at an inexpensive cost.

For more details check <https://www.drillsurgeries.com/> or email contact@drillsurgeries.com

Disclaimer

Neither Drill Surgeries Ltd. (Comp. N. **11867541**) nor Electrodynamic Tap Limited (Comp. N. **12441793**) are responsible for the use/consequences given of/from the content expressed in this product presentation nor from the published material in their website or the "figshare" repository.

Final Word

We are living unprecedented times, but it is in these moments of uncertainty when we must stay closer than ever. Through diversity, teamwork and collaboration we can reach great things and in this project, we have kept these pillars very close to our core.

in countries like Spain and the United Kingdom and many other countries we have read of where similar situations occur.

Because we want to give back, this is an open project that anyone can download, modify and share so that we can extend the life of our masks and maintain them as clean as possible when not in use. We do not want to commercialise this project as a way to profit economically from this pandemic, should anyone decide to purchase this device at an inexpensive cost (rather than building it themselves) for their homes, restaurants, bars, pubs, etc. please do not hesitate to contact us on the email: contact@drillsurgeries.com

With best wishes,

The team at Drill Surgeries Ltd. and EDTap



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CEO at Drill Surgeries Ltd.



Joan Talaya

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