



Protecting Those Who Protect **Us**

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TEAM



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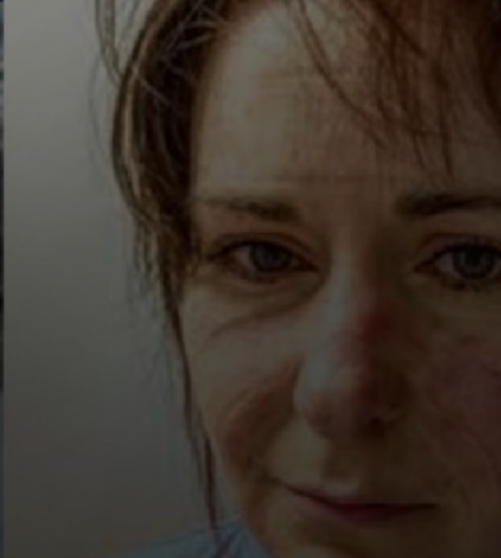
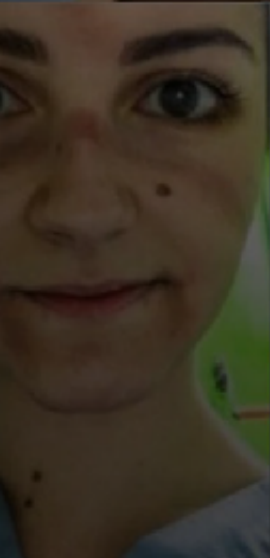
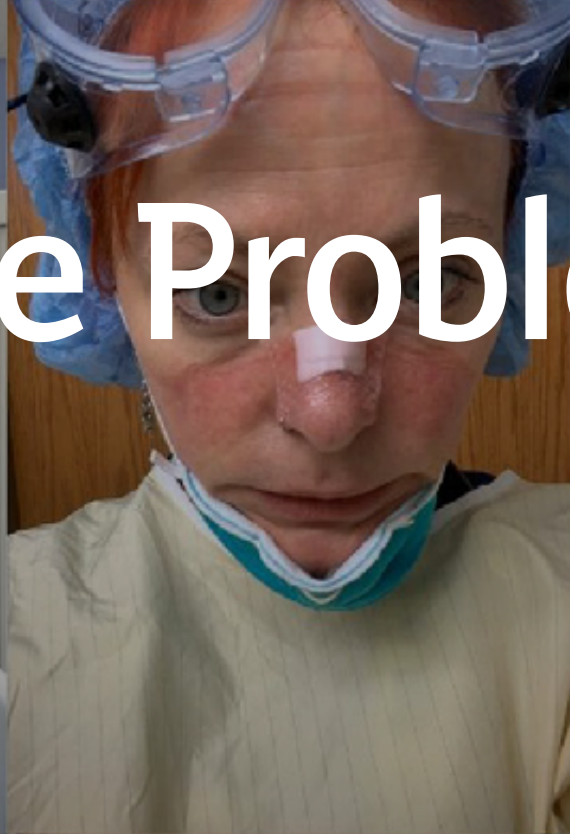
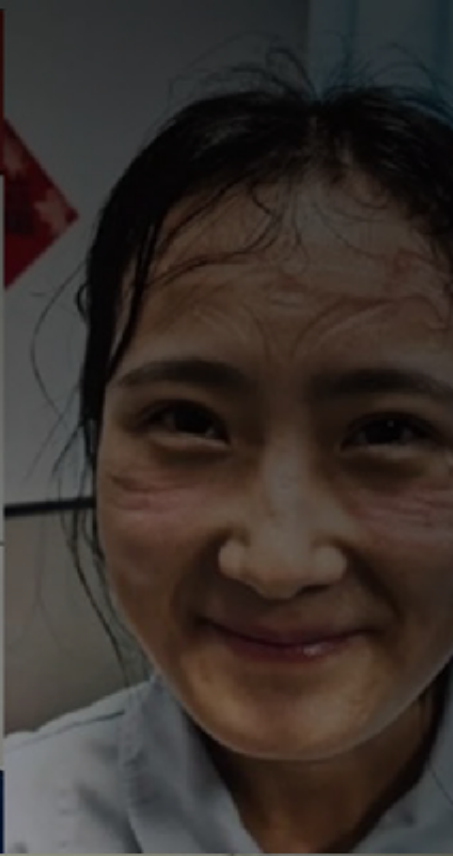
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The Problem

“I want the country to know that if I end up on that ICU bed, it is because I was not given enough PPE to protect me. Why is it that when my shift ends, I peel off the same N95 mask that I have worn for 12+ hours straight? I have breathed in stale air all day on a unit rife with the dying”

— KP Morgan. Nurse at The Mount Sinai Hospital

Problem Statement

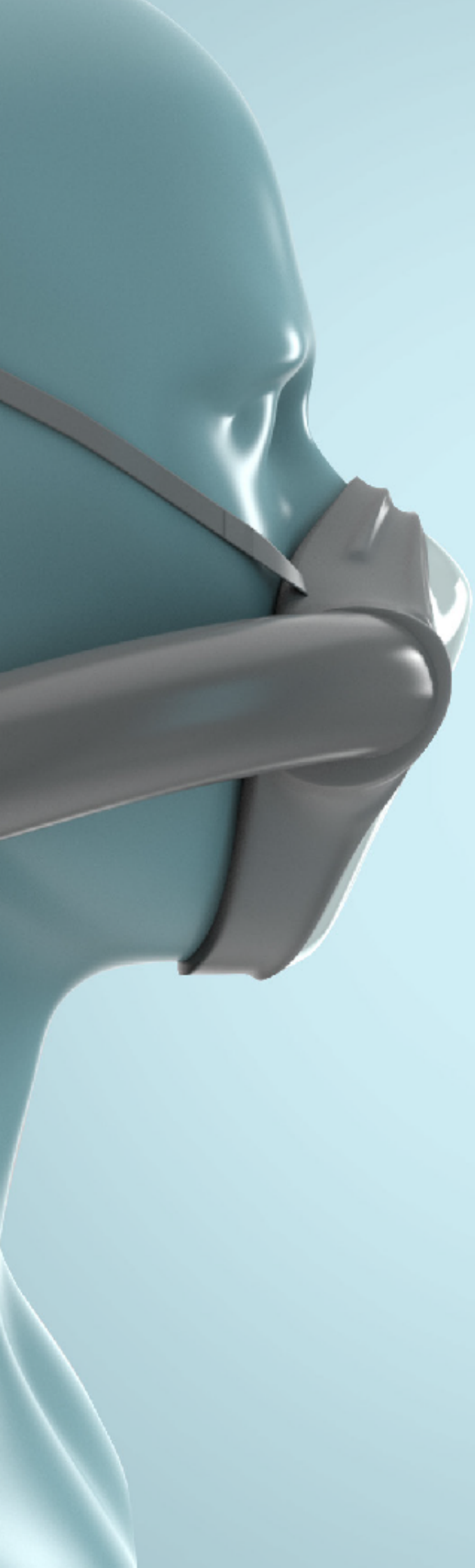
The successful management of an COVID-19 pandemic is reliant on the expertise of healthcare workers at high risk for occupationally acquired influenza. The recommended infection control measures for healthcare workers include surgical masks to protect against droplet-spread respiratory transmissible infections and masks to protect against aerosol-spread infections.

However, everytime the healthcare worker goes into a COVID patient's room they expose themselves - putting workers in jeopardy. It is not one patient and one exposure, it's multiple exposures. Putting workers on getting gravely ill each day without having proper protection.

“We really need to have the discussion about making sure nurses are not going to be put in a place where [they can get sick] because of frequent exposure to the COVID-19. The other concern is lack of proper protection. We can't put nurses and providers in a place where they have to make a decision on care. Moral distress is already evident in the pandemic and it will be ramped up to another level if nurses and health-care providers have to make decisions [about which patients receive care or not].”

— Megan Brunson, RN, MSN, CCRN-CSC, CNL, AACN president and night shift supervisor for the cardiovascular ICU at Medical City Dallas.





The Solution

Our Solution

Disinfection of the breathing air with UVC LEDs

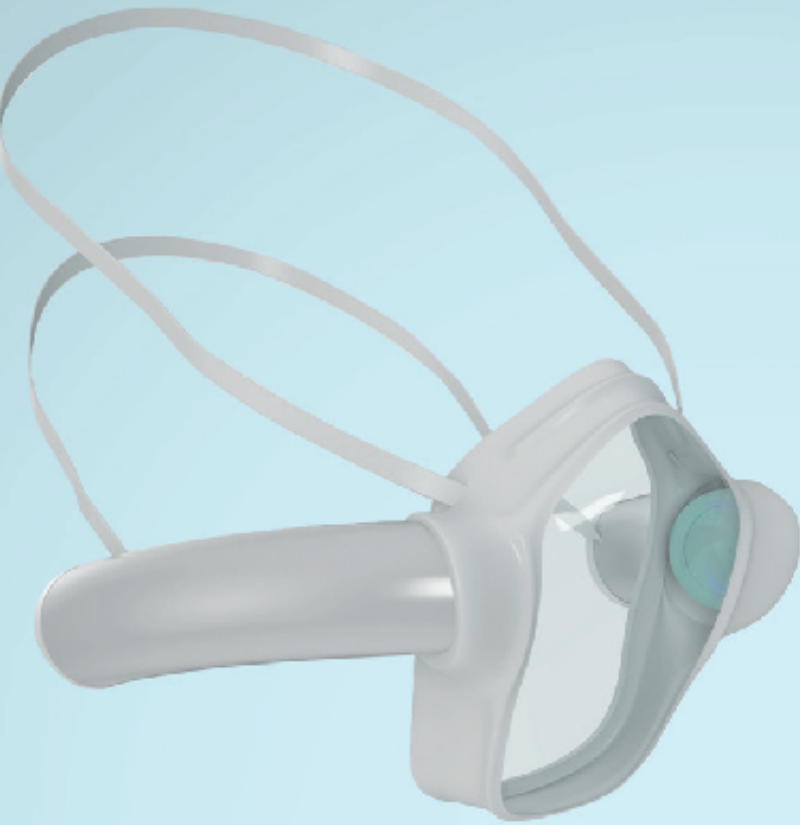
Epsilon is a reusable face mask with over a 99 percent protection against infectious agents. It deactivates the viruses and bacteria using UVC led lights, the light cannot trespass through the tubes due to specialized material. To ensure a cleaner and safer environment, the textile filter prevents dirt and other coarse particles from entering the breathing space of the wearer.

In comparison with the traditional surgical masks and N95, Epsilon enables lip-reading making the mask inclusive and accessible. It is light and can be worn for long hours in addition to being durable with an estimated lifespan of over 5 years.

Lastly, the mask is not only built for the safety of the wearer but also for those around them; the mask filters exhaled breath making it close impossible to infect other patients or health care workers since the mask cleanses the inhaled and the exhaled breath.

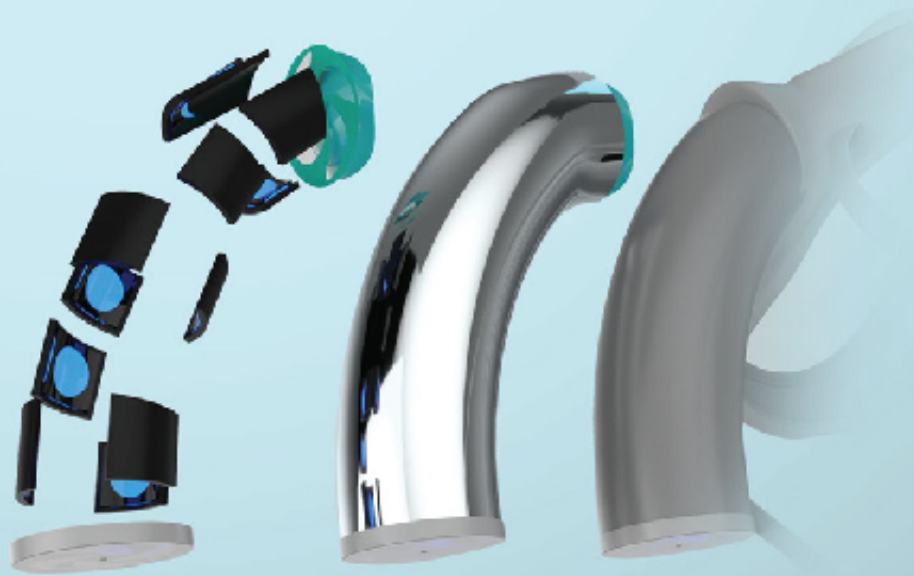


Key Features and Functionalities



The **Epsilon** mask is reusable with **99.99%** protection against infectious agents compared with 95% protection provided by traditional surgical mask and N95.

Removable **UVC light** tubes ensure the durability of the mask, with an estimated lifespan of over 5 years and making it easily replaceable.





The intense illumination deactivates viruses and bacteria within a fraction of a second of getting exposed to UVC light.

UVC light cannot trespass the tubes as the tubes are made with a special material

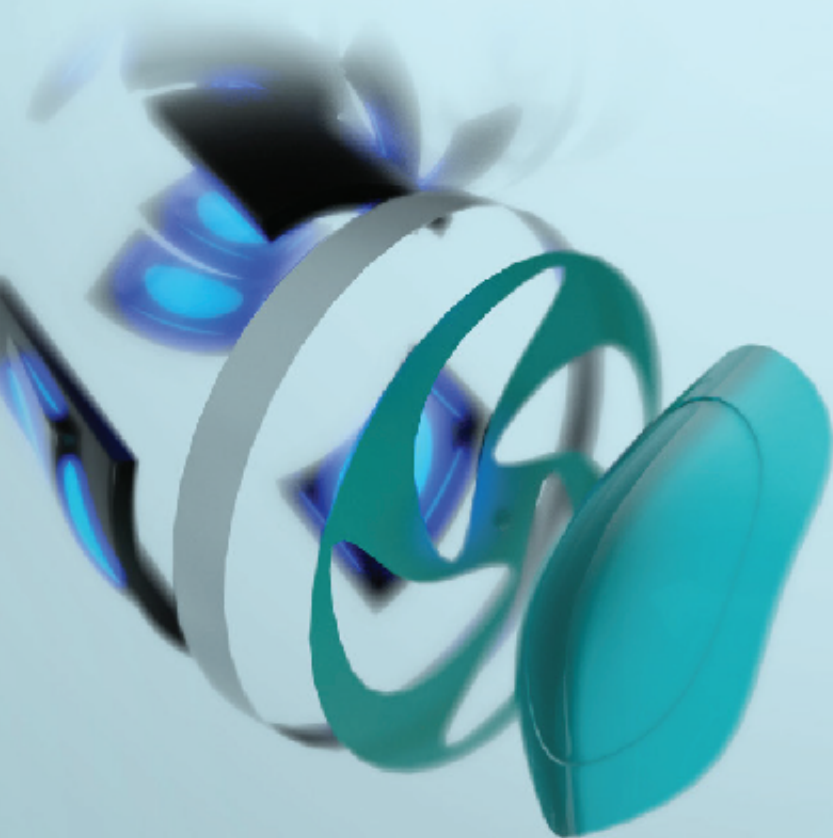
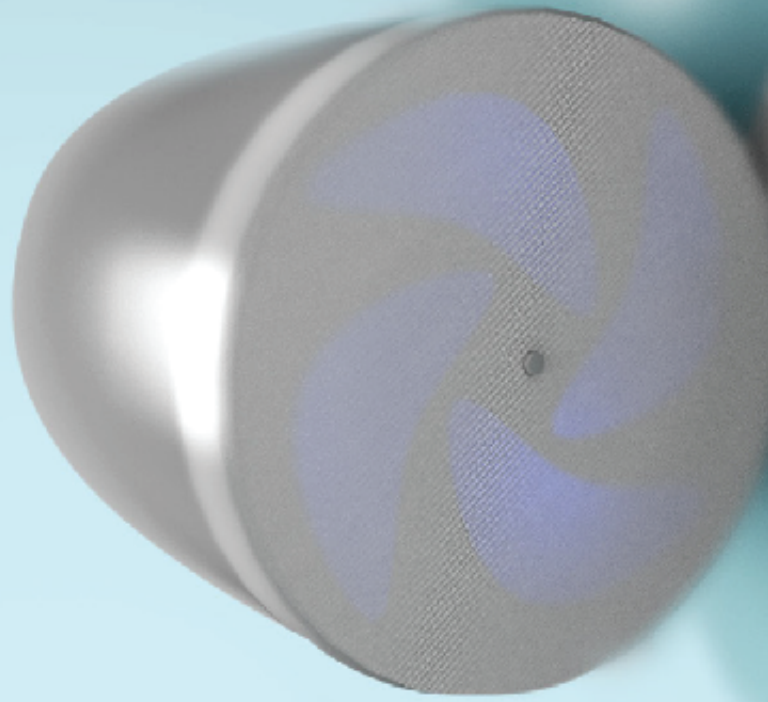
Using transparent **PVC technology**, the mask is equipped with lip reading abilities, enabling inclusivity.

Silicon seals points where the mask does not fit well and locks loose ends.



The **textile filter** prevents dust and other large coarse particles from entering the breathing space of the wearer.

Breathing with the Epsilon mask is easier than with conventional ones because the filter has a lower air resistency.



The **valves** ensure fresh air with every breath. One lets the air in and the other lets the air out. This prevents the concentration of carbon dioxide in the breathing area. They are also designed to be easily replaceable.



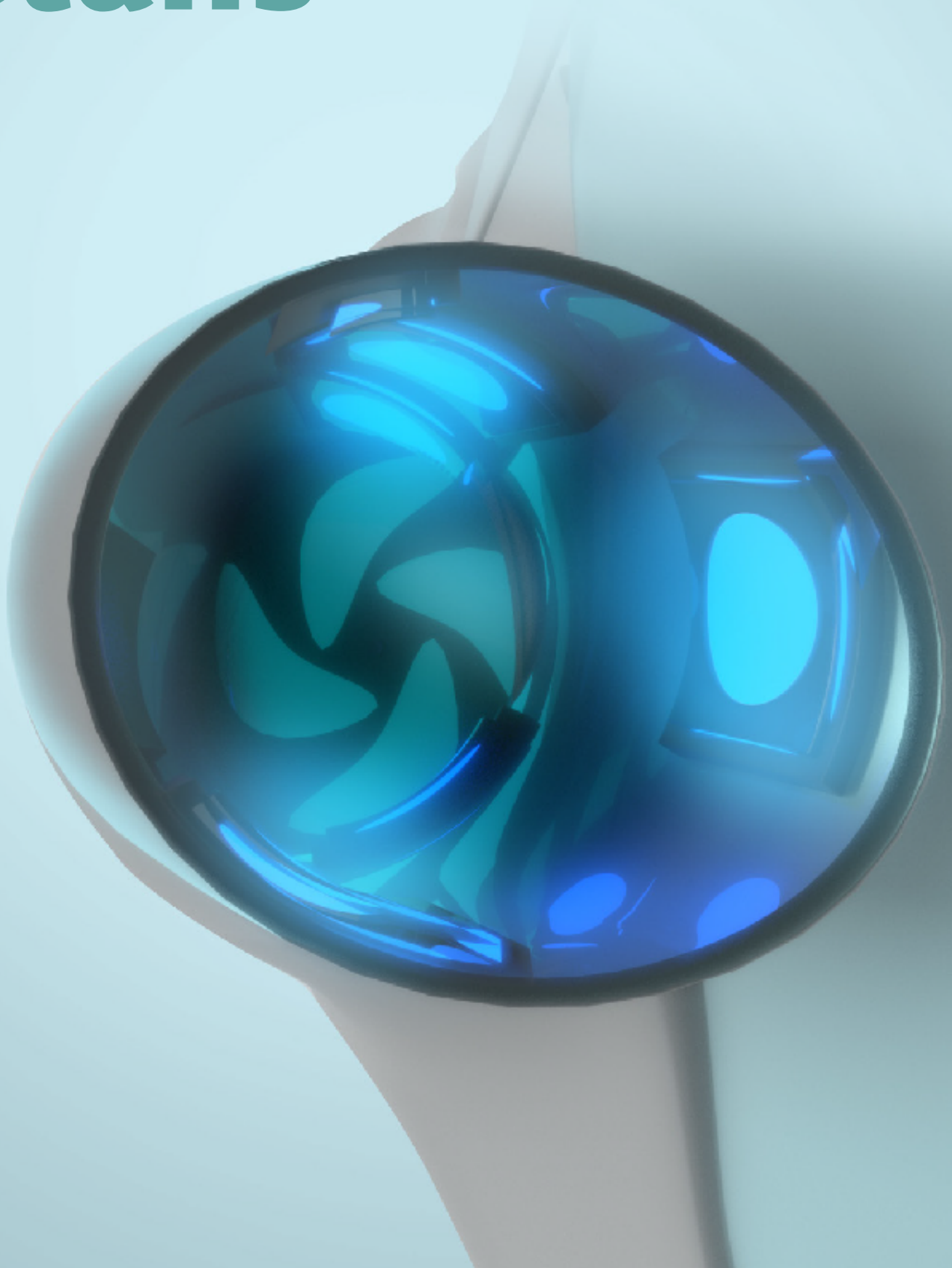
Even though the infectious agents are killed within fractions of seconds of entering the tube, research shows humans have fast **breathing pattern**.

This is the reason for the elongated structure of the tubes. They guarantee higher amounts of air desinfected by having a bigger disinfection area. The UVC LED technology will soon be more efficient so we are looking forward to even shorter tubes.

The modular structure of the Epsilon mask makes the silicon part hand and machine washable aiding reusability.



Technological Details



UVC LEDs

- There are currently UVC LEDs with an area of less than 5 x 5 mm
- They show an optimal scattering angle of UVC light
- They emit light for disinfection with wavelengths between 255-270 nm
- For now each LED has an output of at least 80 mW
- The LEDs can be operated with a voltage of less than 8.8 V.
- UV rays can damage plastics.

Approach

With the help of an internally mirrored cylinder and the LEDs, the light intensity in the cylinder remains relatively homogeneous.

The breathing air is in this cylinder for a fraction of a second and is therefore only briefly exposed to UVC light.

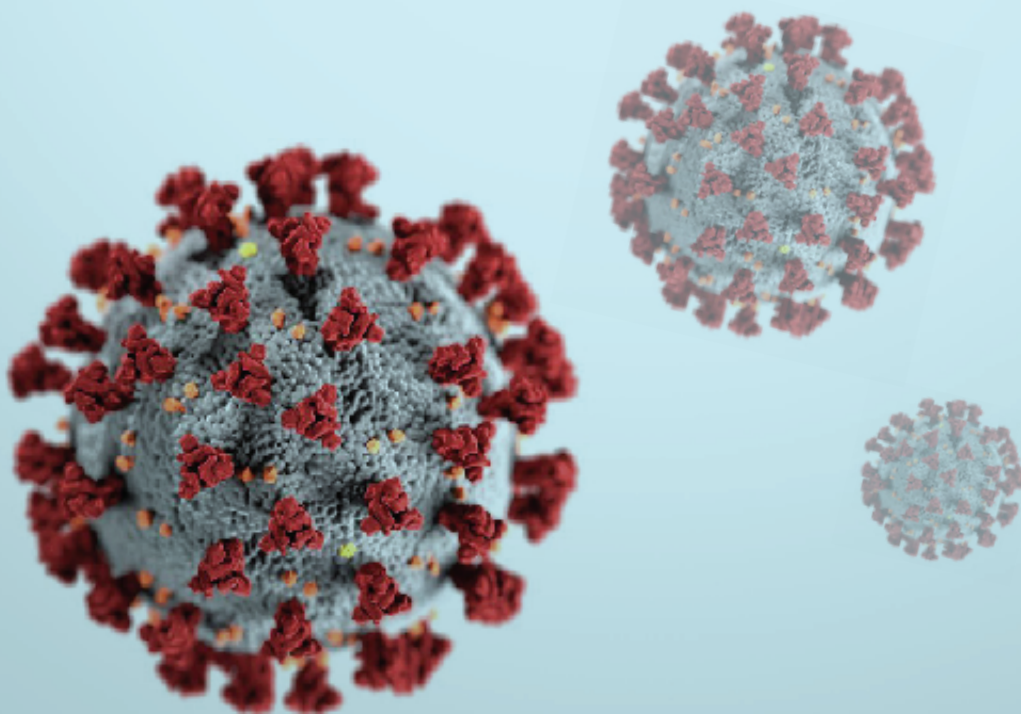
In order to determine the exact required volume of the cylinder and the number of UVC LEDs required, a large cylinder is equipped with a high number of LEDs.

Air prepared with viruses is pushed through the cylinder. At the end of the cylinder it is checked whether the disinfection is 100% successful. The number of LEDs switched on is reduced and the process is repeated until the minimum number of LEDs for 100% disinfection is reached.

All this can be done by **computer simulation**. The simulation is completely trustworthy because we have reliable data, as scientific institutes already studied UVC Lights and viruses for decades.

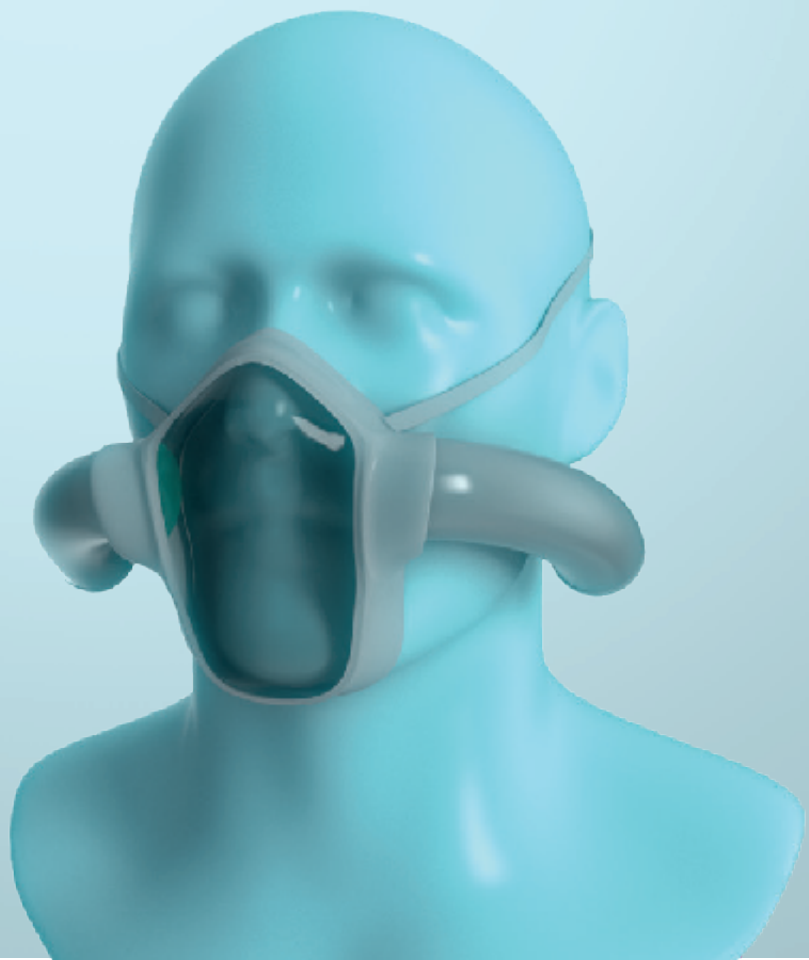
Effectiveness of UVC radiation against viruses

- Every virus needs a different dose of UV light to neutralize it
- The reduction always takes place in the log10 area. So, for example, if you need $10\text{mj} / \text{cm}^2$ for a 90% reduction, then you need $20\text{mj} / \text{cm}^2$ for a 99% reduction.
- Covid 19 is similar to other viruses, so it will perish with closely the same dose of UVC light as the viruses we already know.



The App

- The app uses Near Field Communication (NFC) to connect with the Epsilon Mask
- Sensors ask the latest temperature and pulse to keep a check on the wearer.
- The dashboard on the app shows the measurements of luminous intensity inside the UVC LED tubes, measuring the efficiency of every single UVC light.
- If one tube is unsafe, the user is notified to replace the tube which ensures safety. The mask is also operative with only one tube. This has the side effect that only the inhaled air will be disinfected. This is only an emergency solution.



Business Model



Designed for: Epsilon Mask



Key Partners

What are your key partners to get competitive advantage?

- Public and Private Hospitals including but not limited to hospital staff.
- Government for health sector.
- LEDs producer and supplier

Key Activities

What are the key steps to move ahead to your customers?

- Marketing of Product
- Continuous development of technology through research.
- Troubleshooting for customers

Key Resources

What resources do you need to make your ideas work?

- Human resources
- Physical assets (UVC, LEDs, Silicon, Software for application)
- Intellectual property

Key Propositions

How will you make your customers' life happier?

- Reusability
- 99.99% guaranteed protection
- Lifespan of over 5 years
- Protection against UVC
- Inclusivity through lip reading.
- Filters dust particles in breathing space.
- Hand and machine washability enabling reusability.

Customer Relationships

How often will you interact with your customers?

- Self-service (User buys for themselves)
- Hospital or other large sector bulk order

Channels

How are you going to reach your customers?

- Direct: Marketing
- Indirect: word of mouth
- Partner channels: Hospital sector
- Viral channels

Customer Segments

Who are your customers? Describe your target audience in a couple of words.

- Those who require serious protection from any kinds of viruses and bacteria including but not limited to COVID-19.
- Health Care Workers
- Health Sector
- Military Services
- Transportation Industry
- Security workers.
- Patients

The health care sector Key Partner for mass production.

Cost Structure

How much are you planning to spend on the product development and marketing for a certain period?

- Fixed Costs: Production of the necessary hardware parts of the product including LEDs, silicon, and assembling of the parts into the final product.
- Variable Costs: Personell

Revenue Streams

How much are you planning to earn in a certain period? Compare your costs and revenues.

Coming soon

As the awareness rises and the quality of the LEDs rises the prices will decrease.

Positioning Statement

Epsilon is a reusable face mask that disinfects the breathing air with UVC LEDs. It will deliver up to 99.99% protection against viruses and bacteria.

Unlike the traditional surgical masks and N95 offered today, our product is reliable, durable, reusable, inclusive, and can be worn for longer hours. This enables the limitless capability of the healthcare workers by providing them with the necessary protection and confidence.

Value Proposition Validation

"I'm physically tired because the protective equipment hurts"

"It's clear these surgical mask guidelines aren't working."

"Moral distress is already evident in the pandemic and it will be ramped up to another level if nurses and healthcare providers have to make decisions"

"We are at a risk of getting this virus, and we are at a risk of bringing it home to our families"

"Seem to be ineffective in preventing the dissemination"

Value Proposition Validation

Overall, the incidence of the COVID-19 infection in HCWs is higher than that of the general population. HCW risk (confined in this analysis to nurses and physicians) was 9-11 times higher than the general population.

It can be concluded from the above data and a few examples of statements from real healthcare workers that the current solution for the problem i.e. surgical masks and N95 are failing at providing the necessary protection and risking exposure to viruses and bacteria.

Why is it that doctors have a \$250 stethoscope to hear the lungs of patients and only a \$0.50 cent surgical mask to protect themselves and us from death?



Littmann Cardiology IV Diagnostic
Stethoscope: Rainbow & Plum -
Violet Stem 6205

\$258.68

[View](#)

Revenue Streams

Hypothesis : Epsilon is patented
Transaction based revenue

Epsilon is a one time investment for a product that has a lifespan of about 5 years, and with easily replaceable UVC tubes this can last for a longer period of time.

Epsilon believes its well within reach to partner up with Government sector and Health sector for bulk orders and supply for the healthcare workers, military workers, and safety workers.

https://youtu.be/lstj_o9ln4Y

The **Epsilon** team wanted to take a moment to thank the organization team of the World Hackathon Day, The Embassy of Israel in Netherlands, The Embassy of Netherlands in Israel, and all the other sponsors for providing us with the wonderful opportunity to explore the urgent situation of the world. We are more than grateful to have received this response for our product and we can draw it all back to your humble support.

During this hackathon, the team not only learned the scientific facts of the targeted problem, it was also a huge learning experience for us in terms of understanding the current situation of the world, and how technology can be leveraged to come together to solve the problem for the future generations and for all of mankind. We are extremely happy to have been able to serve a bigger purpose and thank you once again for providing us with this platform.





Thank you

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Links and resources

<https://www.albertahealthservices.ca/assets/info/ppih/if-ppih-covid-19-hcw-risk-rapid-review.pdf>

<https://www.healthleadersmedia.com/nursing/widely-used-surgical-masks-are-putting-health-care-workers-serious-risk>

<https://pubmed.ncbi.nlm.nih.gov/20095070/>

<https://www.healthleadersmedia.com/clinical-care/coronavirus-urgent-need-boost-care-capacity-and-health-care-worker-safety>

<https://www.healthleadersmedia.com/nursing/covid-19-affecting-critical-care-nurses-what-nurse-leaders-need-know>

