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Conceptual Design of Covid Mask

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Abstract: ***The widespread pandemic due to the novel Coro- navirus has put the complete globe under shut in 2020[1]. That was when the microscopically small viral creature which was communicable, spread drastically across the world infecting many, and many lost their lives. This situation completely changed the lifestyle of almost everyone and people are coping to adapt to the new normal, and with this new normal began a new habit. An efficiently designed long-lasting mask could serve this purpose. So, this mask was designed with added features, convertible designs to enhance usability, and certified filtering layered materials, that overcomes the drawbacks of the conventional masks widely beingused.***

Keywords: Coronavirus, full protection, Air filter, tesla valve, inhaler, *covid mask*

1. Introduction

A wide-spread pandemic hit the globe by the end of 2019 and put the entire population into their homes to protect themselves from the deadliest Covid virus. From that time onwards "masks" has become the most essential component in everyone's everyday lives. The existing mask's design and material have a number of shortcomings among people like suffocation/ improper breathing exhaust channel, accumulation of fog, difficulty in voice transmission and communication, opaque due to materials and color which hides one's identity, and ear supporting mask stings which leads to ear pain, etc, So, this everyday essential mask needs innovation in its design and material composition to make it efficient at the same time easy and comfortable for human usage. This paper details one of the most effective designs of protective masks.

2. Project Description

The protective mask is designed in such a way that the existing disadvantages were rectified with additional features added to its design. This mask's design has got added specifications such as transparency, efficient air filtration exhaust, in- built facilities of suitable inhalers, adjustable headband strap, customizable design (1.nose& mouth cover maskFigure 1; 2.complete full shield protection Figure 2), all these adding to its uniqueness. [2]

Figure 1: Nose & mouth cover mask

Figure 2: Complete full shield protection

Figure 3

3. Features

Addressing the following challenges such as difficulty in breathing, uncomfortable texture and design, improper voice transmission, opaque material that hides one's identity, the formation of fog in spectacles, and pain in the ear lobes due to ear sting support. So, the following features are added to the mask.

3.1 Transparent outer cover

This component covers the nose and the mouthparts, made specifically for anti-glare and anti-fog features made from Ultra Violet Polar glass. The outer layer of this transparent cover protrudes outwards covering the nose and mouth in a comfortable design. The inner rim is made magnetic so as to be easily attached and detached from the mask's outer frame and band. This component is made detachable, to reduce a whole load of removing the mask while eating and consuming beverages. Figure 4 [3]

Figure 4: Transparent outer cover

3.2 Full protection shield

A complete face shield covering from the forehead to the chin, with a completely transparent shield which is convert- ible (i.e) attached with the transparent nose & mouth cover mask.Figure 5

Figure 5: Full protection shield

3.3 Air filter and exhaust

The conventional masks are completely covered with very little space through layers for the flow of air, whereas this mask is designed with an air filter with an airfoil-shaped fan for the inlet and exit of air. Figure 6

Figure 6: Air filter and exhaust

3.4 Inhaler

An additional feature of the inhaler pocket is attached to the mask, to improve the breathing rate thus preventing shortness of breath in people.Figure 7

Figure 7: Inhaler

3.5 Air foiled shape valve

The valve is attached to one side of the mask to efficiently allow the flow of breath outside. This is a one-way tesla valve, designed so as it allows airflow from inside to the outside and never the other way around. One of the distinct advantages of this valve is its void of any moving parts and effectively employable in micro scales.[5]

Figure 8: Tesla valve

3.6 Maskstrap

One of the primitive shortcomings of masks is their incli- nation in the ear which on due course causes reddening, pain, and inflammation behind the ears. So this mask is designed with a thick broad strap with an adjustable Velcro strap and rotatable at the nodes, near the attachment of the main mask component, that can be worn around the head or neck in an adjustable position.Figure 9

Figure 9: Mask strap

3.7 Mask layer

The layers employed in this mask material are identical to those used in the certified N95 masks [4] . It has a five-layered protective combination of materials that has about 95% of filtration efficiency which restricts upto0.3micron particles from protrusion. The first and outermost layer has the antibacterial and antiviral coating which prevents pathogens from getting into the mask layers. The second layer has got the meltblown fabric that fine traps dust particles upto2.5PM. The third layer has got the absorbing carbon that prevents gas pollutants and other toxic gases from entering the respiratory path. The fourth material is layered with the thin non- woven fabric and finally the innermost layer has the cotton fabric for comfort of theuser.

4. Method of Use

This mask is a completely protected mask with an external shield, but this can be detached and used as two different protective masks. The first way of use is the inner mask (The Half protection mask) that covers the nose and mouse and the support is anchored behind the head at any comfortable position. This mask also has a detachable transparent layer that can be easily removed during eating and consumption of beverages and fixed safely using the magnetic tethering back into the mask frame without removing the entire mask. Figure 10. The second way of using this mask is attaching the frame of

Figure 10: Tethering of transparent cover to half protection mask

The inner mask removing the detachable transparent layer and fixing it with the full-cover shield easily using magnetic tethering (The Full protection mask). So, one mask can be used in multiple ways with ease.Figure 11

Figure 11: Full protection tethering

CAD Design

Check the Figures-Figures 11,12, 13, 14 and 15 and Table I

Table 1

S.no	Part name
1	Transparent outer cover
2	Air filter and exhaust
3	Mask layers
4	Mask Strap
5	Full protection shield
6	Half protection shield
7	Inhaler
8	Front Layer

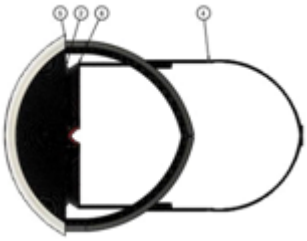

Figure 12: Top view

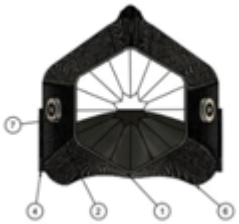

Figure 13: Front view

Figure 14: Line frame view-Half protection

Figure 15: Line frame view-Full protection

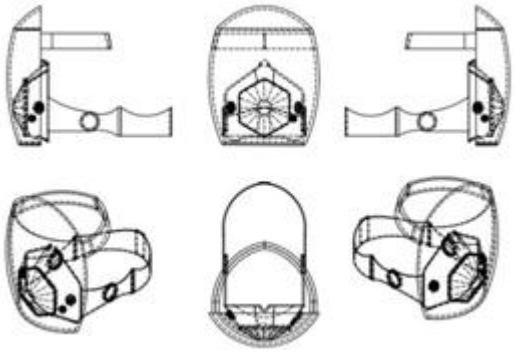

Figure 16: 360 views

5. Conclusion

The technology and innovation can together bring in great impact if utilized in the right time, at the right place, for the right thing to fulfill the needs and this convertible face mask is efficiently designed to safeguard people amidst the Covid pandemic. This mask's design, features are added so as the ease the experience and comfort of people wearing the face mask.

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