

**Sociotechnical Synthesis**

**STS 4600**

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**Mechanical Engineering**

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## **Introduction**

I know we are all tired of quarantining, and fortunately it appears society is slowly returning to a state of normalcy that we knew just over a year ago. Overall, in the United States, even more relevantly in Charlottesville, Covid cases have had a significant drop in frequency. Social distancing guidelines seem to be gradually less restrictive as the weeks go by and allow society to glimpse at what life used to be like. Because of the Sars-CoV-2 pandemic, I focused on ways that the virus has affected all of our lives over the past year and looked at possible solutions to help prevent the spread of the virus, and to safely return to more public activities.

The driving factor for myself was the interaction between different individuals with Covid guidelines and to analyze how isolation and quarantining would affect ourselves and interactions with others; specifically focusing on mental, physical, emotional, and social health. Next, the design portion of this project aimed to look at ways to stop the spread of the virus, which would inevitably help society return to a sense of normalcy and mitigate some of the negative impacts the Corona Virus has had on all of us.

## **Capstone Deliverable and STS Topic**

The technical portion of my thesis was designing and manufacturing a new and more effective face mask that could widely be implemented at the university, and for a fairly reasonable cost. My group mainly looked at aesthetics, long-term comfort, and filtration effectiveness when designing the mask.

The physical aspects of the masks design were deemed essential in order to encourage widespread use. The mask would need to be sleek, customizable, and not obnoxious to the eye, or else it would not be appealing to customers. However, throughout the design process some aesthetic designs were shifted and focused on providing a clear facemask that would allow for

individuals to read each other's emotions. Additionally, long-term comfort was considered because ideally these masks would be work for a typical work day. Eight or so hours of continued use would need to feel like an individual was not wearing the mask at all! Therefore, battery-powered fans were included in the design to pull in air and make breathing seem like no mask was present at all; not to mention the continuous gentle breeze across the face that was a great improvement to stuffy existing masks. Additionally, wide ski goggle straps and masks with soft, form fitting edges were used to reduce pressure around the head and create gentle, yet firm, connection points between the face and the mask. Finally, nothing else about this mask would matter if the filtering ability was not as good as medical grade masks or better. Additionally, facemasks tend to lose some effectiveness over time and as moisture builds up in the material. Therefore, a mask with replaceable filters was designed. Our group attached high quality, medical grade material to replaceable pods that could snap on and off with ease. Based on these considerations, a prototype for a more effective face mask was created and tested.

Following a similar direction, my STS research looked at the effects the Corona Virus has had on personal health, mainly mental, physical, social, and emotional health, and how social interactions and physical activity counteract the negative effects of the pandemic. Obviously, quarantining has had an impact on everyone as social interactions and physical activity have greatly decreased and life has shifted to a more virtual platform. Overall, the shift has caused mental strife for members of society, and not having a good outlet, physically, socially, or emotionally, has led to an increase in mental health related issues. Even if you do not contract the virus, there are still potentially harmful results that come from following the precautionary guidelines set in place by the government and other institutions. This research paper sought to

analyze how the virus has impacted humans, with a focus on physical and mental health, and how returning to social and physical interactions can have an abundance of health benefits.

## **Conclusion**

The STS topic showed just how important returning to public settings is for an individual's overall health. Furthermore, the completion of an innovative and effective mask would help to accomplish the research paper's goal and help bring life back to what it was just over a year ago. There are different opinions about the significance and reality of the virus, and there will always be people who do not follow guidelines to prevent the virus' spread. However, we all need to do our part in order to get over the global pandemic that we are still witnessing today. By following guidelines, wearing proper protective equipment, and taking care of our mind and body, we will all be able to get over this pandemic and return to our old society that many of us dearly miss.

## **Acknowledgements**

This project would not have been possible without the expert assistance and mentorship of Professor Garner. He helped my team brainstorm and come up with designs for a piece of relevant technology that could help make a difference in society (with more testing and fine tuning). Additionally, the research paper and work on the STS topic would have been more difficult without the help of Professor Bryn Seabrook and Professor Richard Jacques. My two STS professors taught me the frameworks necessary for the analysis of this paper and helped in the editing process to create the culminating thesis for my undergraduate engineering career. Finally, this was not a lone effort. Special thanks to my team members David Barret, Wheeler Gibson, Spencer Pergande, and Matt Ziegelbauer; without them this year would have been much less successful and entertaining.

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