

Thesis Project Portfolio

Development of a Powered Air Purifying Respirator (PAPR) for Runners

(Technical Report)

The Politicization of Mask Wearing in America During the COVID-19 Pandemic

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

The overall interest of these research projects had to do with face masks in the time of the COVID-19 pandemic. As preventing or minimizing the spread of COVID-19 has been an important topic of interest during 2020 and 2021, this research work aimed to contribute to research on masks as a technology. While both projects were related to this general topic, they both focused on different aspects of the technology of masks. The technical research was focused on designing and developing a specific type of mask technology, while the STS research was centered on the examining how American society and politics interact with the technology of masks.

The goal of the technical project was to create a Powered Air Purifying Respirator (PAPR) as a method of protection against the spread of the COVID-19 virus. The PAPR was intended to be similar to existing models but with a focus the average runner as a user group. The PAPR needed to be lighter and more compact than existing types of PAPRs, comfortable and secure for use during running, and cheap enough to be potentially accessible to the average person. The PAPR was designed around a baseball cap as a means to make it both cheaper to produce and feasible for use during running. The rest of the project was completed using cost-effective mechatronic design and predominantly 3D printed parts in order to construct a full working device.

The STS research project was focused on understanding the process of politicization of mask wearing on the whole during the COVID-19 pandemic. The implementation of universal mask wearing has been a continuous problem in America over the course of the COVID-19 pandemic. A large part of the issue has been linked to polarizing political debate surrounding the science of COVID-19 and mask wearing. This paper sets out to examine how the issue became

so politicized and what the impact of this politicization is. This examination was done by incorporating SCOT, looking at the problem of scientific uncertainty, and relating relevant examples of debate and action in America during the COVID-19 pandemic.

Ultimately the construction of the PAPR was a successful endeavor in terms of the creation of a functioning device. While the theoretical goal of the project was to create something that would be more widely usable than other versions of PAPRs, particularly for a specific subgroup of users, there was no realistic path for the research team to manufacture this on any large scale or get any sort of approval from an organization with oversight for the devices use as a means to minimize the spread of COVID-19. The design was overall functional for the purposes of the design course. The STS portion of the research was overall able to provide some insight into the intersection of science and politics and how this has played out during the COVID-19 pandemic, although, due to the complexities of the issue, a clear path forward in solving the issues could not be provided.