

Thesis Portfolio

Supplemental Rear Wheel Power Steering System for a FSAE Vehicle
(Technical Report)

COVID-19 and F1 Sponsorship
(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

In the world of motorsport, the most popular racing series is Formula One (F1). The thrill of the Grand Prix races and glamour of the sport have attracted fans of all ages, all over the world. This includes my capstone team; we are all members of Virginia Motorsports at UVA. It is an organization that fosters experiential learning through student projects related to racing, engineering, and project management. One of those projects is to develop a Formula – style vehicle to compete in Formula SAE (FSAE), a collegiate design series. For our technical project, we designed and manufactured a supplemental rear wheel power steering system for the vehicle. For my STS research, I was interested in exploring the business behind F1. With the advent of COVID, that interest shifted towards how the pandemic would affect that aspect.

The technical project implemented electronic actuation of the rear wheels in accordance with the 2021 FSAE competition rules, based on metrics such as cost, added weight to the vehicle, ease of use, and control. The steering geometries from which the controls were modeled off of depended on the vehicle speed. The entire system was tested through measuring the new turning radius and simulating lane changes while driving. The project culminated in a comprehensive report that detailed the final design of the rear wheel steering system, the manufacturing process, results from testing, recommendations for future work as well as an expense report.

In my STS research, I focused on the role of sponsorship in F1. The costs associated with operating a team, including research and development, continue to grow as technology advances and teams work to gain an advantage. Thus, sponsorship becomes a crucial part of success when

it is a factor that determines vehicle performance. The introduction of the pandemic reduced operation on all fronts, through the restriction of personnel and spectators and social distancing. In my analysis of F1's response to COVID, I concluded that in the scaling back of operations, opportunities to apply F1 expertise beyond the scope of the sport benefit society at large. This further encourages sponsorships as it is rewarding to assist in F1's humanitarian efforts brought about by the onset of the pandemic.

The conclusions of my research have made me more aware of the importance of our role as engineers. Our influence extends beyond that of our individual job descriptions and we should strive to positively impact society through our work. There are hardships to face, as I experienced with the technical project, but it is fulfilling to see the final design come to life. My hope is for the technical project to not only aid Virginia Motorsports' entry into FSAE, but to also inspire the members to be more socially – conscious.