

**The Smithinator: Recumbent Vehicle Design and Entry for the 2020  
ASME Human-Powered Vehicle Challenge**

(Technical Report)

**Athlete Participation in Orthopedic Elective Surgery**

(STS Research Paper)

An Undergraduate Thesis Portfolio  
Presented to the Faculty of the  
School of Engineering and Applied Science  
In Partial Fulfillment of the Requirements for the Degree  
Bachelor of Science in Mechanical Engineering

By

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## **Sociotechnical Synthesis**

There is limited access to elective orthopedic surgery for patients of differing socioeconomic and cultural backgrounds. Elective orthopedic surgery is characterized as any operation that is designed to fix non-life-threatening ailments. I will focus on elective surgery that fixes torn ligaments or arthritis. Inability to receive care can lead to a decline in quality of life due to resulting issues such as work limitations or addiction to pain killing drugs. I plan to use Latour's (1992) Actor Network Theory to examine factors that influence a patient's decision to forgo surgery. In order to understand the relationship between culture, socioeconomic status and an inability to receive care, I will conduct in person interviews with stakeholders in this issue. My sample will include patients and physicians from the UVA Sports Medicine Clinic. Since many patients in the UVA Sports Medicine Clinic are student athletes, I expect to find a cultural value of athletic performance over long-term athlete health. These cultural values will reflect both the patient and doctor decision to expedite recovery in the hopes of optimizing availability to contribute to the patient's respective team. This research will uncover ways in which access to elective orthopedic surgery can be improved. Patient and physician interviews may not pose explicit solutions, but it will shed light on the root causes of the problem.

The STS Research in this thesis is completely unrelated to the technical report. The technical report contains a detailed account of my capstone team's design process of a human-powered vehicle (HPV) to be entered in the 2020 ASME Human Powered Vehicle Challenge. Unfortunately, the 2020 ASME Human Powered Vehicle Challenge was canceled due to concerns surrounding the COVID-19 pandemic.