Thesis Portfolio

Human Powered Vehicle
(Technical Report)

Social Perception of Efficiency, Safety, and Implementation of Electric Scooters in China, South Korea, and the United States
(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

Sungwoo Cho
Spring, 2020

Department of Mechanical and Aerospace Engineering

Table of Contents

Sociotechnical Synthesis

The technical portion will cover the process of developing a Human Powered Vehicle for ASME's annual competition. Beginning with the design phase, our team researched design aspects of previous vehicles entered past competitions along with recumbent trike forums for additional information. Deciding on a tadpole design, meaning two wheels in the front and on in the back, we proceeded to begin designing with the gathered information using Solidworks. The design of the vehicle went through many changes after testing using finite element analysis to analyze the amount of force the trike could handle. By the Spring semester, we had completed our design and ordered materials and parts to begin construction. Our team began training at Lacy Hall to get familiar with the tools for construction. Upon arrival of the parts, we began construction while getting frequent advice from U.Va's baja racing team who had experience working with the tubing we chose along with ensuring structural integrity of a vehicle.

In the STS portion, the social perception of electric scooters in China, South Korea, and the United States is analyzed. Factoring in aspects such as level of government involvement, population size, need of users depending on the traffic infrastructure of the country, etc. Multiple methods of data collection were used including interviews, professional journals, articles, and surveys. Using the wide variety of data collection methods, many perspectives on the topic were able to be seen which allowed for a more in depth discussion. Frameworks such as the Social Construction of Technology and the Actor Network Theory were utilized to visualize and study the relationships between electric scooters and other aspects of the traffic infrastructure, human actants and actors, and non-human actants and actors. The literature will further delve into how this new mode of technology is perceived in three different countries along with answering the question of why scooters should be considered as a member of the society and not only a new technology.

The technical and STS theses are not related