The Smithinator: Recumbent Vehicle Design and Entry for the 2020 ASME Human-Powered Vehicle Challenge
(Technical Report)

Using Care Ethics to Examine the 2015 VW Dieselgate Scandal
(STS Research Paper)

An Undergraduate Thesis Portfolio

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By

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Socio-Technical Synthesis: Human Powered Vehicle and 2015 Volkswagen Dieselgate Scandal

My technical work and my STS research are connected primarily through the concept of transportation, utilizing human and fuel power respectively. Transportation methods are a global concern as the movement of people and goods aids in further defining humanity. My technical work concentrates on how to design and produce a human powered transport vehicle that meets set ASME standards, while my research examines the 2015 actions of Volkswagen through an ethical framework. With the clear distinction between my technical and research projects, working on both simultaneously allowed for me to better understand the engineering environment in which a successful transportation product is desired.

My technical work focuses on utilizing the knowledge and experiences obtained through the undergraduate mechanical engineering program to design and build a fully functional human powered vehicle (HPV) to attend the Michigan HPVC North America East competition in April 2020. My capstone team created a three-wheeled recumbent vehicle which included various components such as a full fairing, under-seat Ackerman steering, roll protection system, and adjustable chain tensioner. This vehicle was almost entirely designed and built by our team, with some key components such as wheels, brakes, and cranks being purchased from local bike shops. The purpose of the project was to design and build a vehicle to compete against other university teams, while also putting to use our engineering toolbelt. The vehicle was designed to be a safe,

efficient, and consumer-friendly product that would serve as a possible alternative to fuel powered transport such as cars.

My STS research focused on more of an ethical side to the field of transportation, examining Volkswagens actions during the 2015 dieselgate scandal related to the emission testing defeat devices found in many of their diesel vehicles. The application of an ethical framework was key to better analyzing the actions carried out by VW engineers and management; in this analysis of the scandal, I utilized care ethics. My claim during this research project was that VW failed to act competently and responsively with respect to the four elements of care ethics, therefore displaying unethical behavior with its use of devices to cheat the United States Environmental Protection Agencies testing procedures while producing levels of pollutants up to 35 times higher than regulation values. The goal of this project was to grasp a better understanding of the duty of care that large corporations owe to consumers and the environment in which they operate.

Working on these two projects simultaneously allowed me to learn about and experience the responsibilities and difficulties when creating a consumer product. VW's established lack of competence and responsiveness in my research informed me of the duty of care a producer has towards their consumer, which pushed for increased focus towards ensuring the safety, reliability, and honesty of the design of my group's human powered vehicle. The exploration into the human transportation field has allowed me to become better equipped to tackle the engineering projects of tomorrow.

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