Thesis Portfolio

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

Effect of the Consumer on Automobile Design
(STS Research Paper)

An Undergraduate Thesis

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Author

Westin Recktenwald
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Sociotechnical Synthesis

Automobiles typically struggle to make tight, low speed turns common in parking scenarios and in town driving. At high speeds, the ability to quickly change direction to avoid a collision with another vehicle or animal is critical to vehicle performance. Vehicles with front wheel mechanical steering are typically unable to make tight low speed maneuvers or provide the handling needed for emergency or performance situations at high speeds. The technical aspect of this project is focused on designing and implementing an electronically actuated rear wheel steering system on Virginia Motorsport's Formula SAE car. The technical project team is therefore developing a fly by wire rear wheel steering system for our FSAE car in an effort to significantly decrease the car's minimum turn radius at low speeds and improve stability and maneuverability at high speeds.

The implementation of rear wheel steering by automobile companies is a direct result of the companies meeting consumer demands for high performance and safer vehicles. Understanding how consumers affect automotive design decisions is important due to the large impact this influence has on automotive engineering decisions. These engineering decisions then affect the lives of millions of vehicle owner every day. I structure my analysis using ''The Social Construction of Facts and Artifacts'' framework discussed by Pinch and Bijker. The idea that social groups and individuals have a large and continuous impact on the development of technology is central to the SCOT theory. Recognizing the influence that automobile consumers have on the development of vehicles and then characterizing the scope and nature of this influence reflects SCOT theory's central methodology for analyzing the development of technology in the context of outside societal influences.

Evidence to support the analysis of this research question has been gathered from multiple sources, including automobile engineering literature, economics and business databases,

and other consumer reports and surveys published online. To understand past and current consumer demands, consumer reports and surveys have been most useful. The main deliverables for this analysis are an investigation of certain vehicles whose designs have been significantly affected by consumer demands and analyses of certain design decisions made for the benefit of the consumer but not explicitly demanded by the consumer. Examinations of consumer influence relevant to specific vehicles have been synthesized to develop an overarching understanding of how consumers affect automobile design decisions. The factors affecting design decisions made throughout the technical rear wheel steering project are heavily influenced by the end user's preferences, such as system response time and power. Similarly, the technical workings of the rear wheel steering system influence the end user's driving experience by providing a safer and faster driving experience.