

Thesis Project Portfolio

Human-Powered Vehicle

(Technical Report)

An Evaluation of Regional Transit in America, as Seen on the Northeast Corridor

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Over the past two decades, the number of jobs within a typical commute distance has declined sharply for poorer urban residents (Stromberg, 2015). Unfortunately, this shift is not a new phenomenon, as urban sprawl has been a trend in city design since the rise of the American highway system in the 1950s and 60s. This long-standing trend, along with the strength of the automobile industry both in terms of societal preference and political influence, has created an unsustainable picture of modern urban transit in the United States. If the outdated infrastructures of most American cities are to be brought to today's standards, the need for new and improved modes of transportation must be addressed.

In fact, new forms of smart city transit have already emerged as part of a growing movement towards "smart" cities. Chief among these are mixed modal, and ridesharing companies, who seek to provide citizens modes of transportation they otherwise wouldn't have been able to afford otherwise. Startups such as Uber, which was valued at \$75.5 billion just before it went public in 2019, have also sought to improve urban transit by supplementing public transportation offerings (Hall, Palsson, Price, 2018). However, all of these new forms of technology have fallen short of the accessibility public transit deserves, instead touting their efficiency.

My technical and STS research topics address this issue of insufficient urban transportation networks, and explore the impact that greater accessibility can have on a population.

Research shows that ease of access to transportation plays an enormous role in whether or not an individual will be more economically successful than their parents (Criden, 2008). A huge barrier to transportation, however, is cost. While most new modes of transportation are often

technologically complex and expensive, established modes of transportation can still provide cheap and efficient means to improve one's economic situation. The technical report explores one such mode in the form of an experimental mode of transportation, that is both accessible in terms of cost, and efficient in use.

The HPV capstone project team worked to design and build a Human-Powered-Vehicle, in this case a recumbent tricycle, which can carry a rider and some form of parcel. The vehicle's recumbency takes advantage of increased ergonomics, allowing the rider to be better protected by an enclosure while achieving a greater top speed. Additionally, the vehicle uses inexpensive parts and is cheap to maintain, addressing the problem of accessibility.

Unfortunately, the finished vehicle was unable to undergo testing due to the global COVID-19 pandemic of 2020. The capstone team hopes future developments to urban transportation will continue to address the needs of all citizens, and develop modes of transportation that are accessible for everyone.

In a similar vein, the STS topic also examines the trends of transportation in the United States, this time evaluating the trends and developments of the busiest urban region of the country, the Northeast Corridor (NEC). By examining both the existing preferences of stake holding groups, and the future policies and forecasts for this region, a recommendation of how best to implement future changes in transportation is offered.