Thesis Project Portfolio

Quantifying the Current Transportation Landscapes in Charlottesville to Evaluate the Effects of Shared Dockless E-Scooters on Mobility.

(Technical Report)

When Life Gives You Limes: Integrating New Modes of Mobility into Existing Transportation Landscapes

(STS Research Paper)

An Undergraduate Thesis

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

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Trends in urban growth, transportation innovation, and new modes of micromobility (the class of mobility that can occupy bike lanes), leads to numerous questions about how cities can incorporate new technologies in an equitable, safe, and productive way. The technical project and sociotechnical research both focus on the questions of access to mobility and integrating new forms of mobility into an existing transportation environment. The technical project seeks to bring new quantitative understandings of the current state of mobility access in Charlottesville, VA, and to demonstrate what mobility access might look like when a new mode of micromobility – shared dockless e-scooters-- are introduced. The information put together from the technical research ties into the sociotechnical research, which seeks to illuminate guidelines and frameworks stakeholders can use to promote a successful introduction of new modes of mobility. The two projects together deliver a more enriched perspective on the current and prospective mobility scenarios with the introduction of new technologies.

In my STS research, I compared two cities' introductions of shared dockless e-scooters to find factors that worked well and factors that complicated the prospect of the new vehicles on city streets. Four salient factors emerged from studying how San Francisco and Charlottesville's introductions of e-scooters progressed. First, communities' prior experiences with technology was critically important in shaping the perspectives of various stakeholders and willingness to integrate a new form of transportation into their cities. Second, engaged community members were throughout the process and whether they felt they had an active involvement in the process helped to smooth out difficulties encountered during the process. The last two factors were, whether the negative side effects were perceived as negligence or malice, and how clear the communications between private companies, local governments, and community residents were. These factors can be used by both the cities mentioned and other cities wishing to incorporate new modes of transportation into their transit environments.

The technical portion of my thesis produced analysis and tools to greater understand the current and prospective mobility environments in Charlottesville, Virginia. I gathered publicly available data from Charlottesville Open Data and the American Community Survey to calculate where there were gaps between transit supply and demand. I also used data for where existing bike rack points are to show how scooters parked at them could help increase the mobility options for residents. Additionally, I created an easy to use website that shows the findings in an interactive map.

The technical project and sociotechnical research complement each other quite well. A large finding of the sociotechnical research was the importance of clear communication and monitoring of an introduction of new forms of mobility, and the technical project proposes a way to facilitate those communications through a data driven approach and an accessible tool for community members and leaders to use. The sociotechnical research highlighted what can go awry when new mobility technologies are introduced recklessly, reinforcing the motivation to gather, analyze, and share data along the way so that stakeholders are informed, and they can give feedback throughout. While the projects focused on one form of new mobility, the questions surrounding equitable access, balancing costs and potential benefits, and community participation will apply to future transitions in transportation as well.