Sociotechnical Synthesis

STS 4600

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Bailey Roe

Department of Mechanical Engineering

Signature _____ Date_____

Bailey Roe

Signature _____ Date_____

Richard D. Jacques

The United States has only begun to scratch the surface of dismantling the centuries of oppression towards marginalized groups in this country. The former White House administration only highlighted tones of ableism, racism and discrimination. Moreover, this bigotry in addition to the events from the past few years including displays of white supremacy and racism in the nation's capital and here in Charlottesville as well as the issue of police brutality nationally have only underscored how ingrained bias and discrimination remains in today's America. There are unquestionably countless ways in which systemic oppression has crept its way into the daily lives of marginalized people. These inequalities underline day-to-day issues caused by engineering product design and planning in the United States. The relevance of STS directly ties into its emphasis of including universal design in the future of all engineering practices. Universal design is the design of buildings, products or environments to make them accessible to all people, regardless of age, disability or other factors. Universal design should be a requirement for all engineering creations to ensure marginalized groups are not further disenfranchised by oppressors. In correction of transportation inequities in today's America, my capstone proposes a method and measurement of transportation social justice to benefit all of the Commonwealth while my STS research highlights and measures to what extent those inequities influence the daily lives of marginalized groups.

In my STS research, to fully understand the relationship between urban transportation systems and the communities of marginalized groups, I dive into the relationship low-income populations have with marginalized groups. The detrimental effects to marginalized groups caused by transportation inequities accentuates the magnitude of the problem within urban America. The STS portion mainly focuses on finding the correlation associated with economic factors marginalized groups face and decaying or poorly designed urban systems causing a

deficit in access to transportation and a break in their journey chain. The STS paper aims at finding out how decaying and substandard transportation infrastructure affects the marginalized groups in America. This research will help in understanding the degree of effect that transportation frameworks have on discrimination and how those effects can be changed to begin dismantling systemic inequality in America.

The technical portion of my thesis produced new means in order to help solve transportation efficiency problems in Virginia; hereby, correcting the flawed frameworks effecting said marginalized groups. The goal of designing and pitching a conference report and presentation to UIX-MITRE was achieved as of the Spring of 2021. The anticipated outcome was a design to improve transportation infrastructure by creating remote-sensing evaluation options using a spacecraft or aircraft vehicle. The capstone team established a proposal for a constellation of CubeSats--called the Commuter Live Aggregated Yield Traffic Observation Network (CLAYTON)--to improve roadway safety in Virginia. This constellation is scalable to be applied to roadways throughout the United States. This achievement of better transportation efficiency will improve the quality of life for Commonwealth residents and improve transportation infrastructure.

In conclusion, the STS topic and technical project are tied by analyzing who in the public is most affected by transportation infrastructure and why lack of access may have a significant role in discrimination. This STS topic is the role that transportation infrastructure plays in inequality in the United States. In more depth, this research analyzes how does decaying and substandard transportation infrastructure affect marginalized groups such as people with disabilities and people of color in America. This question is significant as transportation has a tremendous effect on the quality of people's lives and lack of access may have a significant role in discrimination.

A review of locations where marginalized groups are most affected by decaying transportation infrastructure is included as well as census data for comparison of marginalized groups and low-income areas. These locations were also compared to areas with decaying transportation infrastructure and city infrastructure planning. To conceptualize and quantify the negative social and economic effects caused by the failing frameworks, research was analyzed relating to the economic and job-related factors affecting people in these disenfranchised locations. The correlation between marginalized groups and higher poverty rates and then overlaid with these factors of neglected transportation systems confirms transportation infrastructure helps to amplify the systemic discrimination in the United States.

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