

Thesis Project Portfolio

Wheel Surfer: A Device to Recharge Batteries from Mechanical Motion

(Technical Report)

**The Development of Zoning Codes Tied to the Influence and Implications on Decisions
Made by City Governments**

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

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

Jonathan Moon

Spring, 2020

Department of Mechanical Engineering

Table of Contents

Sociotechnical Synthesis

Wheel Surfer: A Device to Recharge Batteries from Mechanical Motion

The Development of Zoning Codes Tied to the Influence and Implications on Decisions Made by City Governments

Prospectus

Sociotechnical Synthesis

Zoning codes have evolved rapidly in aim to secure peace and order within the city but, in the process, obstructed and damaged the livelihood of innocent lives. Zoning codes, in their nature, are to grow and develop as the city develops. It is important to guide the direction in which the laws form and make conscious decisions that may or may not affect the stakeholders. Understanding the community is the first step to understanding the zoning guidelines before any are enforced. Zoning codes are meant to be used as a tool to promote community engagement. This research will explore the aspects in which zoning codes are enforced at the benefit of the city while in heavy costs to the community. In light of understanding the community and their needs, the technical thesis will dissect a means of encouraging people to be energy and time efficient, catering to both the personal users and the community as a whole.

The STS research takes a narrow scope onto the city of Charlottesville as a component to an argument that deals with a problem that lives in various locations across the country. The city of Charlottesville preserves and upholds its glorious history but denies or hides the damages it enforced on its journey. This research will shine a light to an issue that is hard to find but encourages support and builds reform. The evidence points to mistakes but it also builds a path for hope in future studies. It is the role of the engineer to tackle and explore issues with questions and analysis in order to formulate possible solutions.

The technical aspect of the thesis lies on the opposite side of the same coin. The research prompts a living problem and given the circumstances and conditions, the engineer is to explore and execute the means to an answer. Here in the city of Charlottesville, time is of the essence. Students, faculty, and staff live on time and cannot afford to lose it. Engineers find means to preserve said time and optimize each component to the full potential.

Remote distances between buildings and counted minutes between them, the engineers are to design a mechanical device that will induce enough electrical current to charge a battery. This device is a generating spindle wheel that will attach to a bicycle, increasing travel speed while turning otherwise wasted energy into the most prominent commercial use energy, electrical energy. With cellular devices metamorphosing into our lives, finding more means to charge our devices is another means to fueling ourselves.