

Thesis Portfolio

An Automatic Parking Lot Sensing and Management System
(Technical Report)

The Role of Sociocultural Values in Parking Lot Design and Administration
(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

Mac Cartier
Spring, 2021

Department of Electrical and Computer Engineering

Table of Contents

Sociotechnical Synthesis

An Automated Parking Lot Sensing and Management System

The Role of Sociocultural Values in Parking Lot Design and Administration

Thesis Prospectus

Sociotechnical Synthesis

This STS thesis and technical capstone project together address the widespread issues due to ubiquitous and necessary parking technologies. The STS component of the thesis analyzes the current systems and issues and suggests solutions for designers using mediation theory of technology, while the technical project provides a system which allows the goals in the STS component to be carried out.

The technical component consists of a meshed network of inductive sensors and Bluetooth transponders which detect the presence of vehicles, authenticates them, and relays the current information back to management software on a PC. It addresses the inefficiency of parking lots by providing a management system which allows proprietors to enforce badged parking and gain insight into the usage patterns in their parking lot. The STS component investigates several case studies and analyzes current literature using mediation theory to derive conclusions about best practice to provide safety equity for users, to make parking more economically efficient, and to minimize environmental damage due to atmospheric heating and runoff.

The STS component of this project allowed me to see the greater necessity and significance of the technical aspect of the project. Researching the environmental and economic harms caused by the over-construction of parking lots gave me a greater appreciation for my technical project. No longer was it a mere gimmick or gadget, it was a system that could make meaningful impact on the world.