

Thesis Project Portfolio

Robottoman

(Technical Report)

Hybrid Development of Smart Transportation: Through the Lens of the Triple Helix

Model of Innovation

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

The advent of computer systems has woven itself tightly into the fabric of modern society. Seemingly every day there are new products and technologies aimed at improving the lives of people. The declining cost of computer chips and communications technology has enabled a host of new use cases for technology. This connectivity, combined with low-cost computing capabilities, allows for seemingly simple concepts to be expounded upon. A large part of this involves the ability to collect data on an unprecedented scale, and the ability to transmit that information to powerful computers capable of producing valuable new information to be used for the benefit of many. This trend has been called “smart” technology which encompasses a movement towards connecting many formerly unconnected technologies to the internet. The goal is an “internet-of-things” ranging from refrigerators to entire cities.

My capstone project was designed to empower the elderly and infirmed to regain some autonomy over their home. Known as the Robottoman, it is an application of the principle of smart technology. It enables a user to remotely control a piece of furniture via an app on a phone. The value to the user being that less energy is needed to move things around. The core example being once someone sits down, and their ottoman is out of position, it is a hassle to get up and move it into place. This hassle can be avoided by enabling the ottoman to move itself to said person from their phone. The result was not perfect, but a good proof of concept and demonstrated an ability to save the user time and energy.

My thesis is smart technology on a more macro scale than the Robottoman. Using the triple-helix model of innovation, I examine the driving factors on the implementation of smart technology toward the goal of smarter transportation. Smart transportation involves a huge network of connected sensors and devices, but beyond that smarter policies. The interplay of public, private and university interests permeate the transition to smarter cities at every level. It is important to understand who constitutes these parties, how they impact the development of smart cities, and why they are interacting as they are. The most interesting result of this research is that, while the triple-helix model is useful to a degree, what underlies all three helixes is a uniquely human element.

In conclusion, both of these projects advanced my understanding of smart technology and the internet-of-things. They were valuable experiences that in the case of the capstone project gave me an opportunity to work on a real engineering project. The Robottoman solved a real-world problem, and although it was not perfect in its execution, was a good application of smart technology. With further development it could be turned into a viable product. Although my thesis leads to many questions, the primary area that warrants further investigation in my opinion is that of how the human factors across all levels of the triple helix model of innovation can be better understood.

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