Thesis Portfolio

Low-Noise Current Source for Superconducting Circuit
(Technical Report)

The Impediment of Beneficial Progress by Societal Influences
(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

Michael Boddie
Fall, 2019 - Spring, 2020

Department of Electrical and Computer Engineering

Table of Contents

Socio-Technical Synthesis

The contents of this thesis submission include both a technical and an STS component.

The technical component details my Capstone research project, which was completed during the Fall 2019 semester and into the following winter break. For the project I designed a circuit for a graduate research team at UVA, working with one of the graduate students, Scott Hinton. My circuit would interface as part of a larger circuit the team was designing, which would use a superconductor to manifest certain electrical properties and allow it to be used for various testing purposes elsewhere in their research.

The sub-circuit I was designing for my project was a stackable, controlled current source that would interface with the team's larger circuit. My circuit would allow for the precise control of current through different sections of the larger circuit, which is key to making it function as intended. The circuit needed to be designed to fit several specific constraints for its purpose, and also needed to be optimized for ideal performance. The technical report details the design, testing and outcome of the project.

The STS component is a research paper, focused on the topic of how non-technical, social factors act as an impediment to beneficial technological growth. It investigates the different societal factors that influence technological growth and looks at scholarly models that describe the development process, such as the idea of technological diffusion, and the two-step flow theory. It also looks at some real-world examples to help forward the argument.

The thesis also references one of my own projects (separate from that described in the technical report), which was a large semester project completed during the Fall 2018 semester. It explains the nature of the project and tells the story of its development, deployment, and eventual failure. This real-life project provides excellent insight into the phenomena that I introduce in the thesis, and serves as a powerful example of how they play to stifle what could have been a great innovation for the UVa community.

The technical and STS theses are not related.