Thesis Project Portfolio

Perplex Musical Cube

(Technical Report)

The Linux Ecosystem: an Actor-Network Analysis of Free and Open Source Software
(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

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Sociotechnical Synthesis

My technical project was a simple electronic instrument. In the course of completing the technical project I developed it on a Linux platform. Reflection on this process led me to wonder how Linux had progressed from a small hobby project to a large and stable operating system. Towards this end, my STS project focused on analyzing the history of Linux's growth to develop an understanding of what makes an open source project successful.

The technical portion of my thesis consists of an electronic instrument in the shape of a cube which lights up and plays sound in response to motion and orientation and motion. It contains an MSP430 low power microcontroller, accelerometer, pressure sensors, and a speaker with amplifier circuit. It utilizes embedded software development techniques to meet tight timing and resource constraints.

In my STS research I explored what allows a successful open source project to transition from hobbyist development to industry support through a case study of the history of the Linux kernel's development. My research establishes the relationship of the nebulous business concept of software "ecosystems" to that of sociotechnical systems as a subset relevant to business actors. From there I framed factors that lead to industry adoption of open source software with a STS perspective. This connection engendered exploration of Linux's development by the application of actor-network theory. I found ANT remarkably suitable for the analysis of open source development, and I provide a general categorization of groups of actors relevant to open source software development that can be used for further research.

The technical rigor of my technical project was well complemented by the broad considerations of societal influence in my STS paper. Our technical report explored ethical topics

of economic constraints and individual well-being. However, such a “toy” project did not provide the venue for an in depth exploration of larger societal trends. The STS research project provided me an opportunity to examine larger trends in technology than the scope of the technical portion encompassed, and I took this opportunity to explore the success of Linux which fascinated me as a casual user of it. In the process of examining Linux’s success I connected the concept of a software ecosystem to the sociotechnical system model of actor-network theory.