Thesis Project Portfolio

ROMULUS I

(Technical Report)

The Effects of Short-Form Media

(STS Research Paper)

An Undergraduate Thesis

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Executive Summary

In our modern world, knowledge is power. In the coming decades, knowledge over our technology and how we can manipulate it, as well as understanding how it manipulates us, will be paramount for solving global dilemmas. My capstone project serves the former, creating a barebones computing architecture that can be used to teach introductory or advanced computer architecture classes. By providing as little abstraction as possible, the necessary knowledge to design and write programs for such a computer is astonishingly little. My STS paper serves the latter, diving into the effects of short-form content on the user, both socially, and mentally. This is of significant importance, since, from a productivity standpoint if nothing else, short-form content is a drain on the productivity of many, and acts akin to an addiction. While the two endeavors are not directly connected, it is my duty as a computer engineer to educate and inform the public of such issues, while empowering society to enact change through technology.

My capstone project was to create the simplest to understand computer which allows users to program, implement and redesign to fit their needs. ROMULUS-I is one part computer specification, one part physical device that has an easy-to-understand instruction set, and capabilities to implement higher level abstractions. Additionally, to support its pedagogical use cases, ROMULUS is equipped with leds and displays throughout, as well as debugging modes, which allow the end user to glean the current state of the computer at a glance.

We were able to design a 16-bit computer with a Turing-Complete instruction set, along with an assembly language that allows one to write code to run. We implemented interrupt-based peripherals, such as a teletype machine that interfaces, an I/O peripheral, and keyboard support. The clock speed goes up to 4MHz, allowing for up to 200,000 operations per second. Our computer has the ability to be understood from the top down, where one writes assembly and slowly peels back the layers as to what the computer is achieving, or bottom up, where the initial logic is understood, and how the logic makes a computer that is Turing-Complete is later grasped. In future works, we hope to implement graphics, sound, and perhaps allow for faster performance or higher level features like C/C++ language support or protection rings.

In my STS paper, I discuss the effects of short-form content on the human brain and on

society. I discuss the history of mass-media and how we've reached this point in history, as well as using actor-network theory (ANT) to analyze the relationships between the public, our phones,
and companies / their motivations for keeping us engaged in such content. I discuss the phenomenon known as "doom-scrolling", and contend with how lots of consumers feel trapped in a vicious cycle, where their technology is vying for their attention.

In my STS research, I found that short-form content—such as TikToks, Reels, and YouTube Shorts—exploits psychological vulnerabilities in the human brain, especially those related to dopamine-driven reward systems. Drawing on studies from cognitive psychology and media theory, I demonstrate how these platforms are designed to hijack attention and promote compulsive engagement through algorithmic reinforcement. Using actor-network theory, I analyzed the intricate relationships between users, content creators, platforms, and advertisers, revealing how economic incentives are deeply tied to keeping users constantly engaged. The result is a system in which users often report feelings of lost time, reduced focus, and heightened anxiety. My conclusion argues that while short-form content offers entertainment and connection, it demands a critical reevaluation—one that considers both its neurological impacts and its broader influence on culture and productivity.