

Thesis Project Portfolio

Developing Design Features to Facilitate AI-Assisted User Interactions

(Technical Report)

The Detriment to the United States' Electronic Waste Management Infrastructure

Due to National Disposability and Consumerist Culture

(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

Rebecca Dollahite

Spring, 2024

Department of Systems Engineering

Table of Contents

Sociotechnical Synthesis

Developing Design Features to Facilitate AI-Assisted User Interactions

The Detriment to the United States' Electronic Waste Management Infrastructure Due to
National Disposability and Consumerist Culture

Prospectus

Sociotechnical Synthesis

Artificial intelligence (AI) technologies are being implemented to maintain and handle large amounts of data being collected everyday concerning consumer behavior, system performance, and security intel. These AI systems rely heavily on a user's articulation of specific natural language prompts, which raises issues when users fail to accurately express their desired intent. The work herein includes three interactive designs to integrate AI assistance in data queries, enabling specific, goal-oriented, and customizable query responses while not constraining the user. This case study of the business-to-business (B2B) domain considers the three following design considerations: 1) refinement of search categories, 2) context-aware prompt recommendations, and 3) customization of query input per user technical ability. Usability evaluations were conducted and revealed which patterns of search category refinement were preferable to novice and expert users and led to the recommendation that other organizations outside of the B2B domain should consider and account for the degree of AI assistance that would be most suitable to their users.

The incorporation of AI into modern platforms is accompanied by an increased need in computing power and further development of electronic devices. Electronic devices have become integral to the culture and lifestyle of the United States, evident by their incorporation into different avenues of life such as personal, business, academia, and health. Along with a deceptive electronics market exacerbated by large tech corporations, the United States is facing unmanageable levels of electronic waste. By examining the University of Virginia's Facilities Management's ReUSE Store, the state of California, and limited federal e-waste legislation, I advise that individuals, corporations, and governmental bodies should be held responsible for perpetuating this culture. The American tendency to quickly dispose and over-consume presented within these three levels of jurisdiction—local, state, and federal—explains how even relatively successful avenues of electronic disposal cannot accommodate the heavy demand to recycle electronics.