Thesis Project Portfolio

Creating An Autonomous Laboratory Navigator

(Technical Report)

Decoding how Cognitive Bias Becomes Algorithmic Bias in Artificially Intelligent Decisioning Systems

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

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In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

Technological influence in human society can be observed everywhere. Recently, that has taken the form of artificial intelligence, or AI. To many, "AI" can be synonymous with "robot," but it is also found in everyday contexts such as smartphones and surveillance. We rely on AI for a variety of tasks, and often, we believe it to be an objective means of performing them. However, our tendency to have blind faith in artificially intelligent systems highlights ethical concerns within them.

My STS research paper tackles an understanding of algorithmic bias and how it comes to exist in our coded systems. Specifically, I look at AI decisioning algorithms involving facial recognition, job applications, and criminal justice. The ethical dilemma arises when the software used in these areas exhibits flaws in their judgments that can be linked to cognitive biases found in people. By analyzing documented sources of bias in technology in tandem with findings from cognitive psychology, I develop an understanding of the decisioning flaws of AI.

My technical project is an application of an AI decisioning problem. The objective is to create a functional robotic tour guide that can autonomously navigate a user through the University of Virginia's Link Lab. In other words, the robot will drive itself to a specified point in the lab and guide a person there as well. This project focuses less on the ethical issues presented in the STS research and more on the technical intersection of AI and robotics.

Through both components of this thesis, I explore interactions between humans and technology. The technical project deals with human and robotic interaction. The research project centers on how the biases that might exist in the machine come to be and highlights the ethical implications of subjective AI. Computers that make decisions are embedded in the functions of today's world, so it is imperative from an engineering standpoint to recognize how the AI arrives

at those decisions and what the consequences are for their biases. It is also important for the users of decisioning technology to be critical of the information they receive to not perpetuate algorithmic prejudices.