**Thesis Project Portfolio**

# Quantum Computing and Machine Learning for Efficiency of Maritime Container Port Operations

(Technical Report)

# Examining the Practices of Hate Groups on Youtube

(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

**Ibrahim Hamdy**

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Department of Computer Science

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**Sociotechnical Synthesis**

Youtube is the internet's second largest website, and previously it has had trouble moderating far-right extremism and misinformation. It is important to ensure that the website is not continuing to radicalize people and spread misinformation and violence. My STS research topic explores how technology impacts the way that hate groups consume media on Youtube and how Youtube's features and content recommendation algorithms aid in the radicalization process. Firstly, I will utilize the search feature and the content recommendation algorithm to determine the number of hate groups that utilize the website, what features each group takes advantage of, and how popular or successful their content is. Then, I will examine these groups' behaviors on the website through the lens of Technological Determinism, a sociological theory that states that the behavior of social groups is defined by the technology they use. By doing this I will be able to determine the tactics that these hate groups use to connect with and grow their audiences.

Container stacking at ports is a vital optimization problem for increasing flow through ports and decreasing emissions. However, optimizing container stacking is an NP-Complete problem, meaning current technology can only approximate optimal solutions. For my technical topic, I constructed an algorithm that utilized MuZero, a machine learning model developed by Google, to approximate optimal solutions to the container stacking problem.

For optimizing port container stacking for space and movement efficiency, a machine learning algorithm called MuZero was utilized to analyze the stacking problem and approximate optimal solutions. First, a simulation of container stacking was constructed in Python. This simulation included shipping containers labeled with a unique identifier, a "stack" data structure that used a crane to store and move containers at certain addresses in a three-dimensional array, and a set of instructions for which a crane would need to carry out. This set included two types of instructions: adding containers onto the stack and removing containers from the stack. The model

was then given control of the crane, and could move any container, load and unload the crane, etc. The model would then train by attempting to complete as many of the instructions as possible within 500 operations. Each instruction completed would earn the model 10 reward. After 500 operations or after all instructions were completed, the simulation would end and the algorithm would use the results gathered from the simulation to learn, which would help it perform better in future simulations.