

Thesis Project Portfolio

Convolutional Neural Networks: Predicting Human Activity and Measuring Susceptibility to Faulty Data

(Technical Report)

A Virtue Ethics Analysis of the Business Practices of Tesla

(STS Research Paper)

An Undergraduate Thesis

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In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Department of Computer Science

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Sociotechnical Synthesis

My technical work and STS research are connected as they both discuss the development and production of advanced and innovative technologies and the ideas behind ethically creating and releasing said technology. Both of my works explore the development of an innovative technology. My technical paper describes work on creating convolutional neural networks for human activity recognition while my STS research focuses on Tesla electric vehicles. Although the approach of assessment is different, both of my works share a theme of investigating the quality, readiness, and ethical handling of the technologies. For my technical paper, a convolutional neural network is assessed based on its resilience to faulty data to measure its reliability in real-world scenarios and unexpected situations. For my STS research, Tesla is assessed using virtue ethics to determine if they handled the production and release of their electric vehicles ethically.

My technical work involves the creation of a convolutional neural network for human activity recognition. The model was trained using time series human activity data that was transformed into spectrograph images. This neural network's performance was then assessed using faulty incorrect data. Furthermore, the model was then trained using similar faulty data to experiment on whether or not a model could be created that was resistant to faulty data and was flexible enough to consistently produce accurate results. The goal of this work was to improve our understanding of how ready similar convolutional neural networks are for real-world scenarios and how possible it is to create a more flexible model. The work also serves as an example experiment that could be repeated to ensure the quality and preparedness of similar applications.

My STS research paper evaluates Tesla electric vehicles and the ethicality of the related business practices. It investigates the benefits of Tesla vehicles over typical gasoline powered

vehicles, the carbon footprint and humanitarian implications created by the production and recycling of Tesla vehicles, the safety of their vehicles, innovations, such as self-driving capabilities, added to vehicles, and the transparency Tesla has with its customers. With this information, I use the virtue ethics framework to determine if Tesla is missing any virtues necessary for it to be considered trustworthy ethical engineers. The goal of this research is to promote the discussion of what effort is necessary to not only create a worthy product, but also what other work is tangentially needed to ensure that it is prepared for release using ethical means.

The findings of my STS research can be applied to my future work as a software engineer on projects similar to the project I was a part of described in my technical paper. I have an improved understanding of how imperative it is to test products and projects I work on to ensure it is ready to be used by consumers. Furthermore, I have a greater picture of what other efforts are put into work that may relate to or affect my own projects. Without all the necessary connecting efforts, the overall goals of a project may not be met properly or there will be ethical or humanitarian shortcomings that become unintended consequences. With this in mind, I can strive to work as an ethical engineer by being conscious of proper routines that I should adopt.