

# **Thesis Project Portfolio**

## **Ultrasonic Automated Watering System**

(Technical Report)

## **A Virtue Ethics Analysis of “Dieselgate”**

(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

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Spring, 2024

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### **Sociotechnical Synthesis**

My technical project and STS research paper can be related by considering how virtue ethics plays into the design of the respective technologies involved in both papers, particularly focusing on how both projects involved some sense of duty towards minimizing harm to the environment or taking care of the environment. Both works involve practicing certain virtues such as integrity and commitment to quality of work, requiring that the engineers involved in the design process consider care for the environment in their designs. The two works observe this from different perspectives, however. The technical project, when used on a large scale, can provide considerable care to the environment which was noted by our team as we were designing it. Meanwhile, the research paper analyzes the lack of virtuous behavior by specific employees that ultimately led to increased harm to the environment.

My technical project relates to virtue ethics as my team and I needed to consider how to act virtuously throughout the design process. Our project was an automatic plant-watering system, however, we took extra care to listen to the plants' needs more so than any existing system. Based on relatively new studies of plants, we learned that they emit ultrasonic sounds when under stress, whether this be a leaf being torn off or suffering from a lack of water. A more severely dehydrated plant produces more sounds per a given time so we designed an ultrasonic microphone to detect these sounds. We would then track these sounds and if the number of sounds emitted per hour met a certain threshold, we were to design code to determine the plant was in need of water and use a peristaltic dosing pump along with a microcontroller to automate the watering process. In the design process I would say we acted virtuously and were committed to the quality of the design since we found a better way to listen to a plant's needs so that they are met before the plant begins to wilt due to lack of water. We also considered how this design

could be used on a mass scale for applications such as gardening and agricultural purposes and noted this would help us follow our duty to care for the environment.

My STS research paper heavily ties into the idea of virtue ethics because in the paper I used the virtue ethics framework to analyze the actions of those involved in the scandal of “Dieselgate” to determine whether or not they were moral. The paper explores the actions of the employees involved through various professional engineering virtue ethics to determine that the individual actors did in fact behave immorally, but also that it is important to hold those individuals accountable rather than only focus on blaming Volkswagen as a whole. The paper also explains how their immoral actions directly harmed the environment thus they failed to uphold their duty to care for the environment.

The value of working on these projects at roughly the same time came more so from using the STS research paper to reflect upon my technical project and the design process as it was completed before the research paper was written. Analyzing the case of Dieselgate through virtue ethics taught me that company culture often puts pressure on engineers to complete projects quickly, usually at the cost of quality. It showed me that not many employees within the company will challenge this mentality to produce a higher quality product. Thus, in my future work as a professional engineer, I will be vigilant about practicing the professional engineering virtues even when it may entail speaking against those higher-up than me in the company. It is my duty to ensure the company and its employees are following these virtues in order to create the best products with the least amount of harm, whether the harm in question be related to protecting the environment or other aspects of societal well-being.