

**The Ethics of Care: How Engineers can Promote Moderation of Drinking in Adolescents
and Young Adults**

An STS Research Paper Submitted to the

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Bachelor of Science, School of Engineering

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

Signature _____

Approved _____ Date _____

William Davis, Assistant Professor of STS, Department of Engineering and Society

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Sociotechnical Synthesis

Growing up as a teenager in the United States and Ireland, as well as a college student in the US, has afforded me the opportunity to experience a variety of drinking cultures and habits. After participating in an array of drinking activities throughout my young adult life, I began reflecting on why and how these attitudes towards drinking came to be, and what role do engineers play in all this. My technical project focuses on the design of a N.A. beer and hard kombucha process, where the ethanol removed from the beer is saved and used to increase the alcohol level in kombucha. From a purely technical and engineering perspective, this design process is novel, interesting, and economically sustainable. However, this new technology could potentially lead to alcohol being used in other “regular” beverages and marketed towards a younger audience. My STS research focuses on how engineers and others within the beverage industry must hold the virtue of care when designing new technologies or marketing new products, specifically to young adults. Together, I evaluate the technical design of this process and the implications it might pose if those in the beverage industry do not adhere to the ethics of care.

For my technical project, we wanted to repurpose the extracted alcohol from the beer for another beverage. After brainstorming the possible drinks we could make alcoholic, we decided on kombucha due to its growing popularity. In order to complete this task, four major unit operations were designed: beer fermentation to generate the alcohol and our primary beverage, reverse osmosis through diafiltration to remove the ethanol from the beer, distillation to further remove the ethanol from the residual water, and kombucha fermentation to generate our secondary beverage. Reverse osmosis is typically not used within the beverage industry due the

high operating and equipment cost, but we were able to optimize it and achieve a successful and profitable design.

There are potential impacts of this technology on college students, where access to alcoholic beverages while under the legal age is very easy. By introducing alcohol to “regular” drinks, there is a risk of the alcohol content being obscured due to marketing techniques, which could exacerbate underage and binge drinking. This leads me to my STS topic where after performing a cultural comparison of drinking culture in the US and Ireland, I developed a virtue ethics framework to help engineers and others within the beverage industry to address issues of underage and binge drinking, specifically when creating drinks potentially marketed toward college students. The cultural comparison helped me to understand why and how drinking cultures were formed. I realized that by using and understanding cultural differences, those in the beverage industry can engage, market, and design better products, tailored to those cultures. Through the virtue ethics of care, objectivity, and honesty, engineers can prioritize consumers safety and well-being, while also advocating for transparency and accountability with those in management.

Before taking STS and performing my research, I was unaware of the ethical responsibilities inherent in the engineering profession, not only within the engineering community itself, but also within the regulatory and managerial departments of engineering firms. The lures of profitability and institutional group-think in conjunction with each other pose a direct threat to engineers attempting to act in an ethical manner. My STS research allowed me to discover the aspects of engineering beyond the technical design application. It allowed me to understand how ethical principles, such as virtue ethics, can have real impacts on the safety, health, and well-being of ordinary consumers, especially in industries producing for the masses

such as the beverage industry. As I move forward into the industries I have studied and critiqued through this research process, I hope to uphold the principles that I have advocated for with such enthusiasm.