Thesis Portfolio

Automated Air Removal Device for Infusion Pump
(Technical Report)

Ethical Analysis of the Neuralink Company
(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

This thesis has two main components. The first is the technical report, which is about a device that automatically removes air in an IV line. The IV line is a device used for medical reasons that puts various fluids into a patient's bloodstream. If there are bubbles in the IV line, there would be a medical problem as bubbles in a vein are harmful to the patient. If a bubble is found, a sensor is activated, making a sound that tells a nurse to remove the bubble. The design my group came up with was a device that shakes the IV line so the bubbles can return to the IV bag. The overall design had a microcontroller that activates motors that shake to remove the bubble. For the device to tell if there is a bubble, a microphone was included to activate the motors and remove the air bubbles. The report also looks at the constraints of the device, such as the usability of the design created, and the parts needed to create the device. My group also looked at the ethical concerns for the device, such as the device not correctly removing bubbles, which would delay the nurse from being able to remove the bubbles.

With regards to the STS Research Paper, the topic is about the Neuralink company and its device in development, the Link. The Neuralink company is a startup with Elon Musk as the head, which aims to create a brain-computer interface that connects a human mind to a computer, in order for various reasons. One reason is so the device can help medical patients communicate by letting a patient control a computer without physically touching something. Elon Musk also aims for the device to be for general use, in order for people who don't have medical problems to use it. To look at the various aspects of the development of the device, I used SCOT, a framework that looks at the interplay between various groups that affect the development of the device. There are various potential problems with the device, like device safety and the potential uses of the device in the future. My paper details one such way of viewing ethical concerns by using Mediation Theory, which allows a researcher to explore various potential outcomes of the device. Mediation Theory doesn't just look at problems with the device, it also looks at how the device might affect culture and the way people use computers in their lives. The paper also looks at various papers created by authors which reflect their opinions on the device, and how it might affect people in real life, along with how the device might be a step in the right direction with regards to developing brain computer interfaces in general.

Both of these devices are related to the field of medicine, with the IV line directly being a medical device, and the Link being at the beginning a device to help medical patients to communicate.