

Thesis Portfolio

Designing a Modified Armboard for Cardiovascular Medicine

(Technical Report)

Does a Sweet Tooth A Heavy Body Make?

(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

Two projects were done that are somewhat connected. One being a Capstone project involved with constructing an improved and more flexible version of an already existing tool. The other project, the STS Research, involved research into the biological and cultural effects of sugar and its abuse. The technical work involves creating a universal armboard model for the UVA hospital. The armboard has been designed based on feedback from various hospital doctors, nurses, and staff from different labs. The main patients, in the department of cardiovascular medicine, are overweight. Therefore, the armboard model was created with a large patient size in mind. The second project, the STS research, is about how additive sugars are used as political technologies and how these sugars play a role in Actor Network Theory. The connection between the Capstone project and the STS research paper is the different populations of patients. The armboard model was designed for the large patients in the UVA hospital while the STS Research paper looked into how additive sugars may play a part in the rising population of obese people in the world.

The objective of the Capstone Project is to design and create a universal armboard model for the Cardiovascular Medicine department in the UVA hospital. The creation of the universal armboard model first involved interviewing multiple hospital staff for opinions and feedback. After that, a model was created using Autodesk Fusion 360. Afterwards, a small-scale model, 3D printed and 10 times smaller than what the full-scale model should be, was displayed and shown to hospital staff again; former staff interviewed and new people. With the feedback, a brand-new model was made, with improved features such as a redesigned centerboard and changed dimensions of hooks and openings. A model that we removed features found out to be unnecessary and even detrimental and replaced with better more versatile features. Such features

that were removed and replaced included hooks that were then replaced with slots that stylets can be used; stylets are a tool that can bend and hold great weights of wires. Another removed were a cupholder feature that was replaced with a shaped peg holder as a guarantee the arms of the board do not fall out. The creation of the first prototype allowed our team to possess a standard of what our final prototype should contain, a central body and two armboards that will then be securely attached to the centerboard as to allow security and stability of the patient's arm(s).

The subject of the STS Research Paper is additive sugars, their addicting properties, and the exploitation of additive sugars by companies. The research question is: how addictive are additive sugars, how much do additive sugars factor as a political technology and how much influence do additive sugars have in Actor Network Theory (ANT)? Humans evolved to be rewarded when eating foods with sugars as a means to not eat poisonous foods. The STS frameworks that are included throughout this paper are political technologies and Actor Network Theory (ANT). Political technologies are one of the main STS frameworks as the sugar industry changes results of experiments on sugar; most likely so the industry will continue using additive sugars as a means to keep people addicted to their products. ANT is another STS framework used in this analysis as it involves a lot of factors in a business as it needs a company, products, customers, advertisements, and more. Methods that were used in this research paper was research papers on evolution with sugar, socioeconomics, social experiments, history of sugar companies and fast foods, and interviews with people who have dealt with obesity. This research paper has shown that sugar can be very addictive, the sugar industry tampered with evidence, experiments and results in the 1950s-1970s about the effects of sugar, companies spend enormous amounts of money on advertisements alone, socioeconomics can affect what people eat each day, and how cultural backgrounds and/or bad habits can lead to obesity and obesity-related problems. More

importantly, the results of the paper demonstrate how additive sugars are used as a political technology and is a major factor in the ANT.

Both of these projects have shown how much change obesity causes, whether it be on people or devices used by people, and that obesity affects places and things never thought before. The STS Research Paper went into what types of foods and chemicals people can eat every day and how much effect it has on obesity. The Capstone project's purpose is to redesign the armboard tool in the UVA hospital not only to make a universal armboard that can be used amongst the various labs in the Cardiovascular Medicine but also to hold and maintain, while also providing comfort, to large and heavy patients that visit the hospital frequently. These projects are loosely linked, and such connections would not have noticed how these projects are related by themselves. Now that they have, solutions for the future will be hypothesized; solutions that can help eliminate obesity.