

Thesis Portfolio

Design and Construction of a Robotic Half Humanoid Half Rotunda: Rotundaur

(Technical Report)

How Charlottesville can Win with Open Data

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Sciences

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science in Engineering

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Spring, 2020

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Sociotechnical Synthesis

Senior year at the University of Virginia often sees engineering students focus more on a large capstone project and a transition from a student to a career than the typical engineering course load and exams. Being a mechanical engineering student, I spent three years learning how to build machines, learning how to code, learning how to use computer-aided design software, and learning to work in teams. Never in my first three years was I able to apply all of that learning into one cohesive project, and that's what I wanted for my senior design project.

My team and I chose to design and build a robot from scratch using mostly 3-D printed parts. This allowed us to utilize all the skills we had learned in our university career's while giving us the creative flexibility to design it how we wanted. Part of our mission was to use our robot for educational purposes and to introduce middle and high schoolers to STEM projects to spark an interest in engineering as a career path.

While STS courses functions as a discipline in which engineering students must take in order to fulfil some type of writing requirement, STS courses also provide students with the opportunities to think about how technology and society impact each other and affect the culture of the worlds in which they are generated.

In the fall semester, my STS class embarked on a class wide search for the values and policies that would be a catalyst for a "smart Charlottesville". When my little brother, who is also a student at UVA, witnessed a violent mugging on Jefferson Park Avenue, I knew that I wanted to focus on the safety and security of Charlottesville citizens. After doing a considerable amount of research into Charlottesville's current safety processes, I realized Charlottesville's potential to utilize data to the benefit of the city. For this STS research paper, I wanted to

investigate Charlottesville's current shortfalls with open data and how Charlottesville could learn from other municipalities to more effectively use open data. This research taught me so much I didn't know how data is collected and used by governments. With UVA's new addition of a data science school, this research could be a good starting point for a blueprint on how the university and the city of Charlottesville can work together to achieve open data initiatives that are mutually beneficial.

This year was extremely rewarding for me and was crucial to my development. I learned patience through spending countless hours debugging circuits and code. I learned taking responsibility through individual checkpoints and prototype deliverables for our robot. This design project saw the majority of its goals achieved. My team presented our robot and its prototypes on multiple occasions to middle and high school students throughout the fall semester as classes visited and toured the university. We were able to incorporate nearly everything we have learned in the past four years into one project, and in the process, learn more for this project than any traditional college course could teach.