

**Thesis Project Portfolio**

**Rock-Slide: Developing an Indoor Climbing Volume with a Linearly Actuating Hold**

(Technical Report)

**Masculine Design Of Weightlifting Technologies And Exercise Spaces Contribute To Gender Bias In Gyms**

(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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## **Sociotechnical Synthesis**

Athletics and physical activity has always been a significant part of my life. When I started lifting weights in high school for a class, it became distinctly obvious that the sport of weightlifting was primarily tailored towards men. This was apparent on social media, in the content of online workout routines, and experiences of being outnumbered by male lifters while at the gym. Similarly, when I went to college and began participating in the sport of climbing, I realized how intimidating and difficult the sport can be for novices. Both my technical work and STS research were completed due to these restrictions noticed in my personal experience. My technical project focuses on climbing and the creation of an automated climbing hold in efforts to entice more people into the sport and my STS research considers the sport of weightlifting and the implications of equipment design on the gender discrepancy in gym spaces.

My capstone project consisted of building a mechanism that could move a climbing hold in a linear motion back and forth while a person was hanging on it. The internal moving parts were designed to fit within the empty area of a climbing volume, a large hollow prism that gets mounted to a climbing wall in order to create new features. The front face of our trapezoidal design had a slot where the climbing hold moves back and forth. This entire structure was to be mounted in Slaughter Recreation Center at UVA to be used by the community. As one could predict, many different people use the climbing center at UVA. This means that when we designed this product, we tried to account for many body types in our design decisions. This invention was created in efforts to make an exciting addition to climbing to draw more people into the sport. Additionally, it has the potential to alter climbs by changing the location of the hold in order to make climbs more equal for different heights. Overall, the intention was to get more people interested in and excited about the sport of climbing.

My STS research paper considers how the design of weightlifting equipment and gym spaces primarily regard a male audience and thus perpetuate a masculine environment. To analyze this subject, I compared select equipment at the four University of Virginia (UVA) gyms to the average body dimensions of males and females. Through this research, I found that many machines are accessible to most people. However, some of the equipment used for more stereotypically male exercises such as pull up bars, tricep dip bars, and the lat pulldown machines have design features that favor the average male body. This discrepancy can have negative implications for women trying to engage in weightlifting. Additionally in this paper, I analyzed the space itself and how the layout of gym equipment can make accessing certain machines more intimidating. Through this research, I was able to conclude that the design of certain weightlifting equipment and gym spaces generally favors male lifters.

By working on my technical and STS research project at relatively the same time, I was able to consider the implications of what I was designing and who was going to be able to use this device. When the designers of weightlifting equipment created products for their target audience, they were perhaps unaware that in narrowly defining this group, they prohibited others from engaging in certain exercises. Much like these designers, our capstone group was working to create a machine that is to be used by many in an active capacity. By doing this research project in addition to the technical portion, I had a greater capacity to consider all of the potential users of this device. As I was creating this product, I was more aware of making design decisions that made the final hold moving mechanism accessible to many. This included choosing a motor with a high torque to be available for people of different weights and making the hold that is attached to the front easy to hold onto with its deep shape. Without the integration of the two

projects together, I may have been less sensitive to different perspectives and possible users of the climbing device.