

**Thesis Project Portfolio**

**Low-Profile Dynamic Wrist Orthosis Device For Pediatric Patients With  
Wrist Motor Impairment**

(Technical Report)

**A Contemplative Space that Prioritizes Student-Identified Flourishing at UVA**

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science  
University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree  
Bachelor of Science, School of Engineering

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Spring, 2020

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## **Sociotechnical Synthesis**

For the sociological portion of my senior thesis, I sought out information about the idea of student flourishing at UVA, and explored the boundaries of how students view themselves as flourishing versus their professors, faculty and staff. I also looked for proven mechanisms to combat the issues in place on college campuses today, inclusive of mental health stigma and the progression of its consequences.

Some of the prevalent themes throughout the data collected in student surveys on these topics are undeniable and thought-provoking even on a small scale of responses. It remains a common theme that students do prioritize their mental health, especially those students focusing their college tenures on a liberal arts education, and they almost universally recognize as crucial to their thriving. And yet, on the whole students don't have any comfort in talking to their professors about their own mental health, likely because these students do not have confidence in their professor's education on topics of mental health, as revealed in the survey results.

By incorporating design elements which nurture contemplative practices and implementing resilience education programming into the public student spaces as well as the classroom framework, UVA can help follow in suit of many other universities which are beginning to learn from their constituents, the students, and create an undergraduate experience which helps them to flourish and thrive in the way they best identify doing so.

I am thankful to all survey participants who helped drive the results and discussion of this study, as well as to the advisement of Professor Sean Ferguson and Professor Sharon Ku for their advice throughout the research process.

For the technical portion of my senior thesis, I pursued the field of pediatric orthotics. Wrist extensor muscles of children with motor impairments can often be weak, causing several limitations in the development of their grip strength. Our capstone team sought to improve on a previous team's wrist orthosis design, first by developing crucial criteria for device improvement based on clinical observation, including: wrist elevation, movement preservation, and low-profile capability. We then pursued

prototyping for our three most promising designs, as determined by a PUGH chart analysis: thermoplastic design, piano wire design, and coil spring design.

Mechanical testing on the thermoplastic design confirmed its functionality for patients 5-14 years old. A survey given to non-impaired users resulted in both the piano wire and thermoplastic design receiving positive scores, greater than the previous team's design. Finally, we conducted an IRB-approved survey among occupational therapists to determine the potential success of our device designs. Professional response indicated that each of our designs were considered an improvement to the current orthosis devices used, our thermoplastic device scoring especially high in comparison to the previous team's design.

I am thankful to my capstone team members, Kelsey Hannifin and Madisan Yates, for being excellent teammates throughout this capstone process. We are thankful to the advisement from Dr. William Guilford, as well as Sue Berres, O/T and the rest of the occupational therapy dept. at UVA who helped give a professional assessment of our project.