

# LEAH R. THOMAS

---

840 Tosomock Circle Apt. 207, Kalamazoo, MI 49006 || (757) 869-862||  
leah@leah-thomas.com || www.linkedin.com/in/leahthomas4 || leah-thomas.com

## EDUCATION

---

**Virginia Tech, Blacksburg, VA** August 2018- May 2022  
Bachelor of Science in Biomedical Engineering  
Major GPA: 3.91, Overall GPA: 3.63  
Honors: magna cum laude  
Relevant Coursework: Wearable Bioinstrumentation, Bioinstrumentation Lab, Play to Make: Creative Technologies and Engineering, Usability Engineering, Digital Signal Processing, Biomedical Devices, Needs Identification in Healthcare

## HONORS & AWARDS

---

Dean's List for 6 semesters	2018- 2022
Virginia Tech Undergraduate Research Excellence Program	May 2022
Winner of The Engineers' Club Most Outstanding Science Student Scholarship	May 2018
Winner of the Virginia Tech Pamplin Leader Award	May 2018
Winner of the Randolph Book Award Scholarship	May 2018
Winner of the Fary Memorial Scholarship	April 2018
Winner of the Phyllis Varner Memorial Scholarship	March 2018

## GRANTS & FUNDING

---

Carilion Proof of Concept Program Fund <i>Carilion Clinic Innovation</i> Project Title: Development and Testing of a Proof-of-Concept Wearable Device for Treating Lymphedema Role: Lead student researcher and co-grant writer Total awarded: \$20,000	January 2022
Biomedical Engineering Student Grant <i>Virginia Tech Department of Biomedical Engineering and Mechanics</i> Project Title: BioTech Couture Role: Lead designer and co-grant writer Total awarded: \$1,000	January 2022
Engineering Faculty Organization – Opportunity (EFO-O) Seed Investment Grant <i>Virginia Tech Institute for Critical Technology and Applied Science (ICTAS)</i> Project Title: Multi-sensor Array System for Real-time Monitoring of Patients During Hemodialysis Treatment Role: Student researcher and co-grant writer Total awarded: \$10,000	October 2021
Roger and Debbie West Student Grant <i>Virginia Tech Institute for Creativity, Arts, and Technology (ICAT)</i> Project Title: BioTech Couture Role: Lead designer and co-grant writer Total awarded: \$1,000	October 2021

Honors Enrichment Grant  
*Virginia Tech Honors College*  
Project Title: BioTech Couture  
Role: Lead designer and co-grant writer  
Total awarded: \$2,250

September 2021

## RESEARCH EXPERIENCE

---

**Lead Undergraduate Researcher**, Virginia Tech & Carilion Innovation

May 2021-Present

Project Title: Towards the Development of a Wearable Device to Manage Lymphedema

Department: Biomedical Engineering and Mechanics

Primary Investigators: Dr. Christopher B. Arena; Dr. Andre Muelenaer; Tara Newberry COTA/L, CLT, OCC

- Lead programmer responsible for programming arrays of eccentric rotating motors to create customizable patterns simulating traditional manual lymphatic drainage massage techniques.
- Wrote MATLAB programs to conduct FFT analysis, signal process data, and generate meaningful plots.
- Designed and programmed a user-interface mobile application to control vibration patterns via Bluetooth LE.
- Utilized sewing skills to create wearable prototypes of full-arm sleeve wearable device with embedded motors for human study protocol.
- Interviewed stakeholders to define user needs and documented discussions for FDA design controls.
- Conducted experimental trials using vibration motors and an accelerometer to analyze vibration motor data. Results showed that the wearable device had comparable results to clinically used handheld tools.
- Research was funded through Carilion Clinic Innovation proof of concept program, which emphasized Lean Startup, Agile Methodologies, and Human Centered Design processes within time-bound sprints.

**UX Research Assistant**, Virginia Tech

May 2021- September 2021

Project Title: Designing an Interactive Training System for Pediatric Telemedicine Cart Operators Incorporating Augmented Reality

Department: Industrial Design

Primary Investigators: Dr. Elham Morshedzadeh; Dr. Wallace S. Lages; Dr. Andre Muelenaer

- Aided in conducting usability testing for multiple clinical trials, interviewing research participants, and holding focus groups to identify pain points and construct user journey.
- Wrote surveys to retrieve qualitative data from participants.
- Utilized Tobii Pro Glasses 3 and Tobii Pro Lab analysis software to analyze eye tracking data and assess quantitative data from research trials. Wrote eye tracking usage protocol for future studies.
- Presented interim progress report findings to Integrated Translational Health Research Institute of Virginia.

**Undergraduate Research Assistant**, Virginia Tech

January 2020- December 2020

Project Title: Development of an Arm Exoskeleton for Pediatric Patients with Cerebral Palsy

Department: Mechanical Engineering

Primary Investigator: Dr. Alan Asbeck

- Collaborated with one other student to design an arm exoskeleton for a patient with cerebral palsy.
- Utilized machine shop tools to rapidly prototype various solutions.
- Researched various dampers that would limit velocity from spastic motion

## WORK & DESIGN EXPERIENCE

---

### **Stryker Corporation- Instruments Division, Portage, MI**

August 2022- Present

#### ***Electrical Design Engineer***

Chosen as 1 of 7 engineers in the Rotational Intensive Specialized Experience (RISE) Program

#### **Neurosurgical Business Unit**

November 2022- Present

##### *Electrical Design Work:*

- Utilizing Altium Designer to design and layout PCBs.
- Using various BLE development kits for rapid wireless connectivity prototyping and software development.
- Collaborating in interdisciplinary team of 4 to drive forward a new product from R&D to product development.

##### *Data Analytics Research:*

- Selected by senior executive leadership to be a core member of interdisciplinary research team of 3.
- Conducting interviews cross-divisionally to get user feedback on current data analytic measures.
- Determining pain points and mapping user journeys to narrow research scope.
- Utilizing MATLAB to signal process and analyze surgical instrument data.
- Ideating and prototyping a streamlined system to gather data from existing products and present meaningful information to stakeholders.

#### **Experimental Electronics, Shared Services Business Unit**

August 2022- October 2022

- Serviced electronics from multiple product lines across Stryker Instruments, with emphasis on PCBA rework and cable harness construction.
- Sourced, cataloged, and stocked electronic components for prototype PCBA builds.
- Presented invention disclosure preliminary research to IP Evaluation Board resulting in IP assignment.

### **BioTech Couture, Blacksburg, VA**

August 2021- May 2022

#### ***Co-Founder and Design Team Member***

- Collaborated with an interdisciplinary team of biomedical engineers and industrial designers to design a novel collection of couture dresses that incorporate wearable sensors.
- Created a wearable servo-controlled headpiece that would rotate depending on brain activity collected from a Muse EEG headset.
- Lead circuit designer for integrating EEG, EMG, and EKG sensors into the dresses.
- Integrated a variety of technical skills such as 3D printing, laser cutting, data visualizations, sewing, and wearable sensor technology into a singular project.
- Worked under tight time constraints and balanced multiple roles as technical lead, fashion designer/seamstress, and runway show co-director. Hosted model recruitment and training events, coordinated schedules between models and designer team, and planned logistical details of runway show.
- Project culminated in 2 BioTech Couture fashion shows in May 2022 with 250+ attendees.

### **MSAS Hemodialysis Wearable Tracker- Senior Thesis, Blacksburg, VA**

August 2021- May 2022

#### ***Design Team Member***

- Designed a multimodal sensor array system to track biological parameters to improve hemodialysis treatment.
- Prototyped electrodermal activity (EDA) sensors and comparing quantitative results to Empatica E4 EDA data.

- Utilized MATLAB and R to create data visualizations and conduct statistical analysis.
- Collaborated with the American Association of Kidney Patients (AAKP) to create a novel device with the feedback and guidance of dialysis patients.

**Johnson & Johnson Innovation/Carilion Clinic Interdisciplinary Design Sprint, Washington D.C.; Roanoke, VA.**

**Design Team Member**

August 2021

- Collaborated with an interdisciplinary team of 5 biomedical engineers and 3 industrial designers.
- Designed a low-fidelity wireframe web application in 5 days targeted at pediatric hemodialysis patients and their caregivers.
- Resulted in 3 products with supporting intellectual property.
- Prioritized deadlines and produced deliverables in a condensed time frame.
- Interviewed patients, caretakers, practitioners, and dialysis experts to identify clinical needs.
- Presented product development results to an audience of business, academic, and healthcare professionals.

**VT BEAM/Carilion Clinic Innovations, Blacksburg, VA; Roanoke, VA**

May 2021- July 2021

**Medical Device Innovation Consultant**

- Collaborated with a team of 4 biomedical engineers and Carilion Clinic medical professionals.
- Prototyped solutions for an automated medication management system, a female urine collection device, and a head and neck lymphedema treatment device.
- Lead designer of a high-fidelity wireframe application created using Figma for dementia patients and caregivers.
- Built a wearable prototype with customizable vibration motors for a lymphedema wearable device.
- Communicated engineering deliverables to medical professionals resulting in 2 provisional patents.

**Imprint: 3D Printing Micro-factory System, Blacksburg, VA**

January 2020- May 2020

**Design Team Member**

- Collaborated with an interdisciplinary team of 6 in partnership with Boeing, GE, and Caterpillar Inc.
- Developed an additive manufacturing system to reuse plastic waste to create products for the community.
- Responsible for prototyping, research, and product development, and presenting to senior leadership.

**Quality of Life, Virginia Tech Biomedical Engineering Design Club**

January 2019- May 2019

- Prototyped a 3D-printed prosthetic hand for a local Roanoke resident
- Utilized sewing skills to attach MyoWare sensors

**Etsy Shop Owner**

March 2013- December 2020

- Marketed and sold 300+ handmade paintings and handsewn items on Etsy and Instagram.
- Responded to customer inquiries and completed custom commissions.

## **PRESENTATIONS AND PUBLICATIONS**

---

**Thomas, L\***; Jarvis, S\*; Wenger, L; Newberry, T; Muelenaer, A; Arena, CB; (2023, April 17-19). *Towards the Development of a Wearable Device to Manage Upper Extremity Lymphedema*. Proceedings of the 2023 Design of Medical Devices Conference, Minneapolis, MN, USA. DMD2023-6551.

**Thomas, L.**, Hasan, M., Weaver, R., Seth, M. (2022, May 2). *BioTech Couture: An Interdisciplinary Fashion Initiative at the Intersection of Biotechnology and Design* (Presentation). Virginia Tech Institute of Creativity + Innovation Day, Blacksburg, VA, United States.

Daily, A; Laiti, J; Norfleet, D; **Thomas, L**; Wakefield, J. (2022, April 25). *Multi-modal Sensor Array System for Hemodialysis Patients* (Poster). Virginia Tech Department of Biomedical Engineering and Mechanics Senior Design Exposition, Blacksburg, VA, United States.

Wenger, L., Jarvis, S., **Thomas, L.**, Muelenaer, A.; Arena, C.; Newberry, T. (2022, October 12-15). *Development of a Wearable Device to Treat Upper Extremity Lymphedema* (Poster). Biomedical Engineering Society 2022 Annual Meeting, San Antonio, TX, United States.

**Thomas, L\***; Wenger, L\*; Jarvis, S.; Muelenaer, A; Arena, C; Newberry, T. (2021, October 6-9). *Development of a Wearable Device to Treat Postoperative Head and Neck Cancer Lymphedema* (Poster). Biomedical Engineering Society 2021 Annual Meeting, Orlando, FL, United States.

## PATENTS

---

LR Thomas, L Wenger, T Newberry, CB Arena, A Muelenaer. "Devices and Systems for Providing Compression and/or Vibratory Forces to Tissues." US Patent Application PCT/US22/37612

## LEADERSHIP & VOLUNTEER EXPERIENCE

---

**Director of Creativity, Coalition of Christian Outreach** January 2021- Present

- Designed creative projects for a group of 20 students to participate in that include metaphorical elements of lessons learned throughout the semester.
- Volunteered monthly at the local NRV Diaper Pantry to package and distribute diapers to families in need.

**Ministry Leader, Cru at Virginia Tech** January 2019- December 2019

- Wrote and delivered monthly sermons to a group of 50 students and collaborated with 4 students to organize and promote student-led events.
- Led a weekly bible study of 10 freshmen girls.

**Coding Instructor, Boolean Girl Inc., Arlington, VA** July 2019- August 2019

- Taught elementary school and middle school students how to code using Scratch.
- Managed a classroom of up to 15 students and resolved conflicts between students.

**Program Assistant & Residential Advisor, C-Tech<sup>2</sup> Engineering Camp, Virginia Tech** June 2019- July 2019

- Led 15 high school girls by facilitating discussions about STEM diversity and served as a RA.
- Planned educational events and mediated conflicts between students.

**STEM Participation and outReach for K12 (SPARK), VT CEED** August 2018- May 2019

- Volunteered biweekly to lead local elementary school students to engage in STEM projects.
- Facilitated classrooms of up to 15 students and modified curriculum to meet the needs of the students.

## EXTRACURRICULAR ENGAGEMENT

---

**Create & Relate Podcast, Podcast Host** November 2022- Present

- Promoting public interest and raising awareness of assorted topics in science, technology, and design with an emphasis on interdisciplinary research
- Interviewing people from diverse creative and scientific backgrounds to disseminate their research in an accessible format
- Building scientific communication skills and advocating for listeners to explore new ways of approaching Science, Technology, Engineering, Art, and Mathematics (STEAM) fields

**Student Ambassador, VT BEAM Department** September 2019-May 2021

- Participated in engineering outreach events to answer questions about the BEAM program.

#### **Member of Hypatia Living and Learning Community, VT CEED**

August 2018-May 2019

- Participated in academic, professional development, and social events with fellow female engineers.

#### **GE Leadership Essentials/Dare to Lead Conference**

October 2018

- Chosen to attend a conference hosted by General Electric focused on teaching students about leadership and teamwork skills.

#### **Student Transition Engineering Program, VT CEED**

June 2018-August 2018

- Attended a 5-week program and took three foundational engineering classes prior to officially attending VT.

## **PRESS & MEDIA FEATURES**

---

Cooper, E. (2022, July 28). “‘Brainy’ couture: Biomed grad designs high-tech fashion.” *Virginia Business Magazine*, <https://www.virginiabusiness.com/article/brainy-couture-biomed-grad-designs-high-tech-fashion/>

Roberts, S. (2022, May 26). “BioTech Couture Merges Engineering and Art through Biosensor Dress Design.” *VTx*, [https://vtx.vt.edu/videos/k/2022/05/1\\_oj0be60l.html](https://vtx.vt.edu/videos/k/2022/05/1_oj0be60l.html)

Voices of America. (2020, September 11). “College Tours: Virginia Polytechnic Institute [Video].”

<https://www.youtube.com/watch?v=aH1VSm17yGE>

*[Selected as student representative in documentary broadcasted on South Korean TV to encourage international students to apply to Virginia Tech]*

Heymann, A. (2018, June 12). “Graduating seniors reflect on forces that help shape them.” *The Virginia Gazette*.

## **CERTIFICATIONS & LICENSES**

---

Certified SOLIDWORKS Associate in Mechanical Design (2022) *SolidWorks Corporation*

CITI Good Clinical Practice Course for NIH Funded Clinical Trials (2021). *CITI Program*

CITI Basic Responsible Conduct of Research Course (2021). *CITI Program*

CITI Biomedical Research (2020). *CITI Program*

## **TECHNICAL SKILLS**

---

**Software:** Python, MATLAB, R, JavaScript, Arduino, Altium Designer, SOLIDWORKS

**Communication/Protocols:** SPI, I2C, UART, Bluetooth Low Energy

**Prototyping:** PCB manufacturing and design, soldering, schematic design, PCB reworking, microcontrollers, laser cutting, thermoforming

**Design:** User experience research, Figma, wireframing, process mapping, contextual inquiry, MATLAB GUIDE, Processing IDE, sewing, flat pattern making, draping, tailoring