LEAH R. THOMAS

Roanoke, VA 24012 || leah.rebecca00@gmail.com
leah-thomas.com

EDUCATION

2023-2025 Virginia Tech
M.S. in Biomedical Engineering | GPA: 3.88
Advisors: Dr. Christopher Arena, Dr. Robert Stone, Dr. Miguel Perez | Biodesign Fellow

2018-2022 Virginia Tech
B.S. in Biomedical Engineering | GPA: 3.63 | Magna Cum Laude

RESEARCH EXPERIENCE

2023-2025 Virginia Tech & Carilion Clinic | Roanoke, VA
Biodesign Fellow; Advisors: Dr. Chris Arena & Dr. David Salzberg

- Conducted 20+ clinical needs assessments and contextual inquiry research across many clinical environments and synthesized 90+ user insights into a searchable database.
- Collaborated cross-functionally with nurses, physical therapists, surgical residents, and biomedical engineers to translate insights into product design.
- Developed a patient questionnaire with a local free clinic to identify clinical needs, recruit patients for focus groups (8 patients recruited), and expand educational programs for the uninsured/underinsured.

2021-2025 Virginia Tech, Department of Biomedical Engineering and Mechanics | Blacksburg, VA
Project Title: LymphaVibe
Graduate Research Assistant & Undergraduate Research Assistant; Advisor: Dr. Chris Arena

- Co-inventor and lead R&D engineer for a wearable therapy device (Patent US18/415,117).
- Managed technology development, including design, regulatory documentation, usability studies, and risk assessment (FDA, ISO 13485/14971).
- Developed MATLAB programs for FFT analysis and signal processing.
- Designed and programmed a mobile app for controlling vibration patterns via Bluetooth LE.
- Created full-arm sleeve wearable prototypes with embedded motors for a pilot clinical trial using sewing skills.
- Validated vibration motors on a bench to define optimal therapeutic frequency ranges.
- Authored IACUC protocol for in vivo MRI study and an IRB-approved interview study protocol for a clinical trial.
- Conducted over 35 customer discovery interviews in the RAMP Accelerator Program to refine user needs, create a business plan, and develop a commercialization strategy.
- Provided advanced technical support during IRB-approved trials, ensuring protocol compliance.
- Performed bench validation testing of vibration motors to determine optimal therapeutic

frequency ranges.

Summer 2024 Virginia Tech, Department of Biomedical Engineering and Mechanics | Blacksburg, VA
Project Title: Designing Accessible Solutions for Healthcare (DASH) Design Sprint
Graduate Research Assistant; Advisor: Dr. Chris Arena & Dr. Ashley Taylor
Research with Dr. Christopher Arena and Dr. Ashley Taylor

- Developed design sprint curriculum integrating design thinking, engineering, and health equity principles, and evaluated students' adoption of material.
- Organized community stakeholder participation to support student design research interviews.
- Developed pre- and post-assessment plans; analyzed qualitative results and co-authored a paper presented at the ASEE National Conference.

Summer 2023 Virginia Tech, Department of Biomedical Engineering and Mechanics | Blacksburg, VA
Graduate Research Assistant; Advisor: Dr. Sara Arena

- Developed career resources for the College of Engineering Bridge Experience Program.
- Wrote an extensive guide for undergraduates with professional development advice.

Summer 2021 Virginia Tech, School of Design | Blacksburg, VA
Undergraduate Research Assistant; Advisor: Dr. Elham Morshedzadeh

- Aided in conducting usability testing for multiple clinical trials, interviewing research participants, and holding focus groups to identify pain points.
- Wrote surveys to gather 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 the Integrated Translational Health Research Institute of Virginia.

PEER-REVIEWED JOURNAL ARTICLES

Molotkova, E., **L. Thomas**, et al. "Clinical Evaluation of a Device to Treat Upper Extremity Lymphedema." *JVS–Vascular Insights*, Nov. 2025, p. 100326, doi:10.1016/j.jvsvi.2025.100326. (in press)
(Contributed to conceptualization, software, validation, investigation, resources, writing – original draft, writing – review and editing)

Molotkova, E., S. Jarvis, **L. Thomas**, et al. "Safety Evaluation of a Device for Treatment of Lymphedema of the Upper Extremity." *Lymphatic Research and Biology*, Dec. 2024, doi:10.1089/lrb.2023.0070.
(Contributed to experimental design and manuscript writing)

PEER-REVIEWED CONFERENCE PROCEEDINGS

Thomas, L*., Altaii, J.* et al., "Work in Progress: Exploring the Impact of a Pre-Capstone Health Equity Design Sprint on Students' Conceptions of Health Equity." *Proceedings of the ASEE Annual Conference & Exposition*, 2025, Paper ID #49091.
*(*Equal contribution; co-led research design, qualitative analysis, and writing)*
Selected as 1 of 6 best Work-in-Progress papers in the Biomedical Engineering Division.

Thomas, L*., Schroeder, A.*, Altaii, J.* et al. "GaitWay: Development and Testing of a Novel Ambulation Device for Gait Rehabilitation." *Proceedings of the 2025 Design of Medical Devices Conference*, 2025, ASME, V001T09A009, doi:10.1115/DMD2025-1096.
*(*Equal contribution; led motor current draw testing and analysis; co-led experimental design and writing; co-developed poster presentation)*

Thomas, L.*, Jarvis, S.*, et al. "Towards the Development of a Wearable Device to Manage Upper Extremity Lymphedema." *Proceedings of the Design of Medical Devices Conference*, 2023, p. 6551, doi:10.1115/DMD2023-6551.
*(*Co-first author, presenting author; led device development, manuscript writing, and editing)*
Selected as 1 of 9 best papers and awarded 2nd place in the 5-Minute Pitch Competition at the DMD Conference.

CONFERENCE PRESENTATIONS/POSTERS

Thomas, L., et al. "Characterization of Motor Enclosures for a Wearable Device to Treat Lymphedema." *Biomedical Engineering Society (BMES) Annual Meeting*, Oct. 2024, Baltimore, MD. Conference Poster.
*(*Equal contribution; led testing and co-developed poster presentation)*

Thomas, L*., Schroeder, A.*, Altaii, J.* et al. "AI-Driven Wound Care: Enhancing Access and Quality." *SAGES Annual Meeting*, Apr. 2024, Cleveland, OH. Conference Poster.
*(*Equal contribution; supported clinical research framing, visual communication, and co-developed poster presentation)*

Wangler, S., S. Jarvis, **L. Thomas,** et al. "A Wearable Device to Manage Upper Extremity Lymphedema." *Biomedical Engineering Society (BMES) Annual Meeting*, Oct. 2023, Seattle, WA. Conference Presentation.
(Contributed to design iteration, testing protocol, and abstract writing)

Molotkova, E., S. Jarvis, **L. Thomas,** et al. "Safety Evaluation of a Device for Treatment of Lymphedema of the Upper Extremity." *VRHA Rural Health Voice Conference*, Sept. 2023, Blacksburg, VA. Conference Presentation.
(Contributed to experimental design and abstract writing)

Thomas, L.*, Wenger, L.*, et al. "Development of a Wearable Device to Treat Postoperative Head and Neck Cancer Lymphedema." *Biomedical Engineering Society (BMES) Annual Meeting*, Oct. 2021, Orlando, FL. Conference Poster. *(*Equal contribution; co-led device development, abstract writing, and presentation)*

TEACHING & MENTORING

Fall 2025- Present Interdisciplinary Projects (IDPro) program at Virginia Tech
Faculty Mentor

- Mentoring 7 interdisciplinary undergraduate students (architecture, fashion design, BME, CMDA, ISE) through a year-long biosensor fashion project.

Summer 2025 Virginia Tech Center for Engineering Excellence and Discovery | Floyd & Wytheville, VA
Program Co-Lead

- Prepared class activities on the fundamentals of BME for middle and high schoolers
- Utilized place-based pedagogy to teach a total of 14 students in rural Virginia
- Designed interactive STEM games (e.g., Jeopardy-style problem solving, relay races, and obstacle courses) to build student interest in STEM
- Adapted curricula in real time to meet diverse student learning styles and engagement needs.

Summer 2024 Virginia Tech Department of Biomedical Engineering and Mechanics
Program Co-Lead

- Developed lectures and class activities for a 3-day design sprint focused on teaching the principles of biomedical engineering, health equity, and design thinking
- Taught 5 rising senior undergraduate students and assessed learning outcomes

Fall 2023 - Spring 2024 Virginia Tech Department of Biomedical Engineering and Mechanics
Graduate Teaching Assistant: BMES 4015/4016 Senior Capstone

- Mentored capstone design teams by providing technical and professional guidance
- Graded deliverables for 69 students and provided design feedback

2019 Boolean Girl | Arlington, VA
Instructor

- Taught classrooms of 10-15 K-8th-grade students Scratch Programming

2018-2019 Virginia Tech SPARK @ Center for the Engineering Excellence and Discovery
Instructor

- Travelled to local elementary schools to teach after-school STEM activities

WORK & DESIGN EXPERIENCE

2025- Present Virginia Western Community College | Roanoke, VA
Biotechnology Outreach Specialist

- Creating community partnerships and initiatives to increase awareness of biotechnology career pathways for K-12 students
- Teaching workshops in schools and creating curriculum for hands-on STEM activities

2022-2023 Stryker Instruments | Portage, MI
Electrical Design Engineer

- Chosen as 1 of 7 engineers in the Rotational Intensive Specialized Experience (RISE)
- PCB design, BLE prototyping, and product development for neurosurgical tools
- Supported post-market surveillance and technical troubleshooting aligned with surgeon workflows.
- Developed dashboards and data visuals (Power BI, R, Python) for engineering & marketing teams.

- Assisted in a clinical formative assessment with surgeons to align technical design with OR workflows.

2021-2022 BioTech Couture | Blacksburg, VA

Co-Founder & Creative Co-Director

- Collaborated with an interdisciplinary team of biomedical engineers and industrial designers to design a novel collection of couture dresses incorporating biosensors.
- Created a wearable servo-controlled headpiece that rotated 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 the designer team, and planned logistical details of the runway show.
- Project culminated in 2 BioTech Couture fashion shows in May 2022 with 250+ attendees.

2021-2022 Senior Capstone: MSAS Hemodialysis Wearable Tracker | Blacksburg, VA

Design Team Member

- Designed a multimodal sensor array system to track biological parameters to improve hemodialysis treatment.
- Prototyped electrodermal activity (EDA) sensors and compared 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

2021 Virginia Tech & Carilion Clinic Innovations | Blacksburg, VA

Innovation Consultant Intern

- 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.
- Communicated engineering deliverables to medical professionals, resulting in 2 provisional patents.

GRANTS AND FUNDING (Total > $100,000)

2024 Link License Launch Fund | Virginia Tech | $50,000

2023 Biodesign Fellowship | Virginia Tech & Carilion Clinic | Full tuition scholarship

2023 RAMP Accelerator Fund | Regional Accelerator and Mentoring Program | $20,000
2022 Carilion Clinic Proof-of-Concept Fund | Carilion Clinic Innovation | $20,000
2022 Biomedical Engineering Student Grant | Virginia Tech Department of Biomedical Engineering | $1,000
2021 Engineering Faculty Organization – Opportunity (EFO-O) Seed Investment Grant | VT Institute for Critical Technology and Applied Science (ICTAS) | $10,000
2021 Roger and Debbie West Student Grant | VT Institute for Creativity, Arts, and Technology | $1,0000

AWARDS AND DISTINCTIONS

2025 Paul E. Torgersen Graduate Student Research Excellence Award, 4th Place ($350)
2025 ASEE Travel Award from Biomedical Engineering Division ($500)
2023 Medtronic/BMES Student Design Competition Finalist
2023 Five-Minute Pitch, Design of Medical Devices Conference, 2nd Place ($500)
2022 Virginia Tech Undergraduate Research Excellence Program
2018 Fary Memorial Scholarship ($24,000)
2018 Virginia Tech Pamplin Leadership Award ($5000)
2018 Engineers' Club Most Outstanding Science Student Scholarship
2018 Phyllis Varner Memorial Scholarship
2018 Randolph Book Award Scholarship

TALKS

INVITED GUEST LECTURER

Working Towards Equitable Solution; James Madison University, *Intro to Biomechanics,* April 8, 2025
Wearables in the Wild; Virginia Tech, *BMES 4984: Wearable Bioinstrumentation*, February 27, 2024
Community-Based Participatory Design; Virginia Tech, *BMES 3144 Biomedical Devices*, January 25, 2024
Wearable Design and Research; Virginia Tech, *BMES 4984: Wearable Bioinstrumentation*, February 21, 2023

INVITED TALKS

Biomedical Engineering Panel Interview; Undergraduate Biomedical Engineering Society, January 29, 2024
Innovating for Impact; Roanoke Blacksburg Technology Council, May 15, 2024
She Talks: Stories from Women in STEM; Virginia Tech, March 13, 2024
Female Biomedical Engineers at Stryker Panel Interview; Virginia Tech, March 31, 2023
BME Alumni in Industry Panel Interview; Virginia Tech, March 1, 2023

PROFESSIONAL SERVICE

Session Chair, Undergraduate Advances in Device Technologies, BMES Annual Meeting, October 2024.
Judge, Senior Design Capstone Poster & Presentation, Virginia Tech, 2024 & 2025.
Student Ambassador, Biomedical Engineering Department, Virginia Tech, 2020-2022.

PATENTS

Newberry, Tara, **Thomas, L**., et al. "Devices and Systems for Providing Compression and/or Vibratory Forces to Tissues." US Patent Application US18/415,117

SKILLS

R | MATLAB | Arduino | Python | SOLIDWORKS | PCB manufacturing and reworking | Figma | Contextual Inquiry | Physiological signal acquisition | Signal processing | Usability evaluation | Curriculum development | Semi-structured interviews and qualitative coding | Thematic and mixed-methods analysis | IRB & IACUC Protocol Writing | Learning assessments | Community-engaged research methods | Grant writing

PROFESSIONAL MEMBERSHIPS

American Society of Engineering Education (ASEE)
Biomedical Engineering Society (BMES)

CERTIFICATIONS & LICENSES

Certified SOLIDWORKS Associate in Mechanical Design, *Solid Works Corporation*
CITI Good Clinical Practice Course for NIH Funded Clinical Trials, *CITI Program*
CITI Basic Responsible Conduct of Research Course, *CITI Program*
CITI Biomedical Research, *CITI Program*