Marquise D. Bell

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Postdoctoral Research Fellow
Department of Mechanical Engineering and Applied Mechanics
University of Pennsylvania

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Education

Rice University
PhD in Mechanical Engineering | GPA: 3.84/4.00 — Jul. 2020–Aug. 2025
Advised by Prof. Daniel J. Preston

Baylor University
BS in Mechanical Engineering | GPA: 3.71/4.00 — Aug. 2016–May 2020
Minors: Computer Science, Mathematics

Professional Experience

Turner Research Group, University of Pennsylvania – Philadelphia, PA — present
Provost Postdoctoral Research Fellow

Preston Innovation Lab, Rice University – Houston, TX — Jul. 2020–Aug. 2025
Graduate Research Assistant
Investigating thermal and fluidic processes in a soft wearable material context

NASA Visiting Technologist Experience – Cleveland, OH — May 2025–Jun. 2025
Visiting Graduate Research Fellow
Integrated thermal sensing capabilities into textile-based Joule heating material

NASA Visiting Technologist Experience – Houston, TX — Jul. 2024–Aug. 2024
Visiting Graduate Research Fellow
Characterized thermal bonding techniques of heat sealable textiles

NASA Visiting Technologist Experience – Cleveland, OH — Mar. 2024–Apr. 2024
Visiting Graduate Research Fellow
Developed closed-loop feedback control of a textile-based Joule heating material

NASA Visiting Technologist Experience – Cleveland, OH — Jun. 2023–Aug. 2023
Visiting Graduate Research Fellow
Performed thermomechanical analysis on a textile-based Joule heating material

NASA Visiting Technologist Experience – Houston, TX — May 2022–Aug. 2022
Visiting Graduate Research Fellow
Performed mechanical durability tests on a textile-based Joule heating material

Disney Imagineering – Glendale, CA — May 2021–Jul. 2021
Mechanical Ride Team Intern
Designed support placement for future ride attractions and assisted on designs

ExxonMobil Corporation – Spring, TX — May 2019–Aug. 2019
Strategic Global Accounts Intern
Optimized account report dashboards using a faster and more precise database

BNSF Railway – Kansas City, KS — Jun. 2018–Aug. 2018
Mechanical Foreman I Intern
Enhanced a materials billing method and supervised the calibration of tools

Awards and Honors *(* indicates awarded but position not started)*

Penn Provost's Postdoctoral Fellowship – **up to three years full funding**	2025-2028
UCLA Chancellor's Postdoctoral Fellowship (*declined*)	2025
SES Future Faculty Symposium – Travel Grant ($1,000)	2025
IEEE RoboSoft 2025 Rising Star (1 of 16 selected out of 81)	2025
NASA NSTGRO Fellowship – **four years full funding for PhD ($328,000)**	2021–2025
Caltech EAS Trailblazer (one of seven selected across all engineering disciplines)	2024
Notre Dame College of Engineering Future Faculty Workshop (invited)	2024
NSF Inclusive Graduate Education Network (IGEN) – Travel Grant ($1,000)	2024
NextProf NEXUS Future Faculty Workshop – Atlanta, GA	2023
Rice Institute of Biosciences & Bioengineering (IBB) – Travel Grant ($1,500)	2023
Carbon Hub Annual Meeting – Best Poster Presentation (3rd Place)	2022
MRS Fall Meeting – Institute of Physics Best Presentation Award	2022
SES Annual Technical Conference – Travel Grant ($1,000)	2022
GEM Associate Fellowship	2020
Pi Tau Sigma Honor Society	2018
ExxonMobil's Future Leaders Academy	2018

Research Activities

Publications (*italicized #s in preparation or under review)*

9. **M.D. Bell**, H.Y. Lin, A. Johnson, S. Urbina C. Doxley, T.S. Williams, D.J. Preston, "Wearable Self-sensing Textile-based Joule Heating Materials," in preparation.

8. **M.D. Bell**, S. Urbina, B. Jumet, E. Montenegro, A.I. Eujayl, T.F. Yap, A. Rajappan, M.P. Nemitz, V. Sanchez, D.J. Preston, "A Soft Wearable Device for Fluidic Energy Harvesting of Body Heat," in preparation.

7. T.F. Yap, J. Klinkao, **M.D. Bell**, S. Urbina, A. Rajappan, D. Yavas, D.J. Preston, "Understanding Silicone Elastomer Curing and Adhesion for Stronger Soft Devices," *Science Advances*, 11(29), 2025

6. **M.D. Bell**, "Promoting Diverse and Inclusive Spaces with Intentionality," *Science Robotics*, 9(97), 2024.

5. V.T. Vo, A. Rajappan, B. Jumet, **M.D. Bell**, S. Urbina, D.J. Preston, "Sheet-Based Fluidic Diodes for Embedded Fluidic Circuitry in Soft Devices," *Advanced Intelligent Systems*, 6(7), 2024.

4. T.F. Yap, A. Rajappan, **M.D. Bell**, R. Rasheed, C.J. Decker, D.J. Preston, "Thermally Accelerated Curing of Platinum-Catalyzed Elastomers," *Cell Reports Physical Science*, 5(3), 2024.

3. **M.D. Bell**, K. Ye, T.F. Yap, A. Rajappan, Z. Liu, Y.J. Tao, D.J. Preston, "Rapid In Situ Thermal Decontamination of Wearable Composite Textile Materials," *ACS Applied Materials & Interfaces*, 15(37), 2023.

2. R.A. Shveda, A. Rajappan, T.F. Yap, Z. Liu, **M.D. Bell**, B. Jumet, V. Sanchez, D.J. Preston "A Wearable Textile-Based Pneumatic Energy Harvesting System for Assistive Robotics," *Science Advances*, 8(34), 2022.

1. B. Jumet, **M.D. Bell**, V. Sanchez, D.J. Preston, "A Data-Driven Review of Soft Robotics," *Advanced Intelligent Systems*, 4(4), 2022.

Conference Proceedings

Oral Presentations

8. **M.D. Bell** "Thermal and Fluidic Design of Compliant Sheet-Based Wearable Assistive Devices," *8th IEEE – RAS International Conference on Soft Robotics (RoboSoft)*, Lausanne, CH, Apr. 23–26, 2025.
7. **M.D. Bell,** S. Urbina, A. Rajappan, A.I. Eujayl, T.F. Yap, E. Montenegro, D.J. Preston, "A Textile-Based Thermopneumatic Body Heat Harvesting Device to Power Fluidically Actuated Wearable Soft Robots," *8th IEEE – RAS International Conference on Soft Robotics (RoboSoft)*, Lausanne, CH, Apr. 23–26, 2025.
6. **M.D. Bell,** S. Urbina, A. Rajappan, A.I. Eujayl, T.F. Yap, B. Jumet, M. Enriquez, D.J. Preston, "Thermal Energy Harvesting of Body Heat to Power Pneumatic Wearables," *ASME Smart Materials, Adaptive Structures, and Intelligent Systems (SMASIS)*, Atlanta, GA, Sep. 08–11, 2024.
5. **M.D. Bell,** A.I. Eujayl, S. Urbina, A. Rajappan, B. Jumet, T.F. Yap, E. Noce, M. Enriquez, D.J. Preston, "Direct Thermal-To-Pneumatic Body Heat Harvesting to Power Soft Actuators," *Materials Research Society (MRS) Spring Meeting*, Seattle, WA, Apr. 21–26, 2024.
4. **M.D. Bell,** A.I. Eujayl, B. Jumet, A. Rajappan, T.F. Yap, E. Noce, S. Urbina, C.-L. Tran, D.J. Preston, "A Textile-Based Body Heat Recovery System to Power Wearable Soft Devices," *Society of Engineering Sciences (SES) Annual Technical Meeting*, Minneapolis, MN, Oct. 8–11, 2023.
3. **M.D. Bell,** T.F. Yap, K. Ye, A. Rajappan, C.J. Decker, Y.J. Tao, D.J. Preston, "A Heat-Based Self-Decontaminating Textile Material for Wearables," *Materials Research Society (MRS) Fall Meeting*, Boston, MA, Nov. 27–Dec. 2, 2022. (**Institute of Physics Best Presentation Award**).
2. **M.D. Bell,** T.F. Yap, A. Rajappan, C.J. Decker, D.J. Preston, "A Self-Heating Wearable Material for In Situ Thermal Decontamination**,"** *Society of Engineering Sciences (SES) Annual Technical Meeting*, College Station, TX, Oct. 16–19, 2022.
1. **M.D. Bell**, T.F. Yap, A. Rajappan, J.C. Hsu, C.J. Decker, V. Tat, C.T.K. Tseng, D.J. Preston, "Composite Wearable Textile Materials with Spatial Control of Joule Heating," *American Physical Society March Meeting*, Chicago, IL, Mar. 14–18, 2022.

Poster Presentations

4. **M.D. Bell,** S. Urbina, A. Rajappan, A.I. Eujayl, T.F. Yap, E. Montenegro, D.J. Preston, "A Textile-Based Thermopneumatic Body Heat Harvesting Device to Power Fluidically Actuated Wearable Soft Robots," *8th IEEE – RAS International Conference on Soft Robotics (RoboSoft)*, Lausanne, CH, Apr. 23–26, 2025.
3. **M.D. Bell,** S. Urbina, A. Rajappan, A.I. Eujayl, T.F. Yap, B. Jumet, M. Enriquez, D.J. Preston, "Powering Soft Wearable Robots with Thermopneumatic Body Heat Harvesting," *Robotics Gordon Research Conference*, Ventura, CA, Jan. 13–19, 2024.
2. **M.D. Bell,** K. Ye, T.F. Yap, A. Rajappan, Z. Liu, Y.J. Tao, D.J. Preston, "In Situ Thermal Decontamination of Composite Textile Materials as Reusable PPE," *Carbon Hub Annual Meeting*, Houston, TX, May 5, 2023. (**Best Poster Prestation, 3rd Place).**

1. **M.D. Bell,** T.F. Yap, A. Rajappan, J.C. Hsu, C.J. Decker, C.T. Tseng, D.J. Preston, "Thermal Inactivation of Viruses on Self-Decontaminating Wearable Textiles," *GEM Annual Board Meeting and Conference*, Houston, TX, Sep. 9–11, 2021.

Conference Organization

- Co-Organizer, Workshop on *Smart Textiles for Soft Robotics*, 8th IEEE – RAS International Conference on Soft Robotics, Lausanne, CH, Apr. 23-26, 2025.

Invited Talks

- Boston University Mechanical Engineering Seminar Series – Invited Speaker – Boston, MA, Feb. 19, 2025.
- California Institute of Technology EAS Trailblazers Mechanical and Civil Engineering Seminar Series – Invited Speaker – Pasadena, CA, Nov. 8, 2024.

Patents

1. **M.D. Bell**, K. Ye, T.F. Yap, A. Rajappan, Z. Liu, Y.J. Tao, D.J. Preston, "Wearable Composite Materials for Rapid *In situ* Thermal Decontamination," US Patent Application filed Oct. 14, 2024. Patent Pending.

Teaching and Mentorship

Teaching

- **Rice University, MECH 587 – Guest Lecturer (SP 2024)**
  Delivered a lecture on a review of the Navier-Stokes equations, relevant boundary conditions, simple solutions to the Navier-Stokes equations, and Couette and Poiseuille flow.
- **Rice University, MECH 503 – TA (SP 2021)**
  Graded computer aided design (CAD) assignments and projects, while also holding office hours to discuss course content in more depth with students.
- **Rice University, MECH 472 – TA (FA 2020)**
  Graded assignments focused on synthesis of systems using thermodynamics, fluid mechanics, heat transfer, economics, and optimization theories.
- **Baylor University, EGR 1301 – TA (FA 2019 – SP 2020)**
  Delivered guest lectures for introduction to statics, graded assignments and group projects, and held office hours and study sessions for freshmen engineering students in this introductory engineering course.
- **Baylor University, Center of Academic Success and Engagement – Tutor (FA 2019 – SP 2020)**
  Reviewed materials from all coursework in which I had attained a B+ or higher, including intro to computer science, intro to engineering, partial differential equations, and other engineering courses.

Mentorship – Undergraduate Students Advised

- **Eva Montenegro, Rice University** (Oct. 2024–present)
  Research Project: Wearable thermal energy harvesting in compliant structures using low-boiling-point fluids (LBPFs)
  Current Position: Mechanical engineering undergraduate at Rice University
- **Mateo Gonzalez, Rice University** (Nov. 2023–present)
  Research Project: Patterning textiles for 2D thermal gradients
  Current Position: Materials science undergraduate at Rice University
- **Cristiana De Sousa, Rice University** (May. 2024–Aug. 2024)
  Research Project: Electro-pneumatic pinch valve for flow regulation
  Current Position: Mechanical engineering undergraduate at Rice University
- **Megan Enriquez, Rice University** (Sep. 2023–Aug. 2024)
  Research Project: Self-sensing wearable textile-based heating devices for advanced spacesuit applications
  Current Position: Mechanical engineering undergraduate at Rice University
- **Cat-Linh Tran, Rice University** (Jan. 2023–Aug. 2023)
  Research Project: Thermal characterization of wearables powered by body heat
  Current Position: Mechanical engineering undergraduate at Rice University
- **Leighton Less, Rice University** (Jun. 2022–Dec. 2022)
  Research Project: Characterization of thermal bonding formed through layered fabrication approaches
  Current Position: Mechanical engineer at Bechtel Corporation
- **Sofia Urbina, Louisiana Tech University** (Jun. 2022–Aug. 2022)
  Research Project: Layer-based fabrication of an appendable assistive digit
  Current Position: PhD student at Rice University
- **Divya Wagh, Rice University** (Mar. 2022–May 2022)
  Research Project: Creating a GUI for thermal data acquisition
  Current Position: Software engineer at ExtraHop
- **Aman Eujayl, Rice University** (Aug. 2020–Aug. 2022)
  Research Project: Harvesting human body heat to power wearables
  Current Position: PhD student at California Institute of Technology

Service

Leadership Activities

- Student Ambassador – Rice Graduate & Postdoctoral Studies Graduate Ambassadors Program (**Aug. 2022–present**)
  University recruitment group for diverse prospective graduate students
- Member – Rice Mechanical Engineering Graduate Student Diversity Equity & Inclusion Committee (**Aug. 2022–present**)
  Group that works to create more accessible spaces within the department
- Committee Member – Baylor Alumni Houston Professionals (**Jul. 2022–present**)
  Professional development alumni group for networking in the Houston area
- Panelist – Envision by WorldStrides Aerospace Academy (**Jul. 2024**)
  Summer aerospace workshop for high school students across the country

- Student Mentor – Rice Graduate & Postdoctoral Studies Pathways Program (**Jul. 2022–Apr. 2023**)
  Mentorship for first-year graduate students from underrepresented populations
- President – Rice Mechanical Engineering Graduate Student Association (**Apr. 2022–Apr. 2023**)
  Leader of departmental group that advocates for graduate student rights
- Treasurer – Rice Black Graduate Student Association (**Apr. 2022–Apr. 2023**)
  Affinity group that hosts social events for Black graduate students
- Treasurer – Rice Mechanical Engineering Graduate Student Association (**Apr. 2021–Apr. 2022**)
  Financial point-person for departmental graduate student social events
- Co-Founder & Board Member - "*Hirschi Men Can*" Scholarship (**Sep. 2020**)
  Scholarship for minority students from my high school alma mater

Journal Peer-Reviewer

- *Advanced Materials*
- *Advanced Intelligent Systems*
- *Advanced Functional Materials*
- *Soft Robotics*
- *Energies*
- *ACS Applied Materials & Interfaces*
- *IEEE Robotics and Automation Letters*

Professional Society Memberships

- Sigma Xi
- Society of Engineering Sciences (SES)
- Institute of Electrical and Electronics Engineers (IEEE)

Media Coverage

- "Rice graduate student advocates for diverse and inclusive spaces with intentionality in Science Robotics," A. Becker, Rice News, Dec. 9, 2024 (link). ***Excerpt:** "Bell argues that intentionality […] can lead to a stronger sense of belonging in addition to furthering innovation and advancements."*
- "Marquise Bell – GEM Fellow & Mechanical Engineering Doctoral Candidate," T. Tava, Tava Multimedia Group, Oct. 9, 2023 (link). Marquise appeared in a podcast interview discussing education, outreach, and championing success.
- "Protective Gloves Heat Up to Kill Viruses, Keep Wearer's Skin Safe," P. Patel, Chemical & Engineering News, Sep. 22, 2023 (link). ***Excerpt:** "A material that reaches 100 ˚C on one side while staying cool on the other could cut the waste created by the use of disposable personal protective equipment (PPE)…"*
- "College Hosting NextProf Nexus to Support Engineering Faculty Talent," J. Stewart, Georgia Tech College of Engineering, Aug. 29, 2023 (link). ***Excerpt:** "'Through this workshop, I think I'm getting a better idea of what goes into each component of the faculty hiring process,' said Marquise Bell, a mechanical engineering Ph.D. student from Rice University."*

- "Meet Rice's Graduate Ambassador Marquise Bell," Rice Graduate and Postdoctoral Studies, Jan. 23, 2023 (link). ***Excerpt:*** *"Bell advises prospective students to apply even if they do not have undergraduate research experience… Bell also advises prospective students to make the choices that best align with them during the application process."*
- "Marquise Bell Receives Materials Research Society Best Presentation Award," P. Kurp, Rice MECH News, Jan. 5, 2023 (link). ***Excerpt:*** *"Bell's conference submission was titled 'A Heat-Based Self-Decontaminating Textile Material for Wearables.' The award was formally presented at the 2022 MRS event held Nov. 27-Dec. 2 in Boston."*
- "Hirschi High School Alum Receives NASA Fellowship to Develop Textiles for Spacesuits," WFISD, District in Pictures (3rd story), Aug. 27, 2021 (link). ***Excerpt:*** "*…Marquise said his work 'will focus on decreasing the weight and number of material layers in current spacesuit designs while integrating multifunctionality into the spacesuit materials.' Hirschi International Baccalaureate Coordinator Linda Fain remembers Marquise as a brilliant student, one of her favorites…"*
- "Marquise Bell Receives NASA Space Technology Graduate Research Opportunities Fellowship," P. Kurp, Rice MECH News, Aug. 17, 2021 (link). ***Excerpt:*** *"The work consists of integrating low-profile, wearable sensing components, heating and cooling elements, and actuation mechanisms…"*
- "Hirschi High School Alumni Create Scholarships," E. Coleman, KAUZ News Channel 6, May 14, 2021 (link). ***Excerpt:*** *"A group of Hirschi High School alumni are helping to pave the way for the next class of graduates. Now in their 20's, all five men have come together to give back and create 'The Hirschi Men Can Scholarship' for young African American men."*