

Shammo Dutta

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EDUCATION

The University of Alabama

Doctor of Philosophy in Mechanical Engineering

GPA: 3.9/4.0

Lab: Smart Materials and Robotic Technologies (SMART) Lab

Advisor: Dr. Sree Kalyan Patiballa

Relevant coursework: Nonlinear Finite Element Methods, Advanced Linear Controls, Robot Kinematics, Mechatronics

Tuscaloosa, U.S.

Aug. 2022-Present

Amrita Vishwa Vidyapeetham (University)

Bachelor of Technology in Mechanical Engineering

GPA: 9.0/10.0

Amritapuri, India

Jul. 2017-Jun. 2021

RESEARCH EXPERIENCE

SMART Lab, The University of Alabama

PhD Candidate — Advisor: Dr. Sree Kalyan Patiballa

Tuscaloosa, US.

Aug. 2022-Present

- Developed a finite element-based modeling framework to optimize tendon paths in tendon-driven soft actuators, enhancing movement capabilities.
- Initiating experimental and numerical studies on deformable mechanical metamaterials.
- Numerical modeling of dynamic impact tests on UHPC-auxetic metamaterial-based sandwich composite panels.
- Created a robust design optimization approach to address non-uniform stress distributions in planar mechanical metamaterials.
- Expanded professional network through active conference participation, building connections with esteemed researchers and professors.

Department of Mechanical Engineering, Amrita Vishwa Vidyapeetham

Research assistant — Advisor: Dr. Hariprasad M.P.

Amritapuri, India

Sep. 2021-Jul. 2022

- Compiled a technical guide for computational tools used in experimental mechanics.
- Collaborated with interdisciplinary team members to integrate methods from experimental mechanics into analyzing the bio-mechanics and load flow of dental implants.

Department of Mechanical Engineering, Amrita Vishwa Vidyapeetham

Undergraduate researcher — Advisor: Dr. Hariprasad M.P.

Amritapuri, India

Aug. 2019-Jun. 2021

- Engineered novel lightweight and high strength structures reinforced with mechanical metamaterials.
- Acquired proficiency in conducting thorough research, crafting articulate articles, and methodically curating data.
- Communicated two U.S. patents, one high-impact journal article and, two peer-reviewed conference articles.

PUBLICATIONS

JOURNALS

- [J1] Turna, N. R., Luong, T., **Dutta, S.**, Aaleti, S., & Patiballa, S. K. (2025). Auxetic Embedded Resilient Civil Infrastructure. Manuscript in-preparation, Planned for *Wiley Advanced Engineering Materials*.
- [J2] **Dutta, S.**, Conzola, J., Vikas, V., & Patiballa, S. K. (2025). Development and Validation of Computational Modeling Framework for Tendon-based Soft Robotics. *ASME Journal of Mechanisms and Robotics*. <https://doi.org/10.1115/1.4069292>
- [J3] **Dutta, S.**, & Patiballa, S. K. (2025). Design Optimization for Uniform Stress Distribution in Mechanical Metamaterials Using a Maximum Material Utilization Metric. *ASME Journal of Mechanical Design*, 148(1): 011702. <https://doi.org/10.1115/1.4068956>
- [J4] Baghiana G, Manju V, Hariprasad M.P., Menon H.G., **Dutta S**, Vinod Kumar Gopal (2022) Comparison of Attachment Types in Maxillary Implant-assisted Obturators using Digital Image Correlation Analysis. *J Contemp Dent Pract*, 23(7), 695-702. <https://pubmed.ncbi.nlm.nih.gov/36440515/>
- [J5] Menon, H. G., **Dutta, S.**, Krishnan, A., M. P., H., Shankar, B. (2022). Proposed auxetic cluster designs for lightweight structural beams with improved load bearing capacity. *Engineering Structures*, 260, 114241. <https://doi.org/10.1016/j.engstruct.2022.114241>

PROCEEDINGS

- [C1] **Dutta, S.**, & Patiballa, S. K. (2025). Towards self-sensing in auxetic metamaterials using displacement mapping framework. ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE) 2025. (Accepted)
- [C2] **Dutta, S.**, & Patiballa, S. K. (2023). Design optimization framework for uniform stress distribution of mechanical Metamaterials. Volume 4: Advanced Materials: Design, Processing, Characterization and Applications; Advances in Aerospace Technology. <https://doi.org/10.1115/imece2023-112793>
- [C3] Menon H.G., **Dutta S**, Hariprasad M.P., Shankar B. (2021). Investigation on deflection characteristics of auxetic beam structures using FEM. Recent Advances in Manufacturing, Automation, Design and Energy Technologies, 621-628. https://doi.org/10.1007/978-981-16-4222-7_70
- [C4] **Dutta, S.**, Menon, H. G., Hariprasad, M., Krishnan, A., Shankar, B. (2021). Study of auxetic beams under bending: A finite element approach. Materials Today: Proceedings, 46, 9782-9787. <https://doi.org/10.1016/j.matpr.2020.10.479>

PATENTS

- [P1] Shankar, B., MP, H., **Dutta, S.**, Menon, H. G. (2024). Auxetic Member for Load Bearing Structures. U.S. Patent No. 11981111. U.S. Patent and Trademark Office. (Status: Granted, Filed in 2021) <https://patentcenter.uspto.gov/applications/17404733>

CONFERENCES

1. ASME 2025 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC-CIE), *Anaheim, California* [Aug. 17-20, 2025]
2. ASME 2024 Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), *Atlanta, Georgia* [Sep. 9-11, 2024]

3. ASME 2023 International Mechanical Engineering Congress & Exposition (IMECE), *New Orleans, Louisiana* [Oct. 29, 2023-Nov. 2, 2023]
4. ASME 2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC-CIE), *St. Louis, Missouri* [Aug. 14-17, 2022]
5. "Investigation on Deflection Characteristics of Auxetic Beam Structures Using FEM", International Conference on Future Technologies in Manufacturing, Automation, Design & Energy, *National Institute of Technology Puducherry* [Dec. 28-30, 2020]
6. "Study of auxetic beams under bending: A finite element approach", International Mechanical Engineering Congress 2019, *National Institute of Technology Tiruchirappalli* [Nov. 29, 2019-Dec. 1, 2019]

TEACHING EXPERIENCE

ME 372 - Dynamic Systems

Aug. 2024-May. 2025

Reviewed more than 70 assignments each grading period, covering homework, exams, and final assessments. Provided prompt feedback and addressed student inquiries to ensure timely course completion.

ME 349 - Engineering Analysis

Aug. 2023-Aug. 2024

Graded 100+ assignments per grading period, including homework, exams, and final assessments. Provided detailed feedback and promptly resolved student inquiries, ensuring timely course completion.

ME 215 - Thermodynamics I

Jun. 2023-Jul. 2023

Evaluated over 50 assignments per grading period, including homework, exams, and final assessments. Offered comprehensive feedback and promptly addressed student inquiries, facilitating timely course advancement.

SKILLS

- **Software:** *Design and Modeling:* ABAQUS, COMSOL, Solidworks,
Visualization: Inkscape, Origin, Paraview,
Programming and Scripting Languages: MATLAB, Python.
- **Languages:** *Native:* Bengali, *Professional:* English, Hindi, Marathi, *Basic:* Malayalam.

AWARDS

Graduate Council Fellowship

Aug. 2022-May. 2023

Awarded by the Graduate School of The University of Alabama for the first academic year of graduate study.