**MD SAIFUL ISLAM**

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**Finite Element Analysis | Soft Materials | Biomechanics | Linear and Non-linear Analysis**

**Personal Summary**

Ph.D. candidate specializing in finite element analysis, soft materials, and biomechanics. Seeking an industrial internship to apply advanced research skills in material science and numerical simulation for real-world innovation.

**Highlights**

* **Modeling and Simulation:** 4+ years of hands-on FEA experience with ABAQUS (Standard & Explicit) and Python scripting, SolidWorks.
* **Industrial experience:** 3 years as Service Advisor, led a team of Audi experts
* **Writing and communication:** Authored two research publications, delivered several talks and presented posters at conferences
* **Data Analysis and Programming:** MATLAB, Python, OriginPro.
* **Collaborations:** Leading numerical modeling projects at 4Mlab, mentoring researchers, collaborating with teams in Kuwait and the U.S.

**Education**

**University of Louisiana at Lafayette (ULL), R1 Institution** | *Expected May 2027*  
Doctor of Philosophy (Ph.D.) in System Engineering | GPA: 3.90/4.0

**Ph.D. Research:** Interdisciplinary (Computational Modeling, Bioengineering, Medical device, Mechanical engineering)

**Thesis:** Developing a multi-scale finite element framework integrating fibril-reinforced poro-hyperelastic modeling and homogenization for precise cartilage simulations.

**Supervisor**: Dr. Tanvir Faisal, Assistant Professor, Department of Mechanical Engineering, ULL

**University of Louisiana at Lafayette (ULL), R1 Institution** | *Dec 2023*  
Master of Science (M.Sc.) in Mechanical Engineering| GPA: 3.87/4.0

**M.Sc. Research:** Interdisciplinary Computational Modeling, Bioengineering, Mechanical engineering

**Thesis:** Multi-structural fibril-reinforced poro-hyperelastic (MSFPH) finite element modeling approach for advanced understanding of articular cartilage pathomechanics

**Supervisor**: Dr. Tanvir Faisal, Assistant Professor, Department of Mechanical Engineering, ULL

**Islamic University of Technology (IUT)**, B.Sc. in Mechanical Engineering | *Nov 2017*

**Professional Experience**

**Graduate Research Assistant (GRA) | 4MLAB | UL Lafayette, Lafayette, LA** │ *Aug 2021-Present*

Advisor – Dr. Tanvir Faisal

**Project 1: Multi-scale modeling of articular cartilage comparing healthy and degenerative states.**

* Developed a validated micro-FE model to simulate cartilage mechanics and osteoarthritis progression.
* Developing a 3D multi-scale model using homogenization and optimization to link microstructure to bulk behavior.

**Project 2: Markerless Motion Capture Analysis of Knee Biomechanics during Military Load Carriage.**

* Used markerless motion capture system to study knee mechanics under military load carriage (30–50% body weight).
* Now simulating ground reaction forces from high-intensity drills and integrating them into FEA cartilage models to improve OA risk prediction-critical as 1 in 3 U.S. veterans lives with OA.

**Project 3: Data-Driven Constitutive Modeling of Articular Cartilage**

* Developed a predictive FEA framework optimizing hyperelastic parameters to match experimental cartilage data.
* Enabled quantitative assessment of osteoarthritis progression through validated tissue-level simulations.

**Project 4: Convolutional Neural Network (CNN) based quantification of collagen in cartilage (Joint project)**

* Modified pre-trained CNN model to analyze histological image for quantifying tissue collagen content.
* Validate image processed and AI assessed data with FTIR result.

**Project 5: Compatible Bio-printing System for surgery**

* Conversion of 3D printer to Bio printer ($1,000) for surgery and bioink printing. PCL-based hydrogel characterization
* CFD analysis for evaluating cell viability (100%) during direct-ink extrusion, leading to publish paper and presentation.

**Mentor:** 4M Lab, ULL | Undergrad students

* Mentoring 2 undergraduate students through a research apprenticeship on gait analysis and guided senior undergraduates on their capstone projects focused on 3D printer control systems and numerical model development.

**Comprehensive exam:** NSF Proposal | Proposal writing

* Quantifying Early-Age Concrete Evolution Using Leaky Rayleigh Waves: A Validated Multiphysics Modeling Approach.

**Graduate Teaching Assistant | Department of Mechanical Engineering | ULL** │ *Aug 2021-Present*

* Taught 4 undergraduate and graduate level engineering and management courses (theory and lab class) of 400+ students. **Courses:** Biomechanics-I, Mechanics of materials, Finite element analysis, Graphical Communications and Design
* Cover-up class, Grading, Invigilation, Solution manual development, Solution classes, Exam question development. Tools: SolidWorks, ABAQUS, LaTEX, Microsoft Suites, Moodle.

**Tech Intern | Opportunity Machine | Louisiana, Lafayette, LA** │ *Jun 2025 – Aug 2025*

**Project 1:** **AI-Driven Ear-Piercing Safety Assessment with VR Jewelry Visualization**

* Developed an AI-driven scanning system that detects safe spots on the human ear for piercing, avoiding critical anatomical areas like blood vessels and dense cartilage.
* Integrated results into an interactive VR simulation that overlays customizable jewelry on safe zones, enabling personalized, risk-free pre-piercing visualization.

**Research Assistant (RA) | Tran’s Lab | Michigan Tech, Houghton, MI**│*Jan 2024-Aug 2024*

Advisor – Dr. Quang Tran

**Project 1: Development of Air-Coupled Finite Element Model for Early-Age Concrete Using Leaky Rayleigh Wave**

* Developed innovative non-contact ultrasonic techniques to assess early-stage concrete properties such as setting time, aggregate size and distribution enhancing material analysis.
* Integrated finite element simulations with experimental validation to establish reliable non-destructive testing methods for early age concrete materials.
* **Application:** Improving early-age concrete quality control and durability assessment to optimize construction practices and reduce infrastructure repair costs.

**Service Engineer | AUDI AG | Bangladesh, Dhaka│** *Jan 2019 – Aug 2021*

* Led the introduction of mild hybrid technology in Bangladesh, enhancing service efficiency, optimizing inventory and supplier management, and ensuring Audi’s quality standards through technical and warranty coordination.

**Intern Engineer | Walton Hi-Tech Industries Ltd. | Bangladesh, Dhaka│** *Oct 2016 – Dec 2016*

* Trained in HVAC R&D, gaining hands-on experience in refrigeration and air conditioning technologies.

**Professional Events**

**Launch Academy,** Tech entrepreneurship program│Opportunity Machine│ *Jun 2025*

**Designing Leadership program**│ULL │ *Aug 2024 – Dec 2024*

**Carnegie Mellon Forum on Biomedical Engineering│**Oral Presentation **│** *Sep 2023*

**Published Peer Reviewed Journals**

* Istiak, A., **Islam, S**., Adouni, M., Faisal, T. R. (2025). Hyperelastic constitutive modeling of healthy and enzymatically mediated degraded articular cartilage. Biomechanics and Modeling in Mechanobiology, 1-17 ([Link](https://scholar.google.com/citations?view_op=list_works&hl=en&hl=en&user=HIcb4zYAAAAJ))
* Dang, Y.H., Dauzat, E., Istiak, A., Jackson, K., Songe, V., West, L., Kayes, M.I., **Islam, M.S.** and Faisal, T.R. (2025). Conversion of an FDM printer to direct ink write 3D bioprinter utilizing an efficient and cost-effective extrusion system. *Annals of 3D Printed Medicine*, 100212. ([Link](https://scholar.google.com/citations?view_op=list_works&hl=en&hl=en&user=HIcb4zYAAAAJ))
* Patwari, A. U., Hasan, S. U., & **Islam, S**. (2021). Development of a Thermo-Acoustic Device for the conversion of sound waves into cold air. *Acta Technica Corviniensis-Bulletin of Engineering*, *14*(1), 57-60. ([Link](https://scholar.google.com/citations?view_op=list_works&hl=en&hl=en&user=HIcb4zYAAAAJ))

**Journals in Progress**

* **Islam, S**., Adouni, M., Faisal, T. R. (2025). Multi-structural fibril-reinforced poro-hyperelastic (MS-FRPHE) finite element model to investigate the zone-specific mechanics of cartilage and its constituents. Biomechanics and Modeling in Mechanobiology. (**Under review**)

**Selected Presentation**

* **S. Islam**, Istiak, A, I. Kayes, and T. R. Faisal. Zone-specific cartilage mechanics following cartilage degradation: a combined AI (Convolutional Neural Network) and FE approach. 20th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering (CMBBE 2025), Barcelona, Spain**. (Oral)**
* **S. Islam**, T. R. Faisal. Computational Homogenization of the Mechanics of Depth-Dependent Articular Cartilage under Compressive Loading. 41st Southern Biomedical Engineering Conference, (SBEC 2025), Texas, USA. **(Oral)**
* Istiak, A, **S. Islam**, and T. R. Faisal. Multiscale fibril-reinforced poro-hyperelastic model for cartilage and chondrocyte mechanobiology. 19th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering (CMBBE 2024), Vancouver, Canada**. (Oral)**
* **S. Islam**, T. R. Faisal. Advanced Multiscale Modeling of Cartilage: Assessing the Mechanical Influence of Zonal and Radial Cell Variability. 40th Southern Biomedical Engineering Conference, (SBEC 2024), Shreveport, LA, USA. **(Oral)**
* **S. Islam**, T. R. Faisal. Multi-structural Fibril-reinforced Poro-hyperelastic (MSFPH) Finite Element Modeling Approach for the Understanding of Articular Cartilage Pathomechanics. Orthopedic Research Society (ORS) 2024, Long Beach, CA, USA. **(Oral)**
* **S. Islam**, T. R. Faisal. A Multi-Structural Fibril-Reinforced Poro-Hyperelastic (MSFPH) Finite Element Model to Understand the Pathomechanics of Articular Cartilage. 39th Southern Biomedical Engineering Conference, (SBEC 2023), Baton Rouge, LA, USA. **(Oral)**
* **S. Islam**, T. R. Faisal. A multi-structural fibril-reinforced poro-hyperelastic (MSFPH) finite element model is instrumental in understanding the pathomechanics of articular cartilage. Carnegie Mellon Forum on Biomedical Engineering, 2023. **(Oral)**

**Awards and Achievement**

**Full Tuition Aid │** Department of Mechanical Engineering │UL Lafayette │*Aug 2021 – May 2026*

**Full Tuition Aid** │ Department of Civil Engineering │Michigan Tech │ *Jan 2024 – Aug 2024*

**Research Travel Grant │** Southern Biomedical Engineering Conference │ *2024*

**Designing Leadership Program** │ UL Lafayette *│ 2024*

**BSTF Travel Grant** │ Bangladesh-Sweden Trust Fund│ *2021-2022*

**OIC undergraduate study scholarship** │ Islamic University of Technology │ *Jan 2014 – Nov 2017*

**Service and Outreach**

* **Volunteer,** Biomedical Engineering Society (BMES) Annual Meeting, San Antonio, TX *(Oct 2022).* supported conference operations through diverse roles including registration assistance, session coordination, poster and platform session support, attendee guidance, and special event logistics.
* **Vice President,** Bangladesh Student Association, UL Lafayette (*Jan 2022 – Dec 2023*): Collaborated with international communities to foster diverse cultural exchanges. Billing and payment of BSA sponsored social activities with a $6000 budget. Led 2 fundraising initiatives, generating $3000.
* **Member,** Society of Asian Scientists & Engineers, UL Lafayette (*Jan 2022 - Present*)
* **Head of Event Management,** IMechE Student Chapter of IUT (*Jan 2016 - Jan 2017*): Successfully organized two World Bank-supported seminars on Fabrication Lab and 3D printing.
* **Logistic Chair,** Mecceleration 2017, IUT (*2017*): Orchestrated the largest mechanical fest in the country, demonstrating exceptional organizational and leadership skills.