RAFIA HASNAT JINIA

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EDUCATION

- **Bangladesh University of Engineering & Technology (BUET)** *Jul 2022- Sep 2024*
  Master of Science in Biomedical Engineering (BME), CGPA: **3.92** / 4.00

- **Bangladesh University of Engineering & Technology (BUET)** *Feb 2017- May 2022*
  Bachelor of Science in Biomedical Engineering (BME), CGPA: **3.63** / 4.00

RESEARCH INTEREST

- Biomaterials
- Drug Delivery
- Antibacterial Resistance
- Scaffold Fabrication
- Regenerative Medicine
- Rapid Hemostasis
- Wound Healing
- Tissue Engineering

RESEARCH EXPERIENCE

- **M.Sc Thesis, Supervisor: Professor Dr. M Tarik Arafat** *Jul 2022- Sep 2024*

  Fabrication of Tannic Acid Crosslinked Gelatin-CMC Based Electrospun Matrix for Combatting Antibacterial Resistance in Infected Wounds
  - Developed a dual-functional biomaterial platform that promotes wound healing while combating antibiotic resistance for infection management and regenerative medicine.
  - Evaluated physicochemical, antibacterial (*in vitro* and *in vivo*), biocompatibility, and wound healing properties of electrospun matrices with *in silico* modeling of antibacterial and regenerative pathways.
- **Undergraduate Thesis, Supervisor: Professor Dr. M Tarik Arafat** *Mar 2021- Apr 2022*

  Development of Tannic Acid Crosslinked Gelatin-CMC Based Electrospun Matrix with Antibacterial Properties
  - Developed tannic acid crosslinked gelatin/CMC electrospun matrices and assessed their structural, physicochemical, and antibacterial properties against non-pathogenic *S. aureus* and *E. coli*.
- **Experimental skills:**
  - Skilled in electrospun fiber and nanoparticle preparation, characterization (**SEM, TEM, FTIR, XRD, DSC), and statistical analysis** for data reliability.
  - Experience in antibacterial assessments against both pathogenic and non-pathogenic bacterial strains using serial dilution, **MIC/MBC** determination, **disk diffusion** assays, and **bacterial adhesion tests**.
  - Preparation and characterization of **PL-based nanoparticles**.
  - **Decellularization of human amnion** for biomedical applications.
  - Hands-on expertise in **drug delivery** research including drug loading, release profiling.
  - Conducted mechanical (**tensile, compression**) and rheological (**swelling, degradation**) studies.
  - Proficient in biological assays: **hemolysis, histology, anti-inflammatory, and wound-healing tests.**
  - Experienced in **animal handling, anesthetization**, and ***in vivo* studies with mice and rabbits**.
  - Conducted **molecular docking and molecular dynamics simulations.**
  - Drafted ethical clearance proposals, research grant applications, and academic project proposals.
  - Trained and supervised lab members on nanofiber and nanoparticle synthesis, and antibacterial testing.

PUBLICATIONS

- **Journal Publication**
  - **Jinia, R. H.**, Datta, N., Wong, S. Y., Li, X., & Arafat, M. T. (2025). Mechanistic study of unoxidized tannic acid crosslinked gelatin-CMC electrospun matrices for combating antibacterial resistance in infected wounds. *International journal of biological macromolecules*, *330*(Pt 1), 147837. https://doi.org/10.1016/j.ijbiomac.2025.147837.

PROFESSIONAL EXPERIENCE

- **Senior Product Development Engineer** *Jul 2024- Present*
  BioEnclave, Bangladesh
  - Optimized and prototyped **biological material-based advanced wound dressings (PL-based CuraGel™ and decellularized human amniotic membrane-based AmnioVive™)** for regenerative medicine applications aimed at treating non-healing diabetic wounds.
  - Coordinated and supervised **clinical trials and pilot studies**, managing data, collaborating with medical professionals, and ensuring **ethical and regulatory** compliance in Bangladesh.
  - Led a collaborative project **with National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR)**, Bangladesh to design a foot measurement machine, analyzing anatomical features to assess causes of foot pain.
- **Product Development Engineer** *May 2023- Jun 2024*
  BioEnclave, Bangladesh
  - Developed and prototyped **advanced medical-grade sponges (HemoSponge™), dental hydroxyapatite powder (BioApta™), hemostat powder (PowClot™, BioClotX™)** achieving superior performance and regulatory standards.
  - Conducted **market analysis** to guide data-driven product development and competitiveness.
  - Coordinated cross-functional teams, managed timelines, and streamlined production workflows.
- **Teaching Assistant** *Nov 2022- Apr 2023*
  Department of Biomedical Engineering, BUET
  - Prepared lab manuals and presentation slides, and conducted tutorials, lab sessions.
  - Graded assignments, quizzes, and exams.
  - Coordinated and assisted in organizing educational workshops in BME department, BUET.
- **Full Time Research Assistant** *Apr 2022- Nov 2022*
  BioInnovation Research Group: Department of Biomedical Engineering, BUET
  Protocol development based on literature-
  - Bacteria adhesion • MIC-MBC test • *In vivo* biodegradation
- **Undergraduate Student Researcher** *Mar 2022- Apr 2022*
  BioInnovation Research Group: Department of Biomedical Engineering, BUET

TRAINING, INTERNSHIP & WORKSHOP

- **Training on Histopathological Techniques for Biomedical Engineering Training** *Sep 2023*
  - Learned hands-on experience in dealing with delicate tissue sample harvesting, fixation, dehydration, tissue embedding, sectioning, slide staining, and image analysis from **Bangladesh Medical University (BMU)**. Obtained knowledge on different staining procedures including H&E, Masson's trichrome, Picro Sirius red stain.
- **Industrial Exposure on Sustainable Development and Technology Transfer** *Feb 2023*
  - Gained practical experience in pharmaceutical manufacturing, QA, and regulatory compliance at **DBL, Bangladesh**, with industrial exposure to sustainable practices at **UNIDO, Bangladesh**.
- **Industrial Attachment Program for Biomedical Engineers** *Aug 2022*
  - Visited to Dhaka Medical College & Hospital, to learn cutting-edge bone prosthetics. Got introduced to different medical devices and identified problems that are needed to solve.
- **Training on Laboratory Animals for Designing Animal Experiment** *Jun 2022*
  - Learned how to administer drugs to mice, rats, guinea pigs, and rabbits and maintain hygiene, breeding, anesthetization, and gavaging of animals, blood collection procedures from animals to design independent *in vivo* experimental protocols by **International Center for Diarrhoeal Disease Bangladesh (ICDDR, B)**.
- **Internship on Maternal and Neonatal Health, ICDDR, B** *Aug 2018*
  - Completed training in Maternal and Neonatal Health at icddr,b, gaining knowledge in clinical practices, maternal care, neonatal assessment, and public health strategies.

PROJECTS

- **Medical Device Innovation Project** *Jan 2024*
  Foot Measurement Device Innovation in Medical Technology
  - Designed the device with a focus on user-friendliness and ease of operation, ensuring patient comfort and accurate data collection. Collaborated with engineers and other stakeholders to ensure the technical feasibility and functionality of the design.
- **Project funded by the ICT Division, Bangladesh** *Mar 2022*
  Integrated System for Real-Time Neonatal Sleep Apnea Detection Based on the Acceleration Sensor
  - Proposed and developed an HIS integrated clinical-grade apnea detection device using an accelerometer that can assist doctors in remote patient monitoring while also being a lower-cost alternative to the neonatal ventilators and S_PO_2 monitors.
- **Capstone Project** *Dec 2020*
  Heart Rate Estimation from Fetal Phono-cardiogram
  - Developed a method for estimating children's heart rates using phonocardiogram in partnership with the NICU standards at Dhaka Medical College (DMC), Bangladesh, aiding clinicians in remote areas to identify irregularities and assist in illness diagnosis.
- **Capstone Project** *Sep 2019*
  Enhancing Maternal and Infant Health: A Milk Pasteurization Device for Garment Industry Employees in Bangladesh
  - Developed a device-based solution for safe pasteurization of mothers' milk to improve maternal and infant health among garment industry employees in Bangladesh. Involved design, testing, and implementation strategies to ensure accessibility and hygiene standards. Implemented by using Arduino.
- **Capstone Project** *Jul 2019*
  Simulation of Drug Delivery Through Intraocular System Released from Contact Lens

SOFTWARE SKILLS

- **Programming Languages:** MATLAB, C, Python, Arduino, Assembly language of 8086 microprocessor
- **Simulation:** Solidworks, Simulink, Ansys, Comsol Multiphysics, Proteus
- **Molecular Dynamics:** Autodock Vina, Gromacs, Pymol, Biovia
- **Graphing & Reference Software:** OriginLab, Minitab, Discovery Studio, LigPlot, ImageJ, Chemsketch
- **Others:** Microsoft Office, Adobe Illustrator, Adobe Photoshop

AWARDS AND HONORS

- **Dean's List Award for Excellent Scholarly Achievement- 3 Levels of Study** *2017, 2021, 2022*
  Bangladesh University of Engineering and Technology
- **University Merit Scholarship, Academic honor by *BUET*** *2021-2022*
  For achieving the top 10% CGPA
- **Govt. Merit Scholarship, Award by *Ministry of Education, Bangladesh*** *2008, 2011, 2014, 2016*
- **1st Position in Bangladesh Mathematical Olympiad (BdMO)** *2014*
- **2nd Position in National Essay writing Competition by *Ministry of Cultural Affairs*** *2013*
- **3rd Position in National Art Competition by *Ministry of Cultural Affairs*** *2012*

LEADERSHIP & EXTRACURRICULAR

- Led and trained 4 junior product development engineers and guided 2 IBA interns in market analysis for biomedical products commercialization.
- **Article Author, Industry Insider, Bangladesh** *2025*
  - Healthcare 4.0: Unlocking the Promise of Automation in Bangladesh
- **Member, Charcoal – BUET Artista Society** *2020-2022*