Curriculum Vitae

Md Toukir Hasan

West Lafayette, Indiana, United States
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Education

- PhD in Mechanical Engineering — *Aug'21- Present*
  Purdue University, USA
- Master of Science in Mechanical Engineering — *Jan'20- Aug'21*
  University of Texas Rio Grande Valley, USA — *GPA: 3.90/4.0*
- Bachelor of Science in Mechanical Engineering — *July 14 - Oc t '18*
  Bangladesh University of Engineering and Technology, Bangladesh — *CGPA: 3.66/4.0*

Research Interests

Solid-State Battery Analytics, Electro-Chemo-Mechanics of Battery, Materials Design, Data Driven Modeling

Research Experiences

- Graduate Research Assistant — *Aug'21- Present*
  Energy and Transport Sciences Lab (ETSL)
  School of Mechanical Engineering, Purdue University
  Supervisor: Prof. Partha P. Mukherjee

  Thesis Title: Comprehensive understanding of the electro-chemo-mechanics of both anode/solid electrolyte and cathode/solid electrolyte interfaces

  -Exploring the interface and interphase dynamics influencing electrochemical phenomena, focusing on transport, kinetics, and mechanistic responses, and their impact on thermal and stress stability in solid-state batteries.

- Visiting Graduate Researcher — *Summer 2024*
  Brookhaven National Laboratory
  Experience: Studied the 3D internal imaging of cathode and solid electrolyte interface focusing on the chemical oxidation state mapping at various states of charge using full field transmission X-ray microscope (TXM).

- Graduate Research Assistant — *Jan'20- Aug'21*
  Polymer Engineering Laboratory
  Mechanical Engineering, University of Texas Rio Grande Valley
  Supervisor: Prof. Mataz Alcoutlabi

  Thesis Title: The Processing and Characterization of Nano Composite Nano Fibers for Various Applications

- Undergraduate Research Assistant — *Sep'17- Oct'18*
  BioFluids Laboratory
  Mechanical Engineering, Bangladesh University of Engineering and Technology
  Supervisor: Prof. A.B.M. Toufique Hasan

  Thesis Title: Experimental and Numerical Studies of Pulsatile Non-Newtonian Flow Behavior in T and Y Junctions

Teaching Experiences

- Worked as a Teaching assistant for the "Numerical Method" (MATLAB based) course at Mechanical Engineering Department, UTRGV (Spring 2021)
- Graded undergraduate student's answer scripts for homework and final exam
- Conducted Q& A session for the course with 60 students
- Set questions for homework and exams

Publications & Conference

- Interphases and electrode crosstalk dictate the thermal stability of solid-state batteries. Bairav S. Vishnugopi, Md Toukir Hasan, Hanwei Zhou, and Partha P. Mukherjee, 2022; *ACS Energy Letters*, *8*(1), pp.398-407.
- Antibacterial activities of centrifugally spun polyethylene oxide/silver composite nanofibers. Md Toukir Hasan, Ramiro Gonzalez, Mircea Chipara, Luis Materon, Jason Parsons and Mataz Alcoutlabi, 2021. *Polymers for Advanced Technologies*, *32*(6), pp.2327-2338.
- Forcespun polyvinylpyrrolidone/copper and polyethylene oxide/copper composite fibers and their use as antibacterial agents. Md Toukir Hasan, Ramiro Gonzalez, Ari Alexis Munoz, Luis Materon, Jason Parsons, and Mataz Alcoutlabi, 2022. *Journal of Applied Polymer Science*, *139*(11), p.51773.
- The effect of solvent and molecular weight on the morphology of centrifugally spun poly (vinylpyrrolidone) nanofibers. Sk Shamim Hasan Abir, Md Toukir Hasan, Mataz Alcoutlabi, and Karen Lozano, 2021. *Fibers and Polymers*, *22*(9), pp.2394-2403.
- Synthesis of SnO2/TiO2 micro belt fibers from polymer composite precursors and their applications in Li-ion batteries. Gabriel Gonzalez, Md Toukir Hasan, Ramirez Gonzalez, Jason Parsons, and Mataz Alcoutlabi, 2022. *Polymer Engineering & Science*, *62*(2), pp.360-372.
- Non-Newtonian pulsatile blood flow dynamics around a Y-junction. Md Toukir Hasan, Dhiman Bhowmick, A.B.M. Toufique Hasan, 2019, July. In *AIP Conference Proceedings* (Vol. 2121, No. 1). AIP Publishing.

Academic Projects

- "Smart robot, shielding thieves from room": Instrumentation and Measurement course (Fall'16)
  - Python based code development for the path planning of the robot
  - Learnt how to troubleshoot the locomotion of robots
- "Sliding mode control of a two-link robot manipulator": Robot Modeling and Control course (Spring' 21)
  - Dealt with dynamics of a two-link manipulator
  - Developed MATLAB code and simulated in SIMULINK
- "Learning with noisy labels": A machine learning ECE595 course project (Fall'23)
  - Developed a ML algorithm based on support vector machine (SVM) as well as the vgg19 convolution neural network (CNN) to analyze the training model performance for large number of data sets (data, images) accompanied with various levels of noise
  - This model dealt with surrogate loss function as a label dependent cost synergized with unbiased estimator to exhibit exclusive performance

- "Variational heat generated source effect on the transient temperature distribution along a 3D body": A term project of Intermediate heat transfers ME 505 course (Spring' 22)
  - Modeled a 3D lamp faucet body featured with variational heat generated sources
  - Demarcated the heat conduction analytics within the body along different locations based on Dirichlet and Neumann boundary condition.
  - Computed the transient temperature profile using implicit finite difference method
- "Craft a Code Breaker's Challenge": A term project of EBEC python course (Spring'24)
  - Programmed a python code that guess the passcode continuously until it breaks the code of the game
  - Learnt data structures, algorithm design, user interface design, creativity and iterative development
  - Gained proficiency in debugging complex code with multiple interconnected functions

Awards & Achievements

- Dean's list Award- Academic year 2017-2018, BUET, Bangladesh
- Education Board Technical scholarship 2014 to 2018, for securing above 95% scores in the 12th standard exam.
- Awardee in National chemistry Olympiad 2012, Bangladesh
- PGRA Scholarship Awardee in UTRGV, USA, 2020-2021
- Active member as a research student of PREM, UTRGV
- Research Assistantship (RA) Awardee at ETSL lab, Purdue University, 2021-Present
- Best Poster Awardee at MoChA, ECS (student chapter) Purdue University, Feb 9, 2023

Internship Experience

- Engineering Trainee at NWPGCL Power Plant in Khulna, Bangladesh *Summer' 18*
- Got training in operation and maintenance of 120MW gas turbine and 105MW steam turbine
- Gained hands-on experiences on fuel, generation, lubrication and electrical system of the plant

Skills

Machinery

- Neware, Arbin, Nova, Maccor, Gamry, Chroma Battery Analysis tools
- Universal testing machine
- SEM, EDS, XPS, TXM, FIB, TGA, ARC, DSC, DMA, XRD
- Forcespinning, Electrospinning
- Rheometer, Viscometer
- Lathe, Milling, Shaper operation

Software

- CAD: SolidWorks, AutoCAD
- CAE: ANSYS, COMSOL
- Control: ARDUINO
- Programming: Python, MATLAB, C, C++
- Statistics: Origin Pro, Sigma Plot, Tec plot

Leadership

- Treasurer of Engineering Academic Career Club, Purdue University; Fall' 24-Summer'25: Organize various programs for students aspiring to pursue careers in academia
- Deputy manager of ETSL experimental laboratory: Lead in monitoring, housekeeping, maintenance, instrumentation and supply chain of the lab.
- Solid state analytics lead: Train, monitor and guide students in various projects of solid-state battery
- Mentored two undergraduate students for energy storage research at ETSL, Spring' 23
- Mentor and guide five graduate students in their respective projects at ETSL, Fall'22-present
- Trained and conducted robotics workshop for undergraduate students of Manarat University, Bangladesh, 2019(4 weeks)