Musanna Galib

4-Year Doctoral Fellow (4YF) at Department of Mechanical Engineering
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EDUCATION

Ph.D. • Mechanical Engineering (CGPA: 87%)   [Sep 2020 - April 2025 *(expected)*]
UBC, Vancouver, BC, Canada
Dissertation title: Dendrite Inhibition Strategy using Hetero-epitaxy in Thin Film Deposition Mechanics

M.Sc. • Mechanical Engineering (CGPA: 3.92/4.00)   [Apr 2017 – May 2019]
BUET, Dhaka, Bangladesh
Dissertation title: Study of electro-mechanical properties of manganese-based nanocomposites for supercapacitors

B.Sc. • Mechanical Engineering (CGPA: 3.92/4.00; Rank: 4th in 180)   [Apr 2012 - Feb 2017]
BUET, Dhaka, Bangladesh
Dissertation title: Computer Modeling of Fire Smoke Movement in Multizone Structure Using Two Open Source Platforms

RESEARCH EXPERIENCE

Software Development   [2023- 2025]
• Python package development at UBCV

Machine Learning Research   [2023- 2025]
• Interatomic potential development at Modeling and Simulation Research Group, UBCV

Battery Research   [2020- 2025]
• Battery recycling at Modeling and Simulation Research Group, UBCV
• Multi-scale modeling at Modeling and Simulation Research Group, UBCV
• Battery testing at Advanced Materials for Energy Storage Lab, UBCO

WORK EXPERIENCE

Graduate Research Assistant
Dept. of Mechanical Engineering, UBC   [Oct 2021- Apr 2025]

Graduate Teaching Assistant (6 courses)
Dept. of Mechanical Engineering, UBC   [Sep 2022- Apr 2025]
Dept. of Physics, UBC   [Jan 2024- Apr 2024]

Assistant Professor of Teaching (10 Courses)
Dept. of Mechanical Engineering, BUET   [Dec 2019- Sep 2021]

Lecturer (13 Courses)
Dept. of Mechanical Engineering, BUET   [May 2017- Dec 2019]

TECHNICAL SKILLS

Programming Languages: Python, MATLAB, Bash, C, HTML, CSS.
Deep Learning Packages: PyTorch.
Material Simulation Tools: VASP, LAMMPS.
FEM Modeling Tools: ABAQUS, MOOSE.
Visualization & Design Tool: Vesta, OriginPro, OVITO, Paraview, Atomsk, Solidworks.
Battery Testing: Battery cell assembly, Cyclic testing, In-situ optical microscopy.
Clean-room Testing: DEKTAK profilometer.
High-performance Computing (HPC): Alliance, ARC Server.
Documentation & Presentation Application: Office Suite, LaTeX.
Operating System: Windows (WSL), Linux (Ubuntu).

HONORS & AWARDS	• 1st prize in "Ideas With Impact" Competition by The Institute for Computing, Information and Cognitive Systems (ICICS) (Link) [May 2024]
	• CSME Congress "Best Presentation Award" in Computational Mechanics at University of Toronto [May 2024]
	• Conference Travel Support for ICICS Graduate Students for SES-2023 [Aug 2023]
	• Collaborative Research Mobility Award (UBC CRMA) in UBC [Jan - Dec 2023]
	• 4-Year Doctoral Fellowship in UBC [Sep 2020 - Aug 2024]
	• Faculty of Applied Science Graduate Award in UBC [Sep 2021]
	• President's Academic Excellence Initiative Ph.D. Award in UBC [Sep 2020 - Apr 2025]
	• International Tuition Award in UBC [Sep 2020 - Apr 2023]
	• Bangladesh-Sweden Trust Fund (BSTF) Travel Grant for Ph.D. [2021]
	• Dean's List for 4 consecutive years in BUET [Feb 2013 - Feb 2017]
	• University Merit for 4 consecutive years in BUET [Feb 2013 - Feb 2017]
	• Board Scholarship in HSC 2011 [Jan 2011]
	• Board Scholarship in SSC 2009 (37th (among 900k students) in Bangladesh) [Jan 2009]

GRANTS & FUNDING

- DRI EDIA Champions in Digital Research Alliance of Canada [Amount: 35,000 CAD]
  3.15 million funding opportunity (90 Grants) for graduate or post-graduate researchers in Canada (Link)
- 4-Year Doctoral Fellowship in UBC (Link) [Amount: 93,267 CAD]

PUBLICATION *Journal Publication*

- **Galib, M.**, Amardeep, A., Liu, J., and Ponga, M., 'Dendrite Inhibition using Heteroepitaxial Residual Stress in Zn Metal Batteries', ACS Energy Letters, 2025 (Under Review).
- **Galib, M.**, Isiet, M., and Ponga, M., 'AtomProNet: Data flow to and from machine learning interatomic potentials in materials science', npj Computational Materials, 2025 (Under Review).
- Isiet, M., **Galib, M.**, Dadap, J., Ye, Z., and Ponga, M., 'Understanding the spall behavior of alumina: A combined high-fidelity informed molecular dynamics and dual-pulse laser-induced femtosecond experiment approach', Advanced Materials, 2025 (Under Review).
- **Galib, M.**, Orhan, K.O., Liu, J., and Ponga, M.,'Residual Stress Development in Lattice Mismatched Epitaxial Thin Films via Atomic and Molecular Layer Depositions', Journal of the Mechanics and Physics of Solids, 105897, 2024. (Link)
- Xu, J.*, **Galib, M.***, Wu, Z., Tao, L., Shao, Y., Zhang, Y., Guo, X., Hansen, E. J., Chen, Y., Wang, Z., Liu, C., Ponga, M., and Liu, J.,' High-entropy Strategy to Suppress Volumetric Strain and Enhance Diffusion Rate of $Na_3V_2(PO_4)_2F_3$ Cathode for Durable and High-areal-capacity Zinc-ion Battery Pouch Cells', Nano Energy, 110373, 2024. (*Co-first authors) (Link)
- Khan, A.A., Rabi, S.S., Jamee, T. **Galib, M.**, Ashek, F.E., and Rahman, M.A., 'Effects of Crumpling Stage and Porosity of Graphene Electrode on the Performance of Electrochemical Supercapacitor,' J. Phys. Chem. B, 128, 39, 9586–9597, 2024. (Link)
- **Galib, M.**, Orhan, K.O., and Ponga, M., 'Engineering Chemo-Mechanical Properties of Zn Surfaces via Alucone Coating', J. Phys. Chem. C, 127, 5, 2481–2492, 2023. (Link)
- **Galib, M.**, Hosen, M.M., Saha, J.K., Islam, M.M., Firoz, S.H., and Rahman, M.A.,'Electrode Surface Modification of Graphene-MnO_2 Supercapacitors using Molecular Dynamics Simulations', Journal of Molecular Modeling, 26, 251, 2020. (Link)
- Saha, P., Ishtiaque, M.M.U., Sutradhar, A., **Galib, M.**, and Hannan, M.A., 'A sustainable approach to improve the efficiency of Earth Pipe Cooling System', International Journal of Sustainable Engineering, 13, 5, 387-397, March 2020. (Link)

Conference Publication

- Arka, A.M., Mridha, R.H., Shafqat, R., **Galib, M.**, and Morshed, AKM M., 'Design and Comparative Parametric Analysis Using NSGA-II for Multivariable Constrained Optimization of Shell and Tube Heat Exchangers', 13th International Conference on Mechanical Engineering (ICME), December 2019, Dhaka, Bangladesh (Link)

- Saha, P., **Galib, M.**, Ishtiaque, M.M.U., Akanda, S.R., and Hannan, M.A., 'Numerical Study on Improving the Efficiency of the Earth Pipe Cooling System', International Conference on Civil and Environmental Engineering (ICCEE 2018), November 2018, Kuala Lumpur, Malaysia. (Link)

- Khandoker, M.A.R., **Galib, M.**, Islam, A., and Rahman, M.A., 'Modeling of smoke movement in multizone garments building using two open source platforms', The 7th BSME International Conference on Thermal Engineering 2016, June 2017, Dhaka, Bangladesh. (Link)

- Chatterjee, A., **Galib, M.**, and Sarkar, M.A.R., 'Application of Arduino in designing modern electromechanical laboratory', 2017 IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI), June 2018, Chennai, India. (Link)

Poster Presentation

- **Galib, M.**, Liu, J., and Ponga, M., 'Dendrite Inhibition Strategy using Hetero-epitaxial Residual Stresses in Thin Film Deposition Mechanics', 16th World Congress on Computational Mechanics (WCCM), 24 July 2024, Vancouver, British Columbia.

Book Chapter

- Pelletier, J., Wolf, J., and **Galib, M.**, 'Engineering Solutions to Equity, Diversity, and Inclusion' chapter in the book 'Equity, Diversity & Inclusion: Sisyphean Undertaking to an Achievable Reality', 2024 (Under Review).

SOFTWARES   *Python Packages*

- AtomProNet: Atomic Data Processing for Neural Network (Link)
- SurfTrack: Dendrite tracking from in-situ optical microscopy (Link)
- MOOSEanalyze: Post-processing software for exodus file (Link)

CONTRIBUTED TALKS

- 'Dendrite Inhibition Strategy using Hetero-epitaxial Residual Stresses in Thin Film Deposition Mechanics'   [25 July 2024]
  16th World Congress on Computational Mechanics (WCCM 2024)
  Vancouver, British Columbia, July 21 - 26, 2024

- 'Multiscale Approach to Study High Strain Rate Deformation'   [27 May 2024]
  Canadian Society for Mechanical Engineering (CSME)
  Toronto, Ontario, May 26-29, 2024

- 'Dendrite Inhibition Strategy using Hetero-epitaxial Residual Stresses in Thin Flim Deposition Mechanics'   [9 October 2023]
  Society of Engineering Science Annual Technical Meeting (SES 2023)
  Minneapolis, Minnesota, October 8-11, 2023

- 'Using Thin Film to Improve Metal Anode Battery Safety'   [9 March 2023]
  Top presenter, Open heat - 3 Minutes Thesis (3MT)
  Vancouver, UBC, March 9, 2023

- 'Residual Stresses in Thin Film Deposition Mechanics'   [19 October 2022]
  Society of Engineering Science Annual Technical Meeting (SES 2022)
  College Station, Texas, October 16 - 19, 2022

PROFESSIONAL EXPERIENCES	• CIRTL Associate, Center for the Integration of Research, Teaching and Learning [Oct 2024]
	• Member, Battery Division, The Electrochemical Society (ECS) [2024-2025]
	• Member, Canadian Society for Mechanical Engineering (CSME) [2024-2025]
	• Member, Board of Undergraduate Studies of Mechanical Engineering, BUET [2017-2021]
	• Member, Bureau of Research, Testing and Consultation (BRTC), BUET [2019-2021]
	• Member, Publication and Secretariat committee, The 12th & 13th International Conference on Mechanical Engineering (ICME 2017 (Link) & 2019 (Link)) [2017, 2019]

REVIEWER

• Additive Manufacturing [ISSN: 2214-8604]

WORKSHOPS & TRAINING ATTENDED

• Instructional Skills Workshop by Centre for Teaching, Learning, and Technology at UBC [Oct 2024]

• Project Management by Mitacs Inc., Canada [Nov 2023]

EXTRA-CURRICULAR ACTIVITIES

• Steward, UBC Teaching Assistants' & Instructors Union (CUPE 2278) [2024-2025]

• Vice President (External), Bangladeshi Grad Alliance (BGA) at UBC [2024-2025]

• Vice President (Academic), Mechanical Engineering Graduate Association, UBC [2022-2023]

• Award Leader, The Duke of Edinburgh's Award Foundation Bangladesh [2017-2021]

• Gold Awardee of 'The Duke of Edinburgh's Award [2017]

• Financial Secretary at BUET Self Defense Club [2016-17]

• Member at United Nations Youth and Students Association of Bangladesh [2013-16]

REFERENCES

• Mauricio Ponga, Ph.D.
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The University of British Columbia, Kelowna, Canada
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• Okan K. Orhan, Ph.D.
Education Data Warehouse Lead, Ministry of Education and Child Care
Government of British Columbia, Victoria, Canada
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• Mohammed Abdul Hannan, Ph.D.
Lecturer, Department of Mechanical Engineering
Former Lecturer, Bangladesh University of Engineering and Technology
The University of British Columbia, Canada
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