

Md Khayrul Islam

+1 484 935 9363 | @ khayrulbuet13@alum.lehigh.edu | LinkedIn | GitHub | Scholar | Portfolio | Bethlehem, PA

EDUCATION

Lehigh University

Ph.D. in Mechanical Engineering; GPA: 3.84/4.00

- Awarded P.C. Rossin College of Engineering fellowship.

Pennsylvania, USA

Jan 2021 – Current

Lehigh University

M.S. in Mechanical Engineering; GPA: 3.84/4.00

Thesis Title: Predicting Drug Loading in Extracellular Vesicles through Coarse-Grained Molecular Dynamics Simulation got published on [PCCP](#).

Pennsylvania, USA

Jan 2021 – May 2023

IBM

Professional Certificate in Data Science

- Mastered data science competencies including Python, machine learning, SQL, data visualization, and AI, culminating in a capstone project.

Online

Aug 2024

Bangladesh University Engineering and Technology

B.Sc. in Industrial and Production Engineering; GPA: 3.55/4.00

Thesis Title: Molecular dynamics simulation of the mechanical properties of CNT-polyoxymethylene composite with a reactive forcefield got published on [Molecular Simulation](#)

- Awarded SCEA- PTAK prize global case study competition scholarship

Dhaka, Bangladesh

Jun 2014 – Oct 2018

SKILLS

Programming: Python, MATLAB, Bash, SQL

ML and DSA: PyTorch, ImageJ, Pandas, NumPy, OpenCV, ML Algorithms, DSA

Simulation: COMSOL, EspressoMD, ANSYS, LAMMPS, GROMACS, VMD, SolidWorks

Miscellaneous: Docker, Git, High-Performance Computing, Cloud Computing

WORK AND RESEARCH EXPERIENCE

Lehigh University

Graduate Research Assistant

- Collaborated in a multidisciplinary team to publish 11 Q1 journal papers in computational biology and machine learning, featured in prestigious journals including Nature Communications, ACS, and RSC series.
- Supervised 4 undergraduate and 1 master's students; led 5 multidisciplinary group projects involving students from Bioengineering, Computer Science, and Mechanical Engineering.
- Designed the official website and administered lab's GitHub, and Slack; managed computational resources including server setup, management, and resource allocation.

Bethlehem, PA

Jan 2021 - Present

Lehigh University

High-Performance Computing Server Administrator

- Administered a high-computing server valued at \$500K, funded by NSF. Engineered initial setup, optimized for on-demand resource allocation, achieving production-readiness for multi-disciplinary research applications.

Bethlehem, PA

Jan 2023 - Present

GMS Composite Knitting Ind. Ltd.

Management Trainee

- Developed an Excel VBA automated line balancing algorithm, improving line balancing efficiency by 15%.
- Optimized floor efficiency via Excel VBA, achieving an 8-12% efficiency boost by maximizing total floor productivity with minimal machinery.

Dhaka, Bangladesh

Feb 2019 - Aug 2019

PROJECTS

Sub-Millisecond Cell Sorting

Developed a state-of-the-art FPGA-accelerated label-free machine learning framework for real-time cell sorting. Achieved sub-millisecond latency (14.5 s) and 98% classification accuracy, optimizing hardware-software integration for precision tasks. [CVPR25\[Under review\]](#)

May 2023 – Present

Multiplex Image ML

Pioneered a Multiplex Image ML framework integrating biomechanical property data with deep learning techniques, achieving 98.3% classification accuracy. Leveraged advanced image denoising and segmentation for rapid clinical decision-making. Preprint available at [Nature Microsyst Nanoeng\[Accepted\]](#).

May 2023 – Present

Stem Cell Classifier

Trained deep learning models to classify hematopoietic stem cells and multipotent progenitors using light microscopy, focusing on robust feature segmentation and motion artifact mitigation. Enabled rapid, marker-free cell classification for precision diagnostics. Published in [Stem Cell Research & Therapy](#).

Jan 2023 – Feb 2024

Maskless Microfluidic Prototyping

Developed computational models in COMSOL to enhance microfluidic device fabrication with maskless lithography, achieving high fidelity and repeatability. [Nature Communications](#)

Jan 2022 – Jun 2023

PUBLICATIONS

1. **Khayrul Islam**, Ryan F. Forelli, Jianzhong Han, Deven Bhadane, Joshua C. Agar, Nhan Tran, Seda Memik, and Yaling Liu. Real-time sub-millisecond cell sorting with scalable fpga-accelerated deep learning. *CVPR*, 2025. [Under review]
2. **Khayrul Islam**, Ratul Paul, Shen Wang, and Yaling Liu. Mimi: Multiplex image machine learning for high precision cell classification via mechanical traits within microfluidic systems. *Microsystems & Nanoengineering*, 2024. [Accepted for publication]
3. Yue Wu, **Islam**, **Khayrul**, Yaling Liu, and Anand Jagota. Microdroplet resuspension off surfaces. *Langmuir*, 40(52):27206–27215, 2024
4. Mehedi Hasan, **Khayrul Islam**, and AKM Masud. Tailoring polyamide nanocomposites: The synergistic effects of swcnt chirality and maleic anhydride grafting. *ACS Applied Engineering Materials*, 2024
5. Yuwen Zhao, Yue Wu, **Khayrul Islam**, Ratul Paul, Yuyuan Zhou, Xiaochen Qin, Qiying Li, and Yaling Liu. Microphysiologically engineered vessel-tumor model to investigate vascular transport dynamics of immune cells. *ACS Applied Materials Interfaces*, 16(18):22839–22849, 2024
6. Shen Wang, Jianzhong Han, Jingru Huang, **Khayrul Islam**, Yuheng Shi, Yuyuan Zhou, Dongwook Kim, Jane Zhou, Zhaorui Lian, Yaling Liu, et al. Deep learning-based predictive classification of functional subpopulations of hematopoietic stem cells and multipotent progenitors. *Stem Cell Research Therapy*, 15(1):74, 2024
7. Yue Wu, Yuwen Zhao, **Khayrul Islam**, Yuyuan Zhou, Saeed Omid, Yevgeny Berdichevsky, and Yaling Liu. Acoustofluidic engineering of functional vessel-on-a-chip. *ACS Biomaterials Science Engineering*, 9(11):6273–6281, 2023
8. Ratul Paul, Yuwen Zhao, Declan Coster, Xiaochen Qin, **Khayrul Islam**, Yue Wu, and Yaling Liu. Rapid prototyping of high-resolution large format microfluidic device through maskless image guided in-situ photopolymerization. *Nature Communications*, 14(1):4520, 2023
9. Anshu Raj, Sk Md Ahnaf Akif Alvi, **Khayrul Islam**, Mohammad Motalab, and Shuozhi Xu. An atomistic study of the tensile deformation of carbon nanotube–polymethylmethacrylate composites. *Polymers*, 15(13):2956, 2023
10. Yue Wu, Yuwen Zhao, Yuyuan Zhou, **Khayrul Islam**, and Yaling Liu. Microfluidic droplet-assisted fabrication of vessel-supported tumors for preclinical drug discovery. *ACS Applied Materials Interfaces*, 15(12):15152–15161, 2023
11. **Khayrul Islam**, Meghdad Razizadeh, and Yaling Liu. Coarse-grained molecular simulation of extracellular vesicle squeezing for drug loading. *Physical Chemistry Chemical Physics*, 25(17):12308–12321, 2023
12. Yue Wu, Yuyuan Zhou, Ratul Paul, Xiaochen Qin, **Khayrul Islam**, and Yaling Liu. Adaptable microfluidic vessel-on-a-chip platform for investigating tumor metastatic transport in bloodstream. *Analytical Chemistry*, 94(35):12159–12166, 2022
13. Mehdi Nikfar, Ratul Paul, **Khayrul Islam**, Meghdad Razizadeh, Anand Jagota, and Yaling Liu. Respiratory droplet resuspension near surfaces: Modeling and analysis. *Journal of Applied Physics*, 130(2), 2021
14. **Khayrul Islam**, Sourav Saha, and AKM Masud. Molecular dynamics simulation of the mechanical properties of cnt-polyoxymethylene composite with a reactive forcefield. *Molecular Simulation*, 46(5):380–387, 2020

CONFERENCE PRESENTATIONS

1. **Khayrul Islam**, Yuwen Zhao, Shen Wang, and Yaling Liu. Machine learning based classification of cells by mechanical properties in microfluidic device. *48th Annual Northeast Bioengineering Conference (NEBEC 2022) (April 2022)*, Columbia University, New York City, New York, 2022
2. **Khayrul Islam**, Tahreen Nabila, and AKM Masud. Investigation of the mechanical properties of polypropylene /carbon nanotube composite by molecular dynamics simulation. *13th International Conference on Mechanical Engineering, Dhaka, Bangladesh*, 2019