Sakib Mohammad, Ph.D.

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SUMMARY

Assistant Professor of Electronics Engineering Technology with six years of experience in higher education. Mentored students in electrical circuits, digital systems, and electronics across multiple courses and lab sessions. Research expertise includes deep learning applications in biological and material sciences, with a focus on computer vision and explainable AI.

EDUCATION

Southern Illinois University Carbondale, Carbondale, IL — August 2025
Doctor of Philosophy in Electrical and Computer Engineering — GPA: 4.00/4.00
Thesis: *Deep Learning Powered Identification and Classification of Early Differentiated Germ Layers from Pluripotent Stem Cells with Interpretability*
Supervisor: Dr. Farhan H. Chowdhury

Southern Illinois University Carbondale, Carbondale, IL — July 2021
Master of Science in Electrical and Computer Engineering — GPA: 3.96/4.00
Thesis: *A Novel Multiplier Using Modified Shift and Add Algorithm*
Supervisor: Dr. Themistoklis Haniotakis

Islamic University of Technology, Gazipur, Bangladesh — November 2016
Bachelor of Science in Electrical and Electronic Engineering — GPA: 3.81/4.00

EXPERIENCE

Assistant Professor, **Electronics Engineering Technology, Fairmont State University, Fairmont, WV** August 2025 - Present

- Primary duties include teaching, service, and scholarship.
- **Courses Assigned**: ELEC 1100 Circuit Analysis I, ELEC 1120 AC/DC Electronics Analysis, ELEC 2230 Digital Electronics, ELEC 2270 Introduction to Microcontrollers.

Research Assistant, **Mechanogenomics Lab**, **SIUC, Carbondale, IL** August 2021 - August 2025

- Used ResNet50 to classify HeLa cells treated with poly I:C and DMSO from phase-contrast and nucleus images (F1 = 0.87); applied Grad-CAM++ to highlight morphological features and t-SNE for class separation.
- Trained MLP and generative AI models (VAE, CVAE) to predict rheological properties (G' and G") of 3D-printed polyacrylamide (PAA) hydrogels (R^2 = 0.89) and generate material compositions validated by statistical tests & deployed on HF Space.
- Used transfer learning with CNN models (ResNet18, GoogLeNet, VGG11) on HeLa (F1 score 0.92) and B16F1 (F1 score 0.80) phase-contrast images to classify substrate stiffness, with Grad-CAM and LIME for decision-making insights.
- Applied CNN models (InceptionV3, DenseNet121, Xception, U-Net, Attention U-Net) to achieve 97% accuracy and 69% mIoU for phase-contrast and 90% accuracy and 61% mIoU for nucleus images in classifying and segmenting early mesoderm cells, with Grad-CAM for interpretability.
- Developed a supervised AI model combining InceptionV3 and Support Vector Machine (SVM), and unsupervised k-means and hierarchical clustering methods to identify and classify pancreatic tumor repopulating cells (TRCs) into three sub-types with 90% accuracy.
- Utilized a Random Forest Regressor machine learning model to predict thermo-mechanical properties of hollow glass micro-balloon filled composite materials with an R^2 of 0.9.
- Built XGBoost and CNN models (ResNet50, U-Net with ResNet34 encoder) for traction force prediction (MAPE = 4.96%) and substrate stiffness classification (Accuracy = 98%) from multi-modal dataset.
- Used MATLAB and ImageJ for image processing and traction force microscopy (TFM) to find forces and prestresses of single cells.
- Cultured and maintained cell lines including murine embryonic stem cells (OGTR1, OGR1, W4), and human and murine cancer cell lines (HeLa, MIA PaCa-2, B16F1), and performed various assays in a BSL-2 lab.
- Employed a Leica wide-field epifluorescence microscope to acquire and process images for further experimentation.

Research Assistant, **VLSI and RF Circuit Design Lab, SIUC, Carbondale, IL** April 2020 - July 2021

- Developed a binary multiplier using a modified shift-and-add algorithm with a barrel shifter and carry-save adders, implemented in Cadence Virtuoso (GPDK 45nm library), achieving scalable multiplication.

Teaching Assistant, **Department of ECE and EET, SIUC** August 2019 - July 2024

- Delivered laboratory lectures and assisted students in setting up and debugging electrical circuits.
- Graded assignments, labs, and exams.
- Prepared lab manuals.
- **Courses Assigned**: EET 238 Digital Systems Fundamentals, EET 245 Introductory Circuit Analysis and Applications, EET 245L Introductory Circuit Analysis and Applications Lab, EET 304A AC/DC Circuit Theory and Application, EET 304B Network Theory and Application, EET 403A Electronic Circuit Analysis, EET 403B Electronics Application and Design, ECE 235 Electrical Circuits I, ECE 235L Electrical Circuit I Lab, ECE 327 Digital Circuit Design with HDL, ECE 327L Digital Circuit Design with HDL Lab.

Lecturer, **Department of EEE, Gopalganj Science and Technology University, Bangladesh** November 2018 - July 2019

- Prepared and delivered lectures, labs, and supervised over 50 students.
- Managed exam questions, graded assignments, labs, and exams.
- **Courses Taught**: EEE 102 Electrical Circuit I Lab, EEE 321 Power Electronics, EEE 322 Power Electronics Lab.

Adjunct Lecturer, **Department of EEE, Green University of Bangladesh, Bangladesh** May 2018 - September 2018

- Prepared and conducted lectures, lab sessions; graded assignments and exams.
- **Courses Taught**: EEE 101 Electrical Circuits I, EEE 406 Discrete Signal Processing Lab, EEE 340 Engineering Drawing and Electrical Service Design Lab.

PUBLICATIONS

Journal Papers

- Hossain, M.S., Rabi, S.N., **Mohammad, S.**, Cook, K., Chowdhury, F., & Nilufar, S. (2025). Investigation of thermomechanical properties of hollow glass microballoon-filled composite materials developed by additive manufacturing with machine learning validation. Polymers, 17 (11), 1495. https://doi.org/10.3390/polym17111495.
- **Mohammad, S.**, Akand, R., Cook, K.M., Nilufar, S., & Chowdhury, F. (2024). Leveraging deep learning and generative AI for predicting rheological properties and material compositions of 3D printed polyacrylamide hydrogels. *Gels, 10*(10), 660. https://doi.org/10.3390/gels10100660.
- **Mohammad, S.**, Roy, A., Karatzas, A., Sarver, S.L., Anagnostopoulos, I., & Chowdhury, F. (2024). Deep learning powered identification of differentiated early mesoderm cells from pluripotent stem cells. *Cells, 13*(6), 534. https://doi.org/10.3390/cells13060534.
- **Mohammad, S.**, Amar, K., & Chowdhury, F. (2023). Hybrid AI models allow label-free identification and classification of pancreatic tumor repopulating cell population. *Biochemical and Biophysical Research Communications, 677*, 126-131. https://doi.org/10.1016/j.bbrc.2023.08.015.
- Tousif, M. N., **Mohammad, S.**, Ferdous, A. A., & Hoque, M. A. (2018). Investigation of different materials as buffer layer in CZTS solar cells using SCAPS. *Journal of Clean Energy Technologies, 6*(4), 293-296. https://doi.org/10.18178/jocet.2018.6.4.477.

Conference Papers

- Tousif, M. N., Ushan, M. N. R., Akhter, R., Mahmud, S., Rashid, S., & **Mohammad, S.** (2024). Performance analysis of heart disease detection using different machine learning approaches. In *2024 6th International Conference on Electrical Engineering and Information & Communication Technology (ICEEICT)*. IEEE. https://doi.org/10.1109/ICEEICT62016.2024.10534366.
- Tousif, M. N., Ushan, M. N. R., Joha, A. A., & **Mohammad, S.** (2017). A comprehensive study of CZTS solar cell simulation with ZnS buffer layer. In *2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC)* (pp. 193-197). IEEE. https://doi.org/10.1109/R10-HTC.2017.8288936.
- **Mohammad, S.**, Tousif, M. N., Ferdous, A. A., Hoque, M. A., & Rahman, M. W. (2017). Numerical analysis of CZTS solar cell with In2S3 buffer layer: A study of a CZTS-based thin-film solar cell, concerning the effects of several parameters on its electrical performance. In *2017 IEEE International Conference on Smart Grid and Smart Cities (ICSGSC)* (pp. 55-60). IEEE. https://doi.org/10.1109/ICSGSC.2017.8038549.

Poster Presentations

- **Mohammad, S.**, Rabi, S. N., & Chowdhury, F. (2025, April). Drug induced morphological changes in HeLa cells: A deep learning and explainable AI perspective. Poster session presented at the *2025 Creative Activities and Research Presentations (CARP)*, Southern Illinois University Carbondale.

- **Mohammad, S.**, Roy, A., Akand, R., & Chowdhury, F. (2024, April). Impact of various transfer learning methods on small biological dataset training. Poster session presented at the *2024 Creative Activities and Research Presentations (CARP)*, Southern Illinois University Carbondale.
- **Mohammad, S.**, Amar, K., & Chowdhury, F. (2023, April). Tumorigenic pancreatic cancer cell classification with a combined deep and machine learning model. Poster session presented at the *2023 Student Research & Creative Activities Forum (SRCAF)*, Southern Illinois University Carbondale.

AWARDS

- **Dissertation Research Assistantship** 2024, 2025
  Dissertation Research Assistantship for working towards doctoral dissertation.
- **Doctoral Fellowship** 2024
  Doctoral Fellowship for continuing PhD studies.
- **Bangladesh Sweden Trust Fund Scholarship** 2021
  Govt.-sponsored travel grant.
- **OIC Scholarship** 2012
  Awarded for outstanding performance in the entrance exam at my undergraduate university.

PROFESSIONAL SERVICE

- **Reviewer, *Scientific Reports* (Nature Portfolio)** 2025 - Present
  Reviewed manuscripts in the field of deep learning and biomedical applications.
- **Graduate and Undergraduate Student Mentor** 2022 - 2025
  Mechanogenomics Lab, SIUC.
- **Volunteer Mentor, K–12 Students** 2023, 2024
  Guided students in data science and machine learning fundamentals using Python.
- **NSF REU Student Mentor** 2022
  Mentored undergraduate researcher in image processing and analysis, Mechanogenomics Lab, SIUC.
- **Member, Exam Moderation Committee** 2018 - 2019
  Department of EEE, Gopalganj Science and Technology University.

TECHNICAL SKILLS

Circuit Design: Cadence Virtuoso, Verilog, PSpice (LTspice, Proteus), Synopsys Centaurus.
ML/DL: PyTorch, TensorFlow, Keras, Scikit-learn, OpenCV, NLTK, spaCy, HF Transformers.
Data Analysis: NumPy, Pandas, SciPy, Jupyter Notebook.
Data Visualization: Matplotlib, Seaborn, Plotly, Tableau, TensorBoard.
Cloud & Deployment: AWS, Google Colab, Gradio, Streamlit, HF Spaces.
Programming & Database: Python, MATLAB, C, SQL (PostgreSQL), Git.
Image Processing & Analysis: ImageJ, LasX.
Tools: MS Office Suite, D2L, Blackboard.

REFERENCES

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