

Md Abu Bakr Siddique

Ph.D. Researcher · Electrical & Computer Engineering

Woodmar Drive, Houghton, MI 49931, United States of America (USA)

msiddiq5@mtu.edu · [Website](#) · [Google Scholar](#) · [ORCID](#) · [LinkedIn](#) · [Scopus](#)

RESEARCH INTERESTS

- Neuromorphic Computing and Hardware — energy-efficient neuromorphic circuit design, spiking neural networks (SNNs), brain-inspired computing, AI hardware, and neuroprosthetics
- Computer Vision and Robot Perception — underwater imaging, physics-guided view synthesis, waterbody style transfer, and image restoration for challenging aquatic scenes
- Robotics — ground and underwater robotics, Robot Operating System (ROS), and neuromorphic control for autonomous navigation
- Machine Learning & Healthcare AI — deep learning, transfer learning, medical image processing, and AI applications in healthcare systems

EDUCATION

Doctor of Philosophy (Ph.D.), Electrical and Computer Engineering · Aug 2025 – Present

Department of Electrical and Computer Engineering, Michigan Technological University, USA · GPA: 3.82 / 4.00

Selected coursework: High-Speed Circuit Design; Cybersecurity for Industrial Control Systems; Cyber Security for Automotive Systems

Doctor of Philosophy (Ph.D.), Electrical and Computer Engineering · May 2024 – Aug 2025

Department of Electrical and Computer Engineering, University of Florida, USA · GPA: 3.83 / 4.00

Selected coursework: Autonomous Robots; Pattern Recognition

Master of Science in Engineering (M.Sc.Engg.), Electrical and Computer Engineering · Aug 2022 – Apr 2024

Department of Electrical and Computer Engineering, Michigan Technological University, USA ·

Selected coursework: Machine Learning; Computational Intelligence; Advanced Artificial Intelligence; Neuromorphic Robotic Systems; Biomedical Microcontrollers; Data Visualization; Probability & Stochastic Processes

Bachelor of Science in Engineering (B.Sc.Engg.), Electrical and Electronic Engineering · 2011 – 2014

Department of Electrical and Electronic Engineering, Islamic University of Technology (IUT), OIC, Bangladesh · GPA: 3.82 / 4.00 (3.95 over last two years)

Higher Secondary Certificate (H.S.C.), Science · 2010

New Govt. Degree College, Rajshahi Board, Bangladesh · GPA: 5.00 / 5.00

Secondary School Certificate (S.S.C.), Science · 2008

Agrani School and College, Rajshahi Board, Bangladesh · GPA: 5.00 / 5.00

PROFESSIONAL EXPERIENCE

Graduate Research Assistant · Aug 2025 – Present

Dept. of Electrical and Computer Engineering, Michigan Technological University, Houghton, USA

- Research on neuromorphic AI hardware and adaptive deep brain stimulation (DBS).

Graduate Research Assistant · May 2024 – Aug 2025

Dept. of Electrical and Computer Engineering, University of Florida, Gainesville, USA

- Research on computer vision and robotics, with emphasis on underwater imaging and view synthesis.

Graduate Teaching Assistant · Aug 2023 – Apr 2024

Dept. of Electrical and Computer Engineering, Michigan Technological University, USA

- Laboratories: EE 3173 — Microcontroller Applications for Cyber-Physical Systems; EE 4271 — VLSI Design.

Graduate Research Assistant · May 2023 – Aug 2023

Dept. of Electrical and Computer Engineering, Michigan Technological University, USA

- Research on neuromorphic computing and spiking neural networks.

Graduate Teaching Assistant · Aug 2022 – Apr 2023

Dept. of Electrical and Computer Engineering, Michigan Technological University, USA

- Laboratories: EE 2112 — Electric Circuits II; EE 2174 — Digital Logic; EE 3173 — Hardware/Software System Integration; EE 4271 — VLSI Design.

Graduate Research Assistant · Jan 2022 – Jun 2022

Dept. of Computer Science and Engineering, University of Arkansas, Fayetteville, USA

- Research on deep learning, machine learning, and graph neural networks.

Senior Lecturer · Jan 2019 – Nov 2021

Dept. of Electrical and Electronic Engineering, IUBAT, Dhaka, Bangladesh

- Taught microprocessor systems, control systems, industrial electronics, power station, and circuit analysis (lecture and laboratory).

Researcher, IBERG — IUBAT Brain Engineering Research Group · Jan 2019 – Nov 2021

IUBAT, Dhaka, Bangladesh

- Project: Visual Interactive and Interesting Smart Education System (VISES) — analyzing student brain signals to design more effective study materials.

Lecturer · Jan 2015 – Dec 2018

Dept. of Electrical and Electronic Engineering, IUBAT, Dhaka, Bangladesh

- Taught power system analysis, microprocessor systems, and power transmission and distribution (lecture and laboratory).

PUBLICATIONS

Journals

5. **Md Abu Bakr Siddique**, Vaishnav Ramesh, Junliang Liu, Piyush Singh, and Md Jahidul Islam, “UStyle: Waterbody Style Transfer of Underwater Scenes by Depth-Guided Feature Synthesis,” **IEEE Journal of Oceanic Engineering**, 2026. Impact Factor: 5.3. [\[IEEE Xplore\]](#)[\[GitHub\]](#)

4. Jiayi Wu, Tianfu Wang, **Md Abu Bakr Siddique**, Md Jahidul Islam, Cornelia Fermüller, Yiannis Aloimonos, and Christopher Metzler, “Single-Step Latent Diffusion for Underwater Image Restoration,” **IEEE Transactions on Pattern Analysis and Machine Intelligence**, 2025. Impact Factor: 20.8. [\[IEEE Xplore\]](#)[\[GitHub\]](#)[\[LinkedIn\]](#)

Project page: <https://tianfwang.github.io/slurpp/>

3. **Md Abu Bakr Siddique**, Jiayi Wu, Ioannis Rekleitis, and Md Jahidul Islam, “AquaFuse: Waterbody Fusion for Physics-Guided View Synthesis of Underwater Scenes,” **IEEE Robotics and Automation Letters**, 2025. Impact Factor: 6.0. [\[IEEE Xplore\]](#)[\[video demo\]](#)

2. **Md Abu Bakr Siddique**, Yan Zhang, and Hongyu An, “Monitoring Time Domain Characteristics of Parkinson’s Disease Using the Memristive Neuromorphic System,” **Frontiers in Computational Neuroscience**, 2023. Impact Factor: 2.3. [\[Frontiers\]](#)

1. S. I. Sharif, M. A. R. Anik, M. Al-Amin, and **Md Abu Bakr Siddique**, “The Prospect of Renewable Energy Resources in Bangladesh: A Study to Achieve the National Power Demand,” **Energy and Power**, vol. 8, no. 1, pp. 1–6, 2018. [\[Link\]](#)

Book Chapter

1. **Md Abu Bakr Siddique**, Tianze Liu, Yan Zhang, and Hongyu An, “Exploring Associative Learning of Audio and Color Stimuli with Neuromorphic Robots in a T-Maze,” in **Recent Advances in Neuromorphic Computing**, IntechOpen, 2024. [\[IntechOpen\]](#)

Thesis

1. **Md Abu Bakr Siddique**, “The Integration of Neuromorphic Computing in Autonomous Robotic Systems,” Master’s Thesis, Michigan Technological University, 2024. Digital Commons @ Michigan Tech. [\[Digital Commons\]](#)

Conference Proceedings

22. **Md Abu Bakr Siddique**, Jakub Orłowski, Yan Zhang, and Hongyu An, “Neuromorphic Silicon Neuron Controller for Adaptive Deep Brain Stimulation in Parkinson’s Disease,” **ACM International Conference on Neuromorphic Systems (ICONS 2026)**, Chicago, IL, USA, Aug 4–6, 2026. (**Top 3 Best Paper Finalists**) [\[ACM DL\]](#)[\[Finalist announcement\]](#)[\[LinkedIn\]](#)

21. Tianze Liu, **Md Abu Bakr Siddique**, and Hongyu An, “Mimicking Associative Learning of Rats via a Neuromorphic Robot in Open Field Maze using Spatial Cell Models,” **ACM International Conference on Neuromorphic Systems (ICONS 2024)**, Arlington, VA, USA, Jul 30–Aug 2, 2024. [\[IEEE Xplore\]](#)

20. Shadman Sakib, Abyaz Kader Tanzeem, Ihtyaz Kader Tasawar, Fatema Shorna, **Md Abu Bakr Siddique**, and Saadia Binte Alam, “Blood Cancer Recognition Based on Discriminant Gene Expressions: A Comparative Analysis of Optimized Machine Learning Algorithms,” **IEEE IEMCON 2021**, Vancouver, BC, Canada, Oct 2021. [\[IEEE Xplore\]](#)

19. Shadman Sakib, **Md Abu Bakr Siddique**, Mohammad Mahmudur Rahman Khan, Nowrin Yasmin, Anas Aziz, Madiha Chowdhury, and Ihtyaz Kader Tasawar, “Transfer Learning Based Method for Automatic COVID-19 Cases Detection in Chest X-Ray Images,” **IEEE ICOSEC 2021**, Trichy, India, Oct 2021. [\[IEEE Xplore\]](#)

18. Shadman Sakib, Nowrin Yasmin, Ihtyaz Kader Tasawar, Anas Aziz, **Md Abu Bakr Siddique**, and Mohammad Mahmudur Rahman Khan, “Performance Analysis of Machine Learning Approaches in Diabetes Prediction,” **IEEE R10-HTC 2021**, Bangalore, India, Sep 2021. [\[IEEE Xplore\]](#)

17. Mohammad Mahmudur Rahman Khan, Shadman Sakib, **Md Abu Bakr Siddique**, Madiha Chowdhury, Ziad Hossain, Anas Aziz, and Nowrin Yasmin, “Automatic Detection of COVID-19 Disease in Chest X-Ray Images using Deep Neural Networks,” **IEEE R10-HTC 2020**, Kuching, Malaysia, Dec 2020. [\[IEEE Xplore\]](#)

16. Mohammad Mahmudur Rahman Khan, **Md Abu Bakr Siddique**, Shadman Sakib, Anas Aziz, Ihtyaz Kader Tasawar, and Ziad Hossain, “Prediction of Temperature and Rainfall in Bangladesh using Long Short Term Memory Recurrent Neural Networks,” **IEEE ISMSIT 2020**, Turkey, Oct 2020. [\[IEEE Xplore\]](#)

15. **Md Abu Bakr Siddique**, Shadman Sakib, Mohammad Mahmudur Rahman Khan, Abyaz Kader Tanzeem, Madiha Chowdhury, and Nowrin Yasmin, "Deep Convolutional Neural Network Model-based Brain Tumor Detection in Brain MRI Images," **IEEE I-SMAC 2020**, Tamil Nadu, India, Oct 2020. [\[IEEE Xplore\]](#)
14. Mohammad Mahmudur Rahman Khan, **Md Abu Bakr Siddique**, Shadman Sakib, Anas Aziz, Abyaz Kader Tanzeem, and Ziad Hossain, "Electrocardiogram Heartbeat Classification Using Convolutional Neural Networks for the Detection of Cardiac Arrhythmia," **IEEE I-SMAC 2020**, Tamil Nadu, India, Oct 2020. [\[IEEE Xplore\]](#)
13. Shadman Sakib, **Md Abu Bakr Siddique**, and Abdur Rahman, "Performance Evaluation of t-SNE and MDS Dimensionality Reduction Techniques with KNN, ENN and SVM Classifiers," **IEEE TENSYP 2020**, Dhaka, Bangladesh, Jun 2020. [\[IEEE Xplore\]](#)
12. **Md Abu Bakr Siddique**, Shadman Sakib, and Abdur Rahman, "Performance Analysis of Deep Autoencoder and NCA Dimensionality Reduction Techniques with KNN, ENN and SVM Classifiers," **IEEE ICIET 2019**, Dhaka, Bangladesh, Dec 2019. [\[IEEE Xplore\]](#)
11. Mohammad Mahmudur Rahman Khan, **Md Abu Bakr Siddique**, and Shadman Sakib, "Non-Intrusive Electrical Appliances Monitoring and Classification using K-Nearest Neighbors," **IEEE ICIET 2019**, Dhaka, Bangladesh, Dec 2019. [\[IEEE Xplore\]](#)
10. Shadman Sakib and **Md Abu Bakr Siddique**, "Modeling and Simulation of Solar Photovoltaic Cell for the Generation of Electricity in UAE," **IEEE ICAEE 2019**, Dhaka, Bangladesh, Sep 2019. [\[IEEE Xplore\]](#)
9. Fathma Siddique, Shadman Sakib, and **Md Abu Bakr Siddique**, "Recognition of Handwritten Digit using Convolutional Neural Network in Python with Tensorflow and Comparison of Performance for Various Hidden Layers," **IEEE ICAEE 2019**, Dhaka, Bangladesh, Sep 2019. [\[IEEE Xplore\]](#)
8. Rezoana Bente Arif, Mohammad Mahmudur Rahman Khan, and **Md Abu Bakr Siddique**, "Digital Image Enhancement in Matlab: An Overview on Histogram Equalization and Specification," **IEEE ICIET 2018**, Dhaka, Bangladesh, Dec 2018. [\[IEEE Xplore\]](#)
7. **Md Abu Bakr Siddique**, Rezoana Bente Arif, and Mohammad Mahmudur Rahman Khan, "Digital Image Segmentation in Matlab: A Brief Study on Otsu's Image Thresholding," **IEEE ICIET 2018**, Dhaka, Bangladesh, Dec 2018. [\[IEEE Xplore\]](#)
6. Mohammad Mahmudur Rahman Khan, Shadman Sakib, Rezoana Bente Arif, and **Md Abu Bakr Siddique**, "Digital Image Restoration in Matlab: A Case Study on Inverse and Wiener Filtering," **IEEE ICIET 2018**, Dhaka, Bangladesh, Dec 2018. [\[IEEE Xplore\]](#)
5. Mohammad Mahmudur Rahman Khan, Rezoana Bente Arif, **Md Abu Bakr Siddique**, and Mahjabin Rahman Oishe, "Study and Observation of the Variation of Accuracies of KNN, SVM, LMNN, ENN Algorithms on Eleven Different Datasets from UCI Machine Learning Repository," **IEEE iCEEiCT 2018**, Dhaka, Bangladesh, Sep 2018. [\[IEEE Xplore\]](#)
4. Rezoana Bente Arif, **Md Abu Bakr Siddique**, Mohammad Mahmudur Rahman Khan, and Mahjabin Rahman Oishe, "Study and Observation of the Variations of Accuracies for Handwritten Digits Recognition with Various Hidden Layers and Epochs using Convolutional Neural Network," **IEEE iCEEiCT 2018**, Dhaka, Bangladesh, Sep 2018. [\[IEEE Xplore\]](#)
3. **Md Abu Bakr Siddique**, Mohammad Mahmudur Rahman Khan, Rezoana Bente Arif, and Zahidun Ashrafi, "Study and Observation of the Variations of Accuracies for Handwritten Digits Recognition with Various Hidden Layers and Epochs using Neural Network Algorithm," **IEEE iCEEiCT 2018**, Dhaka, Bangladesh, Sep 2018. [\[IEEE Xplore\]](#)
2. Mohammad Mahmudur Rahman Khan, **Md Abu Bakr Siddique**, Rezoana Bente Arif, and Mahjabin Rahman Oishe, "ADBSCAN: Adaptive Density-Based Spatial Clustering of Applications with Noise for Identifying Clusters with Varying Densities," **IEEE iCEEiCT 2018**, Dhaka, Bangladesh, Sep 2018. [\[IEEE Xplore\]](#)
1. **Md Abu Bakr Siddique**, M. Tanvirul Hoque, Tashfique Sibgat Ullah, Rakibul Hasan Sagor, and Shahid Ullah, "Study of PV Implementation for Electricity Generation in Bangladesh," **IEEE ICGET 2015**, Dhaka, Bangladesh, Sep 2015. [\[IEEE Xplore\]](#)

SELECTED RESEARCH PROJECTS

CMOS Neuromorphic Hardware for Closed-Loop DBS

Developing neuromorphic silicon for adaptive deep brain stimulation that delivers tailored stimulation based on continuously evaluated beta-band symptoms, using open-source PDK tools.

LIMO Robot Navigation with ROS & Spiking Networks

Agilex LIMO navigation with ROS; Nengo LIF neurons for T-maze control; speech-command SNNs on SynSense Xylo hardware (Rockpool/Samna); LIDAR-based SLAM mapping.

Underwater Image Enhancement & 3D Reconstruction

Pipelines combining state-of-the-art enhancement with SIFT, FAST, and ORB for improved underwater matching and 3D view synthesis.

Physics-Aware Underwater Style Transfer

Transformer-based and physics-guided methods for realistic color correction and style transfer in underwater imagery and video.

TECHNICAL SKILLS

Programming: Python (TensorFlow, Keras, PyTorch), C, MATLAB

Simulation & Design: Cadence Virtuoso, Magic VLSI, Xschem, PSpice, Proteus, Microsoft Visio, Octave

Systems & Tools: Linux, Windows, LaTeX, ROS, Nengo, Rockpool, Samna, Insight Toolkit (ITK)

Domains: Neuromorphic hardware, computer vision, robotics, medical AI, underwater imaging

Applications: Microsoft Office, academic writing and presentation tools

PROFESSIONAL SERVICE (REVIEWER)

- MWSCAS 2026 — IEEE International Midwest Symposium on Circuits and Systems
- ICRA 2025 — IEEE International Conference on Robotics and Automation
- MWSCAS 2023 — IEEE International Midwest Symposium on Circuits and Systems
- Pattern Recognition (Elsevier)
- International Journal of Machine Learning and Cybernetics (Springer Nature)
- TELKOMNIKA (Scopus-indexed)
- ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM)
- International Journal of Imaging Systems and Technology (Wiley)

Reviewer profiles: [Elsevier](#) · [Web of Science / Publons](#)

HONORS AND AWARDS

- Top 3 Best Paper Finalist — ACM International Conference on Neuromorphic Systems (ICONS 2026). [\[Finalist announcement\]](#)[\[LinkedIn\]](#)
- Fully funded master's offer in Electrical and Computer Engineering, Michigan Technological University, USA.
- Miyan Publication Reward 2021 — 90,000 BDT from Miyan Research Institute, IUBAT, for Scopus-indexed publications (2019–2020).
- Organization of Islamic Cooperation (OIC) scholarship for undergraduate study (2012–2014).
- Rajshahi Education Board scholarships (H.S.C. 2010; S.S.C. 2008); Junior and Primary Board scholarships.
- Industrial Attachment Course certificate — Ghorasal Training Center, Bangladesh Power Development Board (BPDB).

SELECTED ONLINE COURSES

- Machine Learning Scientist with Python (93 hrs) — DataCamp [\[Certificate\]](#)
- Data Analyst with Python (36 hrs) — DataCamp [\[Certificate\]](#)
- AI for Medical Diagnosis — Coursera [\[Certificate\]](#)
- AI for Medical Prognosis — Coursera [\[Certificate\]](#)
- AI for Medical Treatment — Coursera [\[Certificate\]](#)
- Introduction to TensorFlow for AI, ML, and Deep Learning — Coursera [\[Certificate\]](#)
- Convolutional Neural Networks in TensorFlow — Coursera [\[Certificate\]](#)
- Natural Language Processing in TensorFlow — Coursera [\[Certificate\]](#)
- Sequences, Time Series and Prediction — Coursera [\[Certificate\]](#)
- Crash Course on Python — Coursera [\[Certificate\]](#)

STANDARDIZED TESTS (EXPIRED)

GRE: 311 (Quantitative 160, Verbal 151, AWA 3)

TOEFL: 91 (Reading 24, Listening 19, Speaking 23, Writing 25)

Full publication list and research highlights: <https://siddique-mab.pages.dev/>