Muzammil Ahmed

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DOB: 23/01/1999
PhD in Power Electronics
Indian Institute Of Technology, Guwahati

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Education

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
PhD	Indian Institute of Technology, Guwahati	NA	2025-Present
M. Tech	Indian Institute of Technology, Bhubaneswar	8.23	2023-2025
B. Tech	Tezpur University	7.71	2017-2021
Higher Secondary	Assam Higher Secondary Education Council	94.6%	2017

Experience

- **Teaching Assistant** — *July 2025 - Present*
  Department Infrastructure Management Committee (DIMC), IIT Guwahati — Guwahati
- **Head Placement Coordinator (M.Tech)** — *May 2024 - May 2025*
  Career Development Cell, IIT Bhubaneswar — Odisha
- **Student Placement Coordinator (PSE)** — *May 2024 - May 2025*
  Career Development Cell, IIT Bhubaneswar — Odisha
- **Assistant Coordinator** — *May 2024 - May 2025*
  Counselling Service Team, IIT Bhubaneswar — Odisha
- **Teaching Assistant** — *July 2023 - May 2025*
  School of Electrical and Computer Sciences, IIT Bhubaneswar — Odisha
- **Research Intern** — *Aug – October 2020*
  Typhoon HIL, Inc. — Remote

Projects

- **Event-Triggered Reinforcement Learning for Adaptive Boost Converter Control** *2025*
  - Designed an event-triggered RL controller reducing control computation by ∼70% while maintaining voltage stability.
  - Developed a Python-based digital twin (NumPy, PyTorch) for validation under dynamic load and irradiance.
  - Achieved robust, real-time adaptability for renewable and embedded converter systems.
- **Hybrid Sine Cosine Algorithm with Pattern Search for MPPT in PV Systems** *2025*
  - Proposed a hybrid SCA–PS optimization for fast and accurate MPPT under partial shading.
  - Outperformed P&O and conventional metaheuristics in convergence and energy yield.
  - Validated in Python through P–V and V–I simulations for PV system performance.
- **Transient Adaptive Predictive Fuzzy Reinforcement (TAPFR) Controller for Buck Converters** *2025*
  - Developed a hybrid controller combining predictive, fuzzy, and reinforcement learning strategies.
  - Implemented adaptive rule tuning and predictive compensation for voltage regulation.
  - MATLAB results showed low overshoot and strong robustness under load variations.
- **Integrated Dual Output Converter with Model Predictive Control for Solar Pumping Applications** *2024–25*
  Supervised by Dr. Olive Ray
  - Designed a non-isolated SIMO converter using CCS-MPC for dual boost–buck outputs.
  - Implemented on TI TMS320F28379D DSP; verified real-time PWM and current tracking.
  - Demonstrated high stability and efficient solar-powered water pumping performance.
- **Distance Protection Scheme using Mho Relay** *2023*
  Supervised by Dr. Pankaj Dilip Achlerkar
  - Designed and simulated a 3-zone Mho relay in MATLAB/Simulink for line protection.
  - Verified zone-wise tripping and relay stability under faults and power swing conditions.
- **Hybrid Converter System for Renewable Energy Systems** *2022*
  Supervised by Dr. Anish Ahmad
  - Modeled a multi-input hybrid converter integrating solar, wind, and Li-ion battery sources.
  - Implemented SOC-based control ensuring efficient power management for microgrid systems.

Technical Skills

- **Simulation**: Matlab, Simulink, Plecs, Psim, Typhoon HIL
- **Other Softwares**: LaTeX, MS Office

Publications

- **Journals**:

[1] M. Ahmed, S. Barman (2025). **"Adaptive Particle Swarm Optimization for Non-Invasive Parasitic Parameter Estimation in DC-DC Boost Converters"**. *Journal of Dynamics and Control*, Springer. (Under Review).

[2] M. Ahmed, S. Barman (2025). **"Adaptive Fault-Tolerant PID Control Synthesis for Buck Converters via Multi-Objective Genetic Algorithm Optimization"**. *Arabian Journal for Science and Engineering*, Springer. (Under Review).

[3] M. Ahmed (2025). **"Wide-Bandgap Semiconductors for High-Voltage Power Electronics: Advances, Challenges, and Pathways to Adoption"**. *IEEE Power Electronics Magazine*. (Under Review).

[4] M. Ahmed, J. Sk (2025). **"Hybrid Neural Network-Model Predictive Control for Robust Voltage Regulation in Buck Converters"**. *Engineering Research Express*, IOP Science. (Under Review).

[5] M. Ahmed, J. Sk (2025). **"Design and Implementation of the Transient Adaptive Predictive Fuzzy Reinforcement Controller for Buck Converter Applications"**. *International Journal of Automation and Control*, Inderscience Publications. (Under Review).

[6] S. Barman, M. Ahmed, A. Ahmad (2025). **"Efficient Power Conversion for Renewable Energy: Hybrid Multi-Output System with Solar Photovoltaic Inputs and Battery Backup"**. *Renewable Energy Focus*, Elsevier. (Under Review).

[7] Ahmed, M (2025). **"Enhanced Maximum Power Point Tracking for Photovoltaic Systems Using a Novel Sine Cosine Algorithm with Pattern Search"**. *International Journal of Power Electronics*, Inderscience Publications. (Accepted).

[8] Ahmed, M (2025). **"Predictive Control Based MPPT for Solar Boost Converters to Optimize Performance Under Fluctuating Irradiation and Loads"**. *Multidisciplinary Research Journal*, 1(2), 14–25. https://doi.org/10.63635/mrj.v1i2.22 (Published).

- **Conferences**:

[1] Ahmed, M., Sarkar, S., Modak, S., Ahmad, A., Akhtar, M.J., Agarwal, P. **"Switched-Boost Modified Z-Source Inverter for Renewable Energy Application"**. In: Gabbouj, M., Pandey, S.S., Garg, H.K., Hazra, R. (Eds) *Emerging Electronics and Automation (E2A 2022)*, Lecture Notes in Electrical Engineering, Vol. 1088. Springer, Singapore. https://doi.org/10.1007/978-981-99-6855-8_29 (Published).

[2] M. Ahmed and O. Ray, **"Design and Development of Model Predictive Control for Enhanced Performance of SIMO DC-DC Converter"**, *IEEE Energy Conversion Congress and Exposition (ECCE) Asia*, Bengaluru, India, 2025. https://doi.org/10.1109/ECCE-Asia63110.2025.11111825 (Published).

[3] M. Ahmed and A. Ahmad, **"Novel Single Switch Quadratic Boost Converter with Continuous Input and Common Ground"**, *IEEE North-East India Energy Conversion Congress and Exposition (NE-IECCE)*, 2025. https://doi.org/10.1109/NE-IECCE64154.2025.11183477 (Published).

[4] M. Ahmed and A. Ahmad, **"Ultra-High Voltage Gain Transformerless DC-DC Converter for Renewable Energy Applications"**, *IEEE North-East India Energy Conversion Congress and Exposition (NE-IECCE)*, 2025. https://doi.org/10.1109/NE-IECCE64154.2025.11182951 (Published).

[5] M. Ahmed and S. R. Barman, **"Advanced Adaptive Riccati MPC with Integrated Riccati Solvers for Enhanced Buck Converter Stability"**, *IEEE National Power Electronics Conference (NPEC)*, 2025. (Accepted).

[6] M. Ahmed and J. Sk, **"Design and Development of CCS-MPC Inductor Current Control for Hybrid Switched-Capacitor High-Gain Converters"**, *3rd International Online Conference on Energies (MDPI)*, 2026. (Under Review).

[7] M. Ahmed, **"FSM-Guided Adaptive MPC for Robust Fault-Tolerant Control of PV Inverters"**, *3rd International Online Conference on Energies (MDPI)*, 2026. (Under Review).

[8] M. Ahmed, **"Nonlinear Model Predictive Control with Extended Kalman Filter for Robust Voltage Regulation in DC-DC Converters"**, *4th Annual On-Line Conference of IEEE Industrial Electronics Society (ONCON)*, 2025. (Under Review).

- **Book Chapters**:

[1] M. Ahmed (2025). **"Stochastic Reinforcement Learning for Uncertainty-Aware Power Converter Control using Digital Twin"**. In: *Stochastic Planning and Modeling for Energy Systems*, Elsevier. (Accepted).

[2] Ahmed, M., Sarkar, S., Modak, S., Ahmad, A., Akhtar, M.J., & Agarwal, P. (2024). **"Switched-Boost Modified Z-Source Inverter for Renewable Energy Application"**. In M. Gabbouj, S.S. Pandey, H.K. Garg, & R. Hazra (Eds.), *Emerging Electronics and Automation (E2A 2022)*, Lecture Notes in Electrical Engineering (Vol. 1088). Springer, Singapore. https://doi.org/10.1007/978-981-99-6855-8_29 (Published).

Internships

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Typhoon HIL for Real-Time Power Electronics Systems in EV and Microgrids *Aug. 2020 – Oct. 2020*
Quarbz Info Systems | Typhoon HIL Inc.

* Explored Typhoon HIL software and real-time HIL platforms for EV and microgrid power applications.
* Designed and analyzed Photovoltaic (PV) models and power electronic converters for renewable systems.

Achievements

* **Reviewer** – *Control Engineering Practice (Elsevier).*
* **Reviewer** – *IEEE Transactions on Power Electronics (TPEL).*
* Secured **95.68 percentile** in GATE EE-2023 and **92.16 percentile** in GATE ECE-2023.
* Received **Research and Innovation Grant (UGC-BSR Research Start-Up Grant, Tezpur University – Rs. 50,000)** in 2020.
* Achieved **State Rank 9** in Higher Secondary Examination, Assam (2017).
* Won **Gold Medal** in State Chemistry Olympiad, Society for Chemical Education, Assam (2016).
* Won **Silver Medal** in Mathematics Olympiad, Science Olympiad Foundation (2016).
* Received **Anundoram Borooah Award** for outstanding academic performance by the Secondary Education Board of Assam (2015).