# Tanvir Alam Shifat

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## Summary

Electrical engineer with hands-on experience in DAQ integration and prototype validation for motor & generator. Skilled in MATLAB, Python, and cross-functional hardware development from bring-up through validation.

## Education

**Oregon State University** — Corvallis, OR, USA
*Ph.D. in Electrical and Computer Engineering* — *June 2021 - Sep 2026*

**Kumoh National Institute of Technology** — Gumi, South Korea
*MS in Mechanical and Electrical Convergence Engineering* — *Sep 2018 - Aug 2020*

**East West University** — Dhaka, Bangladesh
*BS in Electrical and Electronic Engineering* — *Jan 2012 - Apr 2016*

## Skills

**Programming** : Python, MATLAB, LabVIEW, JMP.
**Testing & Integration** : Hardware bring-up, system integration, debugging, fault injection, data acquisition.
**Modeling** : AutoCAD, PLECS, LTspice, Simulink Real-Time, SpeedGoat.
**Hardware Systems** : HV/LV wiring, CAN integration, DAQ setup, relays/fuses, system bring-up and debugging.

## Work Experience

**Eaton Research Lab** — May 2026 – Sep 2026
*Grid Intelligence Intern – Real-time Simulations* — *Golden, CO, USA*

- Working on electromagnetic transient (EMT) analysis of real-time simulation workflows for critical facility ride through and resiliency events.
- Assisting with development and validation of software-in-the-loop (SIL) and hardware-in-the-loop (HIL) testbeds for advanced protection and control algorithms in critical infrastructure power systems.

**Sylvan Systems** — June 2025 – Sep 2025
*Intern, Electrical Engineer* — *Eugene, OR, USA*

- Integrated 12V auxiliary power distribution using relay/fuse protection enabling safe system startup.
- Developed and implemented microcontroller-based (Arduino and ESP32) thermal management controls (before CAN integration) for battery and inverter cooling using PWM pumps and relay-controlled fans.
- Debugged wiring, control logic, and subsystem interactions during integration and test.

## Selected Engineering Projects

**Linear Generator (PMSG) Torque Control Test and Validation** — June 2021 – Now

- Tested active damping control for a 24-pole axial PMSG (46 Nm continuous torque) coupled to a pneumatic energy storage system, validating stability and maximizing power transfer for variable load conditions.
- Improved generator power conversion efficiency by 15% using a data-driven gain scheduling approach that tunes control parameters in real-time using measured torque, speed, and force under changing load profiles.
- Tuned MPC torque control to regulate generator damping under variable load disturbances, maintaining $< 1\%$ tracking error while maintaining stable operation and maximum power transfer.

**Design and Validation of a Power Take-Off for Class-8 e-Truck Suspension** — Jan 2023 – Jun 2024

- Reframed suspension energy harvesting as a control-driven damping optimization problem, achieving ∼8 kW peak power potential through system-level PTO design under realistic road excitation.
- Validated PTO performance on a hardware prototype, achieving ∼300 W peak output and ∼30% mech-to-elec efficiency, bridging simulation predictions with experimental results.

**BLDC Motor Reliability Testing & AI-Based Fault Diagnostics** Sep 2018 – May 2021

- Built an accelerated life-testing platform for BLDC motors (24V, 5000 RPM) using NI LabVIEW to collect multi-sensor time-series data (vibration, current, speed) for hardware reliability assessment and fault detection.
- Developed and applied a failure monitoring pipeline to track degradation behavior and identify weak fault features at early stage using time-frequency analysis (FFT/STFT).
- Improved diagnostic accuracy by 10% using $3^{rd}$ harmonic features from motor current signature analysis (MCSA).

## Academic Experience

**Graduate Assistant** June 2021 – Present

*Oregon State University* *Corvallis, OR, USA*

- Designed and developed an introductory power electronics course for interdisciplinary researchers, covering power conversion, motor/generator systems, grid integration, and measurement/testing concepts.
- Mentored 120+ students in Electrical Circuits II (ENGR202) and 60 graduate students in Power Electronics (ECE531) courses, assisting with lab experiment setup, debugging, measurements, and hardware validation.
- Maintained GitHub repositories for simulation models and experimental data analysis, enabling reproducible testing, version control, and validation of system performance.

**Graduate Research Assistant** Sep 2018 – May 2021

*Kumoh National Institute of Technology* *Gumi, South Korea*

- Led a team of 5 researchers, coordinating efforts to develop diagnostic tools and ensuring timely project delivery.
- Mentored 3 undergraduate capstone research teams & supported repeatable hardware validation through sensor integration, test-rig debugging, data logging, and structured analysis of failure signatures.

## Selected Journal Papers

1. **Shifat T.A.**, Wallace S., Piacenza J., Brekken, T.K.A., "Electromechanical Design of Suspension Power Take-Offs for Energy Harvesting in Heavy-Duty Electric Trucks," ***IEEE/ASME Transactions on Mechatronics*** *[in Review]*
2. **Shifat T.A.**, Coe, R., Bacelli, G., Brekken, T.K.A., "Real-Time Sea State Identification for Wave Energy Converter Control via Machine Learning," Appl. Sci. 2025, 15, 5772. [Link]

*20+ Journal & conference articles. Full list of publications available on Google Scholar.

## Leadership and Activities

**Chair & Treasurer** June 2023 - Present

*IEEE PES/PELS Student Chapter, Oregon State University* *Corvallis, OR, USA*

- Planned and executed industry-focused technical seminars & workshops, increasing chapter membership by 30%.
- Managed chapter budgeting and secured $5,000 in external funding by preparing competitive grant proposals.

**Chair** Jan 2015 - Dec 2015

*IEEE Student Branch, East West University* *Dhaka, Bangladesh*

- Expanded IEEE student membership from 45 to 80 by executing structured technical and professional activities.
- Founded and launched a new IEEE Industry Applications Society (IAS) Student Chapter at East West University.

## Awards

**DOE Marine Energy Fellowship** 2026

*CalWave/ORISE* *San Francisco, CA*

- Selected as one of eight recipients for contribution to cutting-edge technology in marine energy.

**ARPA-e Student Award** Mar 2025

*ARPA-e Summit 2025* *Washington D.C., USA*

- Selected as one of six recipients for an outstanding technical pitch proposal; awarded $950 in scholarship.

**Best Poster Presentation** Aug 2025

*UMERC 2025* *Corvallis, OR, USA*

- Awarded Best Poster among 50+ technical presentations for clarity, technical rigor, and impact.