Tanvir Alam Shifat

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Education

Oregon State University — Corvallis, OR, USA
Ph.D. in Electrical and Computer Engineering (Minor: Artificial Intelligence) — *June 2021 - Present*

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

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

Skills

Languages: Python (scripting, machine learning, data analysis), MATLAB (simulation, control systems, signal processing), R (statistics), LabVIEW (data acquisition, calibration).
Modeling Tools: PLECS, Simulink, MATPOWER, LTspice, WEC-Sim, AutoCAD, CATIA, Origin, Simscape.
AI Libraries: Scikit-learn, TensorFlow, Keras, Pytorch, OpenCV, SciPy, NumPy, Pandas.
Hands-on: DAQ setup (NI, Speedgoat, Oscilloscope), Sensor calibration, Testing, and verification.
Others: Adobe PS, Adobe AI, Adobe Lightroom, RedHat Linux, Unix OS.

Projects

PI-emulating MPC design for wave energy converters (WECs) — June 2022 – Present
- Developed and verified a constrained PI-pseudo control for WEC using MPC with a tracking error $< 1\%$.
- Enhanced energy capture in two WEC devices by using impedance matching and feedback control techniques.

Linear PTO design for class-8 semi-truck suspension system — Jan 2023 – Present
- Formulated a mathematical model of the relative movement between the chassis and cab of a Class 8 commercial truck, demonstrating a maximum power extraction potential of 8 kW.
- Implemented impedance matching technique in an analogous tractor-trailer system, achieving maximum power extraction of 20 kW.

Supercapacitors for high pulsed power application — June 2021 – June 2022
- Outlined a supercapacitor module architecture controlled by a dual active bridge (DAB) converter for high power output, achieving a peak power of 1 kW.
- Implemented *d-q* current control framework for generator control, achieving a dynamic response of 50 ms.

AI-based prognostics and health management of BLDC motors — Sep 2018 – May 2021
- Built a test-rig and NI LabVIEW DAQ environment for monitoring and acquiring multi-sensor signals, including motor speed, stator current, output voltage, coil temperature, etc.
- Developed a fault diagnosis framework by multi-sensor information fusion and ANN achieving an accuracy of 95%.
- Devised a novel feature selection method using motor current's 3^{rd} harmonic for fault diagnosis, improving accuracy by 10% over conventional methods.

Publication

1. Shifat, T.A., Coe, R., Bacelli, G., Brekken, T.K.A., "Constrained Pseudo-PI Linear Control of a Wave Energy Converter via Model Predictive Control.", ***2024 American Control Conference (ACC)***, Toronto, ON, Canada, July 2024.
2. Shifat T.A., Hur J.W.,"Remaining Useful Life Estimation of BLDC Motor Considering Voltage Degradation and Attention-based Neural Network", in ***IEEE Access***, vol. 8, pp. 168414-168428, 2020.
3. Shifat T.A., Hur J.W.,"An Effective Stator Fault Diagnosis Framework of BLDC Motor Based on Vibration and Current Signals", in ***IEEE Access***, vol. 8, pp. 106968-106981, 2020.
4. Shifat T.A., Hur J.W.,"EEMD Assisted Supervised Learning for the Fault Diagnosis of BLDC Motor using Vibration Signal", ***Journal of Mechanical Science and Technology***, 34(10), (2020).

Relevant Graduate Courses

Adv. Power Electronics, Power System Analysis, Electric Vehicles, Semiconductors, Contemporary Energy Analysis, Linear Systems, Machine Learning, Deep Learning, Intelligent Agents and Decision Making.