Muhammad Haseeb Arshad

PhD Candidate, Electrical & Computer Engineering
University of Alberta, Edmonton, Alberta
haseeb-arshad.me · marshad4@ualberta.ca · Google Scholar · LinkedIn · GitHub

Research

Fault diagnosis for electric machines and drives; Predictive and adaptive control of power electronics; Adversarial robustness without the accuracy tax; Time series anomaly detection under imbalance.

20 peer-reviewed publications · **14** as first author · **239** citations · h-index **8** · **8** in Q1/Q2 journals.

Selected Publications

Chosen for impact and fit, not recency. Full list below.

- **M. H. Arshad**, M. A. Abido, A. Salem, A. H. Elsayed. "Weighting factors optimization of model predictive torque control of induction motor using NSGA-II with TOPSIS decision making." *IEEE Access, 7 (Q1)*, 2019. **Cited 100 times.** doi:10.1109/access.2019.2958415
- **M. H. Arshad**, L. Maraaba, M. A. Abido, Q. Zhao. "Leveraging Meta-Learner-Based Stacking Framework for Stator Winding Inter-Turn Fault Detection of LSPMSM." *IEEE Journal of Emerging and Selected Topics in Industrial Electronics (Q1)*, 2026. doi:10.1109/jestie.2026.3704523
- **M. H. Arshad**, H. Wang, J. Yao, Q. Zhao. "Rotor imbalance fault classification through unified feature fusion: combining statistical signal processing with adaptive deep learning features." *Engineering Applications of Artificial Intelligence, 157 (Q1)*, 2025. **Cited 8 times.** doi:10.1016/j.engappai.2025.111182
- **M. H. Arshad**, A. El-Sayed, A. Salem, Q. Zhao, M. A. Abido. "Implications of the sensorless predictive control for line-start permanent magnet synchronous machine." *IEEE Transactions on Automation Science and Engineering, 21(3) (Q1)*, 2023. **Cited 10 times.** doi:10.1109/tase.2023.3293049

Education

PhD, Electrical & Computer Engineering since 2022
University of Alberta, Edmonton
Advanced Control Systems & Diagnosis Lab. Fault diagnosis for electric drives, predictive control, and robustness in deep learning.

MSc, Electrical Engineering: Control & Systems Engineering 2018–2021
King Fahd University of Petroleum & Minerals, Dhahran
Thesis: Intelligent Model Predictive Torque Control of Induction Motor.

MSc, Electrical Engineering: Power & Control Systems 2016–2017
University of Engineering & Technology, Lahore
Design project: Advance Direct Torque Control of a Two Phase Symmetrical Induction Motor fed with a B4 Inverter.

BSc, Electrical Engineering: Electronics & Telecommunication 2009–2014
University of the Punjab, Lahore
Thesis: Wandering Autonomous Lifelike Behaviour Based Ground Vehicle.

Research Experience

Co-Researcher since 2026
Time to Thrive Research Group, Faculty of Rehabilitation Medicine, University of Alberta
Building the International Student Hub, and sitting in the consultation sessions working out a framework international students can use to manage their time and self-care.

Machine Learning Consultant since 2025
Ibtidah Solutions, Lahore (remote)
Research-side work on AI for industrial and clinical problems. A digital twin of a compressor system built on liquid neural networks, a preprocessing pipeline that synchronises multi-modal sensor streams sampled at different rates, and currently a two-model diabetic retinopathy screening pipeline: a deep network grading retinal scans, and a locally served LLM writing the summary the patient reads.

Research Scholar since 2022
Advanced Control Systems & Diagnosis Lab, University of Alberta
Time-series fault identification and localization with synthetic feature engineering, acoustic anomaly detection for power drives, physics-informed deep learning and data balancing for industrial fault diagnosis, and multi-modal sensor fusion to bring false alarms down. Contributor to the ORION project under Horizon Europe.

Electrical Design Engineer 2020–2021
EPCM Pro, Lahore
Electrical installation design blueprints alongside the senior design engineer; client liaison; project budgets and timelines.

Research Assistant 2018–2020
Flexible AC Transmission Systems Lab, KFUPM, Dhahran
Weighting-factor design for model predictive control of motor drives, sensorless predictive control for line-start PMSMs, differential-flatness control of a DC-DC Cuk converter with hierarchical sliding mode, and a jerk-based chaotic oscillator.

Publications

All peer-reviewed journal and conference papers, most recent first. Name in bold.

20. **M. H. Arshad**, L. Maraaba, M. A. Abido, Q. Zhao. "Leveraging Meta-Learner-Based Stacking Framework for Stator Winding Inter-Turn Fault Detection of LSPMSM." *IEEE Journal of Emerging and Selected Topics in Industrial Electronics (Q1)*, 2026. doi:10.1109/jestie.2026.3704523

19. **M. H. Arshad**, H. Wang, J. Yao, Q. Zhao. "Rotor imbalance fault classification through unified feature fusion: combining statistical signal processing with adaptive deep learning features." *Engineering Applications of Artificial Intelligence, 157 (Q1)*, 2025. **Cited 8 times.** doi:10.1016/j.engappai.2025.111182

18. **M. H. Arshad**, Q. Zhao, M. Kassas. "Robust Control of Grid-Tied Inverter with LC Filter via Adaptive FCS-MPC Cost Function Optimization." *IEEE 34th International Symposium on Industrial Electronics (ISIE)*, 2025. doi:10.1109/isie62713.2025.11124647

17. **M. H. Arshad**, A. El-Sayed, A. Salem, Q. Zhao, M. A. Abido. "Comparison of Dynamic Performance of Field Oriented Control and Model Predictive Control for Line Start Permanent Magnet Synchronous Machine." *IEEE 34th International Symposium on Industrial Electronics (ISIE)*, 2025. doi:10.1109/isie62713.2025.11124709

16. M. M. Raja, H. Wang, **M. H. Arshad**, G. J. Kish, Q. Zhao. "Computationally efficient data-driven model predictive control for modular multilevel converters." *IET Electric Power Applications, 18(12) (Q2)*, 2024. **Cited 4 times.** doi:10.1049/elp2.12523

15. **M. H. Arshad**, A. El-Sayed, A. Salem, Q. Zhao, M. A. Abido. "Implications of the sensorless predictive control for line-start permanent magnet synchronous machine." *IEEE Transactions on Automation Science and Engineering, 21(3) (Q1)*, 2023. **Cited 10 times.** doi:10.1109/tase.2023.3293049

14. M. M. Raja, H. Wang, **M. H. Arshad**, G. J. Kish, Q. Zhao. "Data driven model predictive control for modular multilevel converters with reduced computational complexity." *IEEE Access, 11*, 2023. **Cited 7 times.** doi:10.1109/access.2023.3270773

13. M. M. Raja, **M. H. Arshad**, X. Zhang, Q. Zhao. "Linear quadratic Gaussian control for UAVs with improved state estimation against gyroscope and accelerometer biases." *IFAC-PapersOnLine, 56(2)*, 2023. **Cited 2 times.** doi:10.1016/j.ifacol.2023.10.1446

12. **M. H. Arshad**, M. M. Raja, Q. Zhao. "Neutral Point Voltage Balancing Using MOPSO based Weighting Factor Tuning for FCS-MPTC of Three Level T-Type VSI Fed IM Drive." *IFAC-PapersOnLine, 56(2)*, 2023. **Cited 2 times.** doi:10.1016/j.ifacol.2023.10.1606

11. W. Iqbal, **M. H. Arshad**, G. Tyson, I. Castro. "Exploring crowdsourced content moderation through lens of Reddit during COVID-19." *17th Asian Internet Engineering Conference (AINTEC)*, 2022. **Cited 12 times.** doi:10.1145/3570748.3570753

10. B. Yang, **M. H. Arshad**, Q. Zhao. "Packet-level and flow-level network intrusion detection based on reinforcement learning and adversarial training." *Algorithms, 15(12) (Q2)*, 2022. **Cited 20 times.** doi:10.3390/a15120453

9. **M. H. Arshad**, S. Elfarik, M. A. Abido, M. I. Hossain. "Genetic algorithm tuned adaptive discrete-time sliding mode controller for grid-connected inverter with an LCL filter." *Energy Reports, 8 (Q1)*, 2022. **Cited 8 times.** doi:10.1016/j.egyr.2022.09.179

8. A. Arshad, S. Ghazal, N. Saleem, M. A. Hanan, **M. H. Arshad**. "Revisiting media literacy measurement: Development and validation of a 3-factor media literacy scale." *Journal of Computer Assisted Learning, 38(5)*, 2022. **Cited 21 times.** doi:10.1111/jcal.12682

7. **M. H. Arshad**, M. A. Abido. "Hierarchical control of DC motor coupled with Cuk converter combining differential flatness and sliding mode control." *Arabian Journal for Science and Engineering, 46(10) (Q1)*, 2021. **Cited 23 times.** doi:10.1007/s13369-020-05305-9

6. **M. H. Arshad**, M. Kassas, A. E. Hussein, M. A. Abido. "A simple technique for studying chaos using jerk equation with discrete time sine map." *Applied Sciences, 11(1)*, 2021. **Cited 11 times.** doi:10.3390/app11010437

5. **M. H. Arshad**, A. H. Elsayed, M. A. Abido, A. Salem. "Artificial Bee Colony Optimized Self-tuning PI Speed Controller for FCS-MPCC of Permanent Magnet Synchronous Machines." *1st International Conference of Smart Systems and Emerging Technologies (SMARTTECH)*, 2020. **Cited 3 times.** doi:10.1109/smart-tech49988.2020.00057

4. **M. H. Arshad**, M. A. Abido. "An overview of sequential learning algorithms for single hidden layer networks: current issues and future trends." *TechRxiv (preprint)*, 2020. **Cited 3 times.** doi:10.36227/techrxiv.12253340.v1

3. **M. H. Arshad**, M. Kassas. "A Chaos Based SVPWM Technique for B4 Inverter Fed Two-Phase Symmetric Induction Motor for THD and EMI Improvement at Low Modulation Index." *IEEE Texas Power and Energy Conference (TPEC)*, 2019. **Cited 3 times.** doi:10.1109/tpec.2019.8662163

2. **M. H. Arshad**, M. A. Abido, A. Salem, A. H. Elsayed. "Weighting factors optimization of model predictive torque control of induction motor using NSGA-II with TOPSIS decision making." *IEEE Access, 7 (Q1)*, 2019. **Cited 100 times.** doi:10.1109/access.2019.2958415

1. **M. H. Arshad**, M. Khalid. "Advanced Direct Torque Control of Four Switch Fed Two-Phase Symmetric

Induction Motor." *IEEE 27th International Symposium on Industrial Electronics (ISIE)*, 2018. **Cited 2 times.** doi:10.1109/isie.2018.8433668

Teaching

MATH 100, 101 & 102 2022–2026
ESSC · University of Alberta, Graduate teaching assistant
Eight terms on the drop-in desk, working through first-year students' questions in person. Terms: MATH 101 Jan–Apr 2026, MATH 100 Sep–Dec 2025, MATH 101 Jan–Apr 2025, MATH 100 Sep–Dec 2024, MATH 102 Jan–Apr 2024, MATH 100 Sep–Dec 2023, MATH 101 Jan–Apr 2023, MATH 100 Sep–Dec 2022.

ECE 460: Control Systems II Laboratory Jan–Apr 2023
Electrical & Computer Engineering · University of Alberta, Laboratory teaching assistant
Set up the benches, walked students through each procedure and marked the reports.

EE 480: Power Electronics Sep–Dec 2019
King Fahd University of Petroleum & Minerals, Dhahran, Teaching assistant
Graded assignments and worked with the course instructor on evaluating the final projects. I also answered students' questions about their own designs while they were still building them.

Teaching assistantship Apr–May 2019
King Fahd University of Petroleum & Minerals, Dhahran, Assistant to Umer Johar

LAB 380: Automatic Control Apr–May 2018
King Fahd University of Petroleum & Minerals, Dhahran, Teaching assistant
Ran the automatic control lab, setting up each experiment, taking students through the procedure and marking their write-ups.

Leadership and Governance

President, Graduate Students' Association 2024–2025
University of Alberta
$8.55M in graduate student financial support secured over the term · **$3.4M** returned to students through the renewed U-Pass agreement · **$400K** saved over three years by a re-engineered health & dental plan · **$200K** channelled into a new Community Engagement Award for course-based master's students, with $400K committed after.

- Created the Course-Based Graduate Community Engagement Award, allocating $200,000 of GSA funds and distributing it with GPS in December 2024; secured commitments to sustain it through 2027.
- Published Under Pressure, the first comprehensive mental health report for University of Alberta graduate students, released on World Mental Health Day 2024.
- Secured key exemptions under Bill 18 through sustained advocacy from May 2024, and pushed the Minister of Advanced Education toward comprehensive MNIF guidelines.
- Ran a comprehensive revision of the GSA bylaws and policy for transparency and accountability, including expanding the definition of "GSA officer".

Vice President Student Services, Graduate Students' Association 2023–2024

- Applied machine learning to the association's raw survey data to find trends and outliers, across a response volume that had grown from under 200 to over 830 in twelve months.

- Built the framework for the Graduate Peer Support Program across meetings with the Dean of Students and other units, and chased the funding to run it. The program launched in 2025.

Governor, Board of Governors 2024–2025
University of Alberta
The GSA's seat on the university's highest governing body, which is where the budget decisions actually get made. The result I am proudest of from that year is no tuition increase for international graduate research students, with the university's financial support kept in place rather than traded off against it.

Primary Delegate 2024–2025
Canadian Alliance of Student Associations, Ottawa
Represented the University of Alberta GSA at CASA. That year CASA carried a dedicated graduate student ask for the first time, covering two things. Indexing Tri-Council grants to inflation, and revising the Section D comprehensive points for international students studying in Canada.

Member, Federal Policy Committee 2024–2025
Canadian Alliance of Student Associations, Ottawa
Lead author on the AI policy paper CASA published that year, setting out how generative AI should be used in Canadian post-secondary education.

Member, Graduate Advocacy Committee 2024–2025
Canadian Alliance of Student Associations, Ottawa
Helped start the first graduate-student-led Graduate Forum, so graduate delegates had somewhere to present their own research rather than only lobby about it.

Board Member 2023–2024
Campus Food Bank, Edmonton
Finalised the Executive Director's new contract, rebuilt the financial accounting so the organisation met both Edmonton Food Bank requirements and provincial legislation, and helped the Food Bank run and win its first referendum with the Graduate Students' Association.

Awards and Scholarships

Best Paper Presentation Award Jun 2025
IEEE International Symposium on Industrial Electronics (ISIE)

Alberta Innovates Graduate Student Scholarship 2023–2025
University of Alberta
$31,000 a year, held for two years.

Alberta Graduate Excellence Scholarship 2022–23, 2025–26
University of Alberta
Held twice, $12,000 each time.

Graduate Research Assistance Fellowship since 2022
University of Alberta

Graduate Recruitment Scholarship Jan–Dec 2022
University of Alberta
$10,000.

China Belt & Road Scholarship Sep 2021
The Hong Kong Polytechnic University
Full tuition for the research PhD programme, HKD 42,100 a year.

University International Postgraduate Award (UIPA) Jun 2021
University of New South Wales, Sydney
Full tuition and a living stipend for the PhD in Electrical Engineering.

PhD Studentship Mar 2021
The Hong Kong Polytechnic University
Four years of funded study.

KFUPM Graduate Excellence Scholarship (full funding) 2018–2021
KFUPM, Dhahran

IES Travel Grant Jun 2018
IEEE Industrial Electronics Society, for ISIE 2018

HEC Indigenous Scholarship 2016–2017
Higher Education Commission, for the MSc at UET Lahore

Professional Service

Peer reviewer for IEEE Industry Applications Society publications, IET Generation, Transmission & Distribution, IEEE Transactions on Industrial Informatics, Engineering Applications of Artificial Intelligence.

Certifications

Local AI: Build a RAG Model from Scratch with Open-Source Tools Jul 2026
LinkedIn Learning

Fundamentals of Reinforcement Learning 2025
Coursera

TCPS 2: CORE research ethics 2023
Panel on Research Ethics, Canada

Data Science Fundamentals 2020
KnowledgeHut

Technical Skills

Languages: Python, MATLAB, C/C++, R

Machine learning: PyTorch, TensorFlow. LSTMs and learnable filter banks, 1D CNNs, random forests, gradient-boosted meta-learners, stacking ensembles, transformers, liquid neural networks, locally served LLMs

Training: Adaptive focal loss, adversarial training, out-of-fold stacking, class balancing for rare faults, physics-informed constraints

Optimisation: NSGA-II, MOPSO, genetic algorithms, artificial bee colony, TOPSIS decision making, primal-dual formulations, convex surrogates

Control: Finite-control-set MPC, model predictive torque control, adaptive discrete-time and hierarchical sliding mode, backstepping, differential flatness, MRAS observers, LQG, field-oriented control

Signals & data: Statistical feature engineering and feature fusion, acoustic fault signatures, sparse identification of nonlinear dynamics, multi-modal sensor synchronisation, sentence embeddings and retrieval

Plant: Induction machines, line-start PMSMs, modular multilevel converters, grid-tied inverters with LCL and LC filters, DC-DC Cuk converters, quadrotor UAVs

Bench: Hardware in the loop with RTDS and dSPACE, Imperix B-Box real-time control, Profi CASSY acquisition, torque and speed instrumentation, MATLAB/Simulink

Tools: Git, VS Code, PyCharm, Jupyter, Weights & Biases, Ollama

References available on request.