SARDER JUNAID AHMED

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GitHub • LinkedIn • Portfolio • IELTS Academic: 7.0 (L 7.5, R 6.5, W 7.0, S 6.5; Jan 2026)

RESEARCH INTERESTS

Developing principled methods for **Causal Machine Learning** and **Trustworthy AI**—building systems that reason about cause-and-effect while ensuring fairness, robustness, interpretability, and reproducibility across domains including criminal justice, environmental governance, and healthcare.

EDUCATION

B.Sc. in Computer Science & Engineering **Feb 2025**
Rajshahi University of Engineering & Technology (RUET), Bangladesh
Thesis: A+ — Seminar: A+ — CGPA: 3.08/4.00 (First Class; 8th-semester GPA: 3.27)
Relevant Coursework: Advanced Statistical Inference, ML, Deep Learning, Linear Algebra, Probability, Convex Optimization, Bayesian Analysis, Causal Inference

Higher Secondary Certificate (HSC) – National Board Exam **2018**
Pabna Cadet College • **Perfect GPA: 5.00/5.00**

Secondary School Certificate (SSC) – National Board Exam **2016**
Pabna Cadet College • **Perfect GPA: 5.00/5.00**

RESEARCH EXPERIENCE

Independent Researcher **2024 – Present**
- Designed fairness-aware classification frameworks for imbalanced data, jointly optimizing accuracy and group fairness metrics with applications to criminal justice.
- Implemented causal discovery (PC, LiNGAM) and Pearl's do-calculus for counterfactual inference in fairness auditing.
- Built reproducible research infrastructure (ReproHub, StatsPro) using composite scoring models beyond p-value-only validation.
- Validated SHAP feature importance with 200-iteration bootstrap retraining, narrowing nearly all features flagged as important to the six to eight that were statistically robust.
- Developed approaches for uncertainty quantification (conformal prediction, Bayesian NNs), ensuring calibrated decisions under distribution shift.
- Led end-to-end research projects from problem formulation and data curation to model deployment and publication, managing timelines and deliverables.

Research Assistant **2026 – Present**
Center for Artificial Intelligence and Robotics (CAIR), Southeast University, Dhaka, Bangladesh
- Conducted research on AI, machine learning, and robotics applications, focusing on frameworks for robust and trustworthy autonomous systems.
- Mentored junior researchers in research methodology, statistical analysis, and machine learning best practices.
- Guided team members in experimental design, model development, and scientific writing for publication.

Senior Researcher & Executive Committee Member **May 2022 – May 2024**
Young Learners' Research Lab, RUET
- Led hypothesis testing (Mann-Whitney U, KS, Shapiro-Wilk) with Benjamini-Hochberg FDR correction across 15+ datasets in social sciences, healthcare, and environmental studies.
- Developed a statistical framework combining permutation tests with effect size estimation, reducing false positives by 15%.
- Established lab-wide reproducibility standards (version-controlled data, pre-registered analysis) adopted by 20+ researchers.
- Mentored 5+ junior researchers in Bayesian and causal inference; organized weekly research seminars.
- *Recognition:* Certificate of Appreciation, recognized as Esteemed Alumnus of the Lab (2024); Certificate of Appreciation for thesis research excellence, RUET (2024).

PUBLICATIONS

1 journal article, 11 refereed conference papers (including 2 best paper awards), 2 conference abstracts, 1 invited book chapter, and 3 manuscripts under review.

Journal Articles:
- Ahmed, S.J., Kwoshik, M.H.R., & Islam Nahian, M.T. (2026). Machine Learning for Crime Classification: A Fairness-Aware Approach to Class Imbalance. *J. Mach. Learn. Appl.*, 2(1), 9–17. DOI: 10.61577/jmla.2026.100002. *(Extended journal version of the IEEE SPICSCON 2026 conference paper below, with expanded methodology and evaluation.)*

Refereed Conference Papers:
- Ahmed, S.J. (2026). Auditing, Not Predicting: A Causal Bias-Decomposition Framework for Clinical Fairness, and a Cautionary Tale of Representation Collapse in A-ICF. *IEEE OMLET 2026.* (Accepted). IEEE Xplore. *Poster Presentation.*

- Ahmed, S.J. (2026). FAI: Feature-Wise Adaptive Imputation via Downstream-Aware Method Selection. *5th International Conference on Innovations in Science, Engineering and Technology (ICISET 2026)*. (Accepted; ∼27% acceptance rate). *Oral Presentation.* Paper ID: 363.
- Ahmed, S.J. (2026). DeepEnMap: Ordinal-Aware Multi-Modal Deep Learning for Energy Poverty Risk Mapping. *IEMIS 2026*. (Accepted). Springer LNNS.
- Ahmed, S.J. (2026). Density-Decoupled, Mask-Ablated Segmentation-Guided Diffusion for Controllable Mammography Synthesis. *IEMIS 2026*. (Accepted). Springer LNNS.
- Ahmed, S.J., Kwoshik, M.H.R., & Nakib, M.F.N. (2026). Environmental Livability Assessment via Adaptive Bootstrap-Retrained SHAP and Statistically-Constrained Pareto Counterfactuals. *IEEE SPICSCON 2026*. (Accepted; Presented). IEEE Xplore.
- Ahmed, S.J., Kwoshik, M.H.R., & Nakib, M.F.N. (2026). Machine Learning for Crime Classification: A Fairness-Aware Approach to Class Imbalance. *IEEE SPICSCON 2026*. (Accepted; Presented). IEEE Xplore. *(Conference version; see extended journal article above.)*
- Ahmed, S.J., Kwoshik, M.H.R., & Islam Nahian, M.T. (2026). CF-EGAT: A Causal Fairness-Aware Equity Graph Attention Network for Country-Level Environmental Livability Classification. *SPECTRA 2026*. Oral. **1st Best Paper Award.** DOI: 10.5281/zenodo.21195761
- Ahmed, S.J. (2025). Multi-Dimensional Statistical Similarity for Governance Classification: Beyond Arbitrary Thresholds in Comparative Politics. *6th Annual Paper Meet, EED, IEB* (APMEE 2025). Oral. **Best Research Paper Award.** *(Provisionally accepted for publication in the Journal of EED, IEB.)*
- Ahmed, S.J., Islam Nahian, M.T., & Kwoshik, M.H.R. (2026). RMA-BO: Regret-Minimizing Adaptive Bayesian Optimization. *SPECTRA 2026*. Oral. DOI: 10.5281/zenodo.21194394
- Ahmed, S.J. (2026). Conformal Influence-Driven Realignment (CIDR): A Framework for Restoring Model Reliability under Distribution Shift. *IEEE CSDE 2026*. (Accepted; Presented). Paper ID: ieee-csde_3254.
- Ahmed, S.J. (2026). CalForget: Calibration-Driven Selective Forgetting via Conformal Influence Attribution. *IEEE CSDE 2026*. (Accepted; Presented). Paper ID: ieee-csde_3237.

Conference Abstracts:

- Ahmed, S.J., Kwoshik, M.H.R. (2026). Conformal Influence-Driven Realignment (CIDR): A Framework for Restoring Model Reliability under Distribution Shift. *1st National Science Conference 2026*. (Presented). Barishal University Science Club (BUSC). *(Received Certificate of Appreciation.)*
- Ahmed, S.J. (2026). Identification-Aware Selective Prediction: A Decision-Theoretic Framework for Causal AI Reliability. *2nd International Student Research Conference (ISRC 2026)*. (Accepted; ∼20% acceptance rate). *Oral Presentation.* Dhaka University Research Society (DURS), University of Dhaka. Submission ID: ISRC-2026-126.

Book Chapters:

- Ahmed, S.J. (2026). Generative AI and Mathematical Optimization for Football Match Outcome Prediction. In: Lahby, M. (ed.) *Generative AI and Mathematical Optimization for Performance and Innovation in Football*. Springer. (Invited, Under Review)

Manuscripts Under Review:

- Ahmed, S.J. (2026). DemocracyGuard: Testing a Divergence-Index Reconciliation of Subjective and Objective Democracy Indicators for Forecasting Adverse Regime Transitions. *Transactions on Machine Learning Research (TMLR)*. (Submitted; Under Review).
- Ahmed, S.J., Kwoshik, M.H.R., & Islam Nahian, M.T. (2026). Active Neuro-Causal Immunization (ANCI): A Conflict-Neuron Framework for Jointly Auditing Fairness, Robustness, and Privacy in Neural Classifiers. *ICRPSET 2026*. (Under Review). Paper ID: 132.
- Ahmed, S.J. (2026). Identification-Aware Selective Prediction: A Decision-Theoretic Framework for Causal AI Reliability. *ICEEICT 2027*. (Under Review). Paper ID: 27.

RESEARCH SOFTWARE & PROJECTS

A-ICF — Amortized Invariant Causal Fairness Framework 2026
GitHub

- Developed a five-phase causal fairness auditing framework combining causal-structure discovery, invariant representation learning (DCEVAE), path-specific ε-fairness optimization, and a causal decomposition of outcome disparity ($TV = SE + IE - DE$) for clinical ML.
- Achieved near-perfect group fairness (Equalized Odds Difference ≤ 0.055) on two clinical datasets (N=101,766 and N=4,240).
- Revealed that observed disparities are driven predominantly by spurious/confounding pathways (e.g., SE = 0.110 for Framingham) rather than a large direct effect (DE = 0.055).
- Conducted comprehensive ablation studies localizing the representation bottleneck; positioned the framework as a fairness-auditing and bias-decomposition tool with full reproducibility.
- *Tech:* Python, PyTorch, NumPy, SciPy.

DeepEnMap — Multi-Modal Ordinal Energy Poverty Risk Mapping 2026
GitHub

- Developed a multi-modal deep learning framework fusing satellite imagery (CNN branch) with demographic data (dense branch) for ordinal energy poverty risk prediction.
- Proposed a custom **ordinal-aware loss function** that penalizes distant misclassifications more heavily than nearby ones, reducing ordinal error from 0.1229 to 0.1201 compared to standard cross-entropy.
- Achieved **91.66% accuracy** and **0.9102 F1 (macro)** through multi-modal fusion; demographic branch adds under 0.1% computational overhead while delivering the largest performance gains (improving accuracy by 5.7% over image-only).
- Implemented Grad-CAM explainability aligned with the ordinal training objective for interpretable risk predictions.
- *Tech:* Python, TensorFlow, Keras, NumPy, Matplotlib.

ReproHub — Automated Research Reproducibility Platform 2024 – 2025

Live App • GitHub

- Built a modular platform that automatically verifies published statistical claims against raw data using a composite scoring model (p-value, effect size, test statistic agreement) across 11 statistical tests.
- Designed a benchmarking suite with synthetic and real-world datasets for systematic reproducibility evaluation.
- Engineered a standardized reporting system that generates automated PDF summaries, streamlining the validation process and reducing manual verification time by 40%.

StatsPro — AI-Powered Statistical Analysis Platform 2025 – 2026

Live App • GitHub

- Built a full-stack platform automating CSV-to-report workflows for 10 statistical tests with Benjamini-Hochberg FDR correction.
- Integrated **ML Studio** for rapid experimentation with 6 models (XGBoost, CatBoost, etc.) and live inference.
- Implemented automated outlier detection and data quality assessment pipelines, flagging issues before analysis and improving model reliability by 12%.

Smart RAG Chatbot — Cited Retrieval-Augmented QA System 2025 – 2026

Live App • GitHub

- Developed a system enforcing per-response citation to exact source passages; decoupled embedding and generation layers to isolate retrieval quality from generation quality.
- Implemented MMR-based retrieval re-ranking and configurable chunking for systematic evaluation.

TECHNICAL SKILLS

- **Research Areas:** Causal Inference & Discovery, Fairness-Aware Machine Learning, Uncertainty Quantification, Bayesian & Statistical Modeling, Reproducible Research, RAG & LLM Applications.
- **Math & Stats:** Linear Algebra, Probability, Optimization; Hypothesis Testing, FDR, Bootstrap, Bayesian & Causal Inference, Uncertainty Quantification.
- **Causal Inference:** DAGs, Pearl's do-calculus, SEMs, PC algorithm, LiNGAM, propensity score matching, instrumental variables.
- **ML & DL:** PyTorch (GATs, Transformers), TensorFlow, Scikit-learn; XGBoost, CatBoost, LightGBM; Bayesian Optimization; HuggingFace.
- **LLM & Data Science:** RAG, LangChain, FAISS, Vector Search, Prompt Engineering; Pandas, NumPy, SciPy, Statsmodels, Matplotlib, Plotly, Seaborn.
- **Dev Tools:** Git, Docker, Linux, Jupyter, Streamlit.
- **Research Practices:** Reproducible workflows, pre-registration, version control, open science.

HONORS AND AWARDS

2026	**1st Best Paper Award**, SPECTRA 2026, HSTU, Dinajpur, 19–20 June 2026 (for "CF-EGAT: A Causal Fairness-Aware Equity Graph Attention Network for Country-Level Environmental Livability Classification"; awarded 100% registration fee waiver for IEEE OMLET 2026)
2026	Certificate of Appreciation, 1st National Science Conference 2026, Barishal University Science Club (BUSC)
2025	Best Research Paper Award, APMEE 2025, IEB, Dhaka, 13–14 December 2025
2024	Certificate of Appreciation (recognized as Esteemed Alumnus), Young Learners' Research Lab, RUET
2024	Certificate of Appreciation for thesis research excellence, RUET
2018	Perfect GPA (5.00/5.00), Higher Secondary Certificate (HSC)
2016	Perfect GPA (5.00/5.00), Secondary School Certificate (SSC)
2013, 2009	Talentpool Scholarship (National Merit-based)
2013	Principal's Prize for Outstanding Academic Performance, Pabna Cadet College

TEACHING & MENTORING

Research Trainee **2026 – Sep 2026**

Royal Scientific Publications

- Researched and developed mathematical content for guide books and fully worked solutions in Higher Mathematics for SSC and HSC level students.
- Translated advanced mathematical concepts into clear, step-by-step explanations aligned with the national secondary and higher-secondary curricula.
- Conducted research into pedagogical approaches for mathematical problem-solving and content structuring.

Independent Tutor & Peer Mentor 2019 – Present

- Provided free tutoring in Physics, Chemistry, and Mathematics to 10+ students from disadvantaged backgrounds.
- Mentored 10+ university peers in Vector Calculus, Statistics, Linear Algebra, and ML.
- Guided 5 students to perfect GPAs (5.00/5.00) on national exams and 4 to premier engineering universities (RUET, BUET, CUET).
- Designed a 6-week "Introduction to ML with Python" workshop for 10+ undergraduates.

PROFESSIONAL ACTIVITIES

- **Research Communication:** Presented at 5+ national and international conferences, delivering oral and poster presentations to diverse audiences.
- **Open Science Advocate:** Maintained public GitHub repositories for all research projects, with comprehensive README documentation and reproducible code.
- **Collaborative Research:** Established cross-disciplinary collaborations across multiple Bangladeshi institutions, fostering research initiatives in computational social science and governance analytics.
- **Workshop Organization:** Co-organized research methodology workshops and seminars on advanced statistical methods, fostering a culture of rigorous inquiry within the academic community.
- **Invited Submission:** Invited to submit a new paper to IEEE OMLET 2026 with 100% registration fee waiver, awarded as the 1st Best Paper prize at SPECTRA 2026.

LEADERSHIP & EXTRACURRICULAR ACTIVITIES

Leadership

- **Volleyball Team Captain:** Led junior team at Pabna Cadet College.
- **Class Captain:** Managed student coordination and classroom activities.
- **Parade Commander:** Led school parade team to 2nd position on Independence Day, a competitive inter school event.
- **Scout Commander & Leader:** Led scout activities, advancing through Upazila, District, and Divisional rounds.

Arts & Media

- **Published Poet:** Author of "Sob Odvuture" (*All Adventures*) — 50+ poems.
- **Musician:** Lyricist, composer, and singer of 3+ original songs.
- **RJ at Radio Kothabondhu:** Hosted "Suspense with RJ Rupok."
- **RJ at Radio RUET:** Hosted shows on Radio RUET.
- **Poetry Recitation:** 3rd position in a competitive poetry recitation event.
- **Art Competition:** 2nd position in Liberation Day Art Competition.

Competitions & Sports

- **Spelling Bee:** Reached Divisional Round four times; received Best Speller Award, Pabna Cadet College (2014).
- **Cricket:** Received several Man of the Match and Man of the Series awards in competitive cricket tournaments.

Academic & Community

- **Onuronon Club:** Former member, Rajshahi University of Engineering & Technology.
- **Teaching & Mentoring:** Taught Statistics, Linear Algebra, and Machine Learning to peers.
- **Research & Analytical Strength:** Investigated complex problems with meaningful, evidence based insights.

REFERENCES

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