

Muhammad Hasan Ferdous

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RESEARCH INTERESTS

Causal Discovery and Inference; Trustworthy and Robust Machine Learning; Time-Series Analysis; Deep Learning; Adversarial and Robust ML for Cybersecurity Applications; Open-Source Benchmarks for AI Reproducibility.

EDUCATION

Ph.D. in Information Systems | January 2021 – August 2026 (expected)

University of Maryland, Baltimore County (UMBC), Baltimore, MD

Dissertation: Bridging Theory and Practice. Robust Causal Discovery from Autocorrelated, Non-Stationary, and Irregular Time-Series Data

Advisor: Dr. Md Osman Gani | CGPA: 3.809 / 4.0

M.S. in Information Systems | January 2021 – December 2023

University of Maryland, Baltimore County (UMBC), Baltimore, MD | CGPA: 3.809 / 4.0

B.Sc. in Statistics | May 2005 – December 2010

University of Dhaka, Bangladesh | Result: First Class

PEER-REVIEWED PUBLICATIONS

- **Muhammad Hasan Ferdous**, E. Hossain, Md Osman Gani. "TimeGraph: Synthetic Benchmark Datasets for Robust Time-Series Causal Discovery." *Proc. of the 31st ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD '25)*, pp. 5425–5435, 2025. doi:10.1145/3711896.3737439.
- E. Hossain, **Muhammad Hasan Ferdous**, D. Dunmire, A. Subramanian, Md Osman Gani. "Causal Time Series Modeling of Supraglacial Lake Evolution in Greenland under Distribution Shift." *IEEE International Conference on Machine Learning and Applications (ICMLA)*, 2025.
- E. Hossain, **Muhammad Hasan Ferdous**, J. Wang, A. Subramanian, Md Osman Gani. "Correlation to Causation: A Causal Deep Learning Framework for Arctic Sea Ice Prediction." *IEEE PerCom Workshops*, pp. 62–67, 2025.
- **Muhammad Hasan Ferdous**, U. Hasan, Md Osman Gani. "CDANs: Temporal Causal Discovery from Autocorrelated and Non-Stationary Time Series Data." *Machine Learning for Healthcare Conference (MLHC)*, pp. 186–207, 2023.
- **Muhammad Hasan Ferdous**, U. Hasan, Md Osman Gani. "eCDANs: Efficient Temporal Causal Discovery from Autocorrelated and Non-Stationary Data (Student Abstract)." *Proc. of the AAAI Conference on Artificial Intelligence (AAAI)*, vol. 37(13), p. 16208, 2023.

PREPRINTS AND MANUSCRIPTS UNDER REVIEW

- **Muhammad Hasan Ferdous**, Md Osman Gani. "DCD: Decomposition-based Causal Discovery from Autocorrelated and Non-Stationary Temporal Data." arXiv preprint arXiv:2602.01433, 2026. Submitted to *Transactions on Machine Learning Research (TMLR)*.
- N. Mahmud, N. Emmert, **Muhammad Hasan Ferdous**, et al. "ClassyGlass: A Benchmark Dataset for Activity and Mobility Analysis using Smart Eyewear." Submitted to *ACM SIGKDD Dataset Track*, 2026.

OPEN-SOURCE SOFTWARE

CDANs. Constraint-based causal discovery for autocorrelated and non-stationary time series. Python package: `pip install cdans`. github.com/hferdous/CDANs.

TimeGraph. Synthetic benchmark suite for time-series causal discovery. Published at KDD 2025.

ClassyGlass. Multimodal benchmark for activity and mobility analysis using smart eyewear. (Under review at KDD 2026 Dataset Track.)

RESEARCH EXPERIENCE

Graduate Research Assistant — UMBC Causal AI Lab | *Fall 2021 – Present*

- Developed constraint-based and decomposition-based methods for causal discovery on autocorrelated, non-stationary, multi-seasonal time series.
- Built TimeGraph, the first open-source synthetic benchmark suite for temporal causal discovery (KDD 2025).
- Released CDANs as an open-source Python package, enabling adoption of the framework by other researchers and practitioners.
- Collaborated with Dr. Aneesh Subramanian (University of Colorado Boulder) on causal modeling of Greenland supraglacial lake evolution and Arctic sea-ice dynamics.
- Co-authored peer-reviewed publications with junior Ph.D. and M.S. students in the lab.

TEACHING EXPERIENCE

Graduate Teaching Assistant — UMBC, Department of Information Systems | *January 2021 – May 2025*

Five consecutive semesters across four distinct courses:

- **Structured Systems Analysis and Design** (Spring 2025). Process modeling, design specifications, review sessions, grading.
- **Advanced Database Project** (Spring 2022 – Spring 2024). Supervised graduate teams through requirements, schema design, indexing, and query optimization.
- **Database Program Development** (Spring 2021; Spring 2022 – Spring 2024). ER modeling, normalization, SQL, indexing, transactions. Weekly recitations and lab supervision.
- **Management Information Systems** (Spring 2022 – Spring 2024). IT-systems analysis, organizational decision-making, individual and group tutoring.

Guest Lecturer — UMBC Causal AI Lab | *2023 – Present*

- Lectures on causal discovery, time-series modeling, and trustworthy machine learning to graduate seminars.

COURSES PREPARED TO TEACH

Direct match (TA experience): Database Systems; Systems Analysis and Design; Software Engineering; Management Information Systems.

Strong match (training and research): Introduction to Data Science; Introduction to Programming; Data Structures; Discrete Mathematics; Algorithms; Probability and Statistics for Computer Science.

AI / ML graduate and advanced electives: Artificial Intelligence; Machine Learning; Deep Learning; Data Mining; Time-Series Analytics.

Specialized electives: Trustworthy AI; Causal AI for Decision Systems; Adversarial Machine Learning; Machine Learning for Intrusion Detection; Privacy-Preserving Machine Learning.

HONORS AND AWARDS

- **COEIT Summer Student Project Award** (\$5,000), UMBC, Summer 2025. Competitive award supporting independent student-led research in the College of Engineering and Information Technology.
- **Honorable Mention** — Research Poster, COEIT Research Day 2025, UMBC.
- **Travel Award**, Machine Learning for Healthcare (MLHC) Conference, New York, 2023.

PROFESSIONAL SERVICE

- Reviewer and sub-reviewer for AAAI, IEEE PerCom Workshops, and ACM SIGKDD-affiliated venues.
- Presenter and volunteer, COEIT Research Day, UMBC, 2024 and 2025.
- Presenter, Information Systems Student Research Symposium, UMBC, 2022.

SELECTED PRESENTATIONS AND POSTERS

- "DCD: Decomposition-based Causal Discovery from Autocorrelated and Non-Stationary Temporal Data," COEIT Research Day, 2025.
- "Attention-based Causal Discovery from Autocorrelated and Non-Stationary Temporal Data," COEIT Research Day, 2024.
- "eCDANs: Efficient Temporal Causal Discovery from Autocorrelated and Non-Stationary Time Series Data," AAAI Conference, 2023.
- "CDANs: Temporal Causal Discovery from Autocorrelated and Non-Stationary Time Series Data," MLHC 2023; IS Student Research Symposium, UMBC, 2022.

TECHNICAL SKILLS

Languages: Python, R, SQL, LaTeX.

ML / AI Frameworks: PyTorch, TensorFlow, scikit-learn, NumPy, Pandas, Matplotlib, Seaborn.

Areas: Causal Inference and Discovery, Time-Series Analysis, Deep Learning, Robust ML, Data Mining.

Tools: Git / GitHub, Jupyter, VSCode, PyCharm, Anaconda, Linux / Unix, HPC (SLURM).

REFERENCES

Available upon request.