

Ayush Mohanty — Curriculum Vitae

U.S. Permanent Resident

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EDUCATION

- **Ph.D. Candidate in Machine Learning (School of Industrial & Systems Engineering)**
Georgia Institute of Technology, Atlanta, GA 2020-2026
 - **Advisor:** Nagi Gebraeel
 - **Doctoral Minor:** System Informatics and Control
- **M.S. in Computer Science (Specialization: Machine Learning)**
Georgia Institute of Technology, Atlanta, GA 2024-2025
- **B.S. in Manufacturing Sci. & Engg. with M.S. in Industrial Engg. & Mgmt. (Dual Degree)**
Indian Institute of Technology (IIT) Kharagpur, India 2015-2020

RESEARCH INTERESTS

Methodology: Data Science, Federated Learning, Causal Reasoning, Fault Diagnosis & Prognostics, State Estimation & Control

Applications: Cyber-Physical Systems (Manufacturing, Aerospace, and Power Systems), Internet-of-Things, Robotic Manipulator

PEER-REVIEWED PUBLICATIONS

- [1] A. Mohanty[#], J. Dekarske, S. Joshi, S. Robinson, N. Gebraeel, “**Prognostic Framework for Robotic Manipulators Operating Under Dynamic Task Severities**”, *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, vol. 56, no. 1, pp. 443-457, Jan. 2026 [Paper](#)
 - **Top publication venue for Automation & Control Theory** – [Google Scholar Metrics](#).
- [2] A. Mohanty^{+ #}, N. Mohamed⁺, P. Ramanan, N. Gebraeel, “**Federated Granger Causality Learning For Interdependent Clients With State Space Representation**”, *International Conference on Learning Representations (ICLR) 2025* [Paper](#)
 - **CORE A*** – **flagship venue, top conference in ML and AI (20-25% acceptance rate)** – [Google Scholar Metrics](#).
- [3] S. Sherman, P. Pischulti, A. Mohanty, M. Hwang, D. Ivey, S. Robinson, M. Berges, N. Gebraeel, D. Klaus, A. Anderson, “**A Development Framework for a Comprehensive Capstone which Demonstrates Human Interaction with Autonomous Habitat Technology**”, *International Conference on Environmental Systems, 2024* [Paper](#)
- [4] D. Ivey, T. Barkouki, M. Torralba, U. Ulusoy, S. Eshima, A. Mohanty, C. Lindbeck, S. Balakirsky, S. Robinson, “**Design, Build, Test of a CO2 Removal Testbed and Twin Robotically Manipulable Testbed: Sensing Degradation and Performing Maintenance with Robot/Human Teaming**”, *International Conference on Environmental Systems, 2023* [Paper](#)
- [5] S. Eshima, J. Nabity, A. Mohanty, H. Rozas, N. Gebraeel, “**A Diagnostics Model for Detecting Leak Severity in a Regenerable CO2 Removal System**”, *International Conference on Environmental Systems, 2022* [Paper](#)
- [6] S. Singh, A. Mohanty, R. Rai, B. Mahanty, M.K. Tiwari, “**An Optimization Framework for Operational-Level Resource Composition in an Inclusive Manufacturing System**”, *ASME Journal of Computing and Information Science in Engineering (JCISE)*, October 2022; 22(5): 051003 [Paper](#)
- [7] A. Rudrapal, A. Mohanty, D.K. Pratihari, “**Improvement of Crow Search and Bat Algorithms Using Two Novel Mutation Operators**”, *International Conference on Computers & Industrial Engineering (CIE), 2018* [Paper](#)
- [8] A. Mohanty[#], J. Sindha, A. Panda, D. Chakravarty, “**A Novel Approach for Optimal Speed Control of the Vehicle Using Drive Envelope Based Analysis**”, *IEEE Transportation Electrification Conference (ITEC-India), pp. 1-5. IEEE, 2017.* [Paper](#)

PREPRINTS AND UNDER REVIEW

- [9] A. Mohanty[#], N. Mohamed, N. Gebraeel, “**Uncertainty in Federated Granger Causality: From Origins to Systemic Consequences**”, *International Conference on Machine Learning (ICML) 2026* [Paper](#)
- [10] A. Mohanty[#], P. Ramanan, N. Gebraeel, “**Learning Unknown Interdependencies for Decentralized Root Cause Analysis in Nonlinear Dynamical Systems**”, *IEEE Transactions on Knowledge and Data Engineering* [Paper](#)
- [11] N. Mohamed⁺, A. Mohanty^{+ #}, N. Gebraeel, “**Federated Causal Representation Learning in State-Space Systems for Decentralized Counterfactual Reasoning**”, *Conference on Uncertainty in Artificial Intelligence (UAI) 2026* [Paper](#)

⁺Equal contribution [#]Corresponding author

- [12] A. Tursucular, A. Mohanty[#], N. Mohamed, N. Gebraeel, “**Federated Learning of Nonlinear Temporal Dynamics with Graph Attention-based Cross-Client Interpretability**”, *Conference on Knowledge Discovery and Data Mining (SIGKDD) 2026* [Paper](#)
- [13] B. Peters, A. Mohanty[#], X. Fang, S. Robinson, N. Gebraeel, “**Prognostics for Autonomous Deep-Space Habitat Health Management under Multiple Unknown Failure Modes**”, *Acta Astronautica* [Paper](#)
- Previous version of the preprint cited by a publication in *Reliability Engineering & System Safety*

MANUSCRIPTS IN PREPARATION

- [14] A. Mohanty, N. Gebraeel, “**Federated Learning of Rate Interactions in Coupled Stochastic Differential Equations**”, Target Venue: *Advances in Neural Information Processing (NeurIPS), 2026*
- [15] A. Mohanty, N. Mohamed, N. Gebraeel, “**Cyberattack Detection and Localization in Interconnected Power Systems via Federated Granger-Causal Analysis**”, Target Venue: *IEEE Transactions on Power Systems*
- [16] N. Mohamed, A. Mohanty, N. Gebraeel, “**Federated Kalman Filtering for Networked Systems with Unknown Dynamics**”, Target Venue: *IEEE Transactions on Automatic Control*

LEADERSHIP AND RESEARCH PROTOTYPING

1. **Capstone: Decentralized Root Cause Analysis & Repair in a Deep Space Habitat** ([NASA HOME STRI](#), 2024)
 - **Role:** *Capstone Captain*; presenter of the Interdependency Learning Framework.
 - **Stakeholder Engagement:** NASA Ames Research Center, NASA Johnson Space Center, Collins Aerospace.
 - (a) Live-demonstrated a decentralized machine learning framework for fault detection and root cause analysis across interdependent subsystems, using [HOME mockup](#), and [STEVE testbed](#) (both present at Aerospace department, CU Boulder).
 - (b) Highlighted cascading fault scenarios and the framework’s ability to autonomously trace the root subsystem in real time.
 - (c) Integrated root cause analysis results to inform the crew for repair. The crew’s cognitive state data was used to dynamically model repair decision-making during the live session.
2. **Scenario Demonstration: Decentralized Orchestration of Edge Analytics in Smart Habitats** ([NASA HOME STRI](#), 2023)
 - **Role:** *Scenario Scientist*; host of the live demonstration and lead for the Robotic Edge Computer.
 - **Stakeholder Engagement:** Blue Origin, NASA Ames Research Center, NASA Johnson Space Center, KBR Inc.
 - (a) Demonstrated a real-time orchestration of predictive analytics across four edge computers (representing habitat subsystems) and a central Vehicle System Manager (VSM) in front of NASA and industry stakeholders.
 - (b) Deployed Docker-based algorithms autonomously via [gustavo](#), with each edge computer processing its own local data to generate subsystem-specific insights such as anomaly detection, remaining useful life, fault diagnosis, and overheating.
 - (c) Showed how insights flowed back to the VSM to drive real-time optimization for repair scheduling using [gustavo comms](#)

TEACHING EXPERIENCE

○ INSTRUCTOR

1. **Fall 2025:** ISyE 3770, Statistics & Applications, Georgia Tech
Class Size: 75 students
Duties: Was responsible for the entire course, including preparing syllabus, designing lectures, creating new homework problems, writing quiz and exam questions, and holding instructor office hours.
2. **Spring 2026:** ISyE 3030, Basic Statistics, Georgia Tech (Guest instructor)
Class Size: 14 students
Duties: Taught multiple lectures.

○ TEACHING ASSISTANT

3. **Spring 2026:** ISyE 6381, Manufacturing Reliability, Georgia Tech
Duties: Graded assignments and exams, and held a weekly lecture to guide students through homework exercises.
 - Taught “*Reliability & survival analysis*” module of JMP.
4. **Fall 2023:** ISyE 6381, Manufacturing Reliability, Georgia Tech
Duties: Graded assignments and exams, and held a weekly lecture to guide students through homework exercises.
5. **Fall 2021:** ISyE 4803/6805, Reliability Engineering, Georgia Tech
Duties: Conducted a lecture to discuss midterm solutions, graded homework and exams, and held office hours.
6. **Fall 2021:** ISyE 6381, Manufacturing Reliability, Georgia Tech
Duties: Graded assignments and exams, and held a weekly lecture to guide students through homework exercises.

SERVICE AND OUTREACH EXPERIENCE

○ PEER-REVIEWING

● **2026-Present:**

1. Transactions on Machine Learning Research (TMLR) – *Reviewer*
2. International Conference on Machine Learning (ICML) – *Program Committee Member*
3. IEEE Transactions on Automation Science and Engineering – *Reviewer*
4. Communications in Statistics: Simulation and Computation – *Invited by the Editor*

● **2025-2026:**

5. Annual Conference on Artificial Intelligence and Statistics (AISTATS) – *Program Committee Member*
6. International Conference on Learning Representations (ICLR) – *Program Committee Member*
7. AAAI Conference on Artificial Intelligence (AAAI) – *Program Committee Member*
8. Communications in Statistics: Simulation and Computation – *Invited by the Editor*
9. Conference on Neural Information Processing Systems (NeurIPS) – *Subreviewer (invited by advisor)*
10. ACM Practice and Experience in Advanced Research Computing (PEARC) Conference – *Program Committee Member*

● **2024-2025:**

11. International Conference on Learning Representations (ICLR) – *Program Committee Member*
12. Annual Conference of the Prognostics and Health Management (PHM) Society – *Guest Reviewer*
13. IEEE Transactions on Industrial Electronics – *Subreviewer (invited by advisor)*

● **2023-2024:**

14. INFORMS Manufacturing & Service Operations Management Journal – *Subreviewer (invited by advisor)*
15. Technometrics – *Subreviewer (invited by advisor)*

○ MENTORING

1. **2024-Present:** *Nazal Mohamed* – 3rd Year Ph.D. Student
 - Mentored on the art of defining research problems and thinking clearly through research
 - Provided extensive guidance on academic writing and research paper preparation
 - Collaborated on 3 manuscripts submitted to machine learning conferences. Currently collaborating on 2 journal manuscripts.
2. **2025-Present:** *Ayse Tursucular* – 2nd Year Ph.D. Student
 - Guided her in defining a research problem and deriving mathematical proofs
 - Mentored on research paper writing and effective presentation of results
 - Collaborated on 1 research paper, currently doing joint work on the second manuscript.

○ COMMUNITY INVOLVEMENT

- **2025:** Judge for K-12 InVenture Prize State Finals (Georgia)

○ STUDENT ACTIVITIES

- **2018-2019:** *Mechanical Team Lead* of the runner's up team (twice) in Intelligent Ground Vehicle Competition ([IGVC](#))
- **2016-2018:** *Public Relations Head* of Asia's largest AstroTech fest – National Students' Space Challenge ([NSSC](#))

HONORS AND AWARDS

1. **Travel Award Grant, ASA QPRC Conference (2025)**
Awarded a full travel grant by the American Statistical Association (ASA) & the National Science Foundation (NSF) to present research at the Quality and Productivity Research Conference.
2. **AI Safety Fellowship (Spring 2025)**
Selected as a fellow in the Georgia Tech AI Safety Initiative. Participated in a 6-week seminar with reading group discussions on *Reward Misspecification and Instrumental Convergence*; *Goal Misgeneralization*; *Task Decomposition for Scalable Oversight*; *Adversarial Techniques for Scalable Oversight*; *Interpretability*; *Criticisms and Whitepaper* in Large AI Models.
3. **Novelis Graduate Scholarship (2024–2025)**
Recipient of an \$8,000 fellowship awarded by the Novelis Innovation Hub at Georgia Tech. Culminated with a thesis presentation at Novelis' Global Research and Technology Center (NGRTC) in Kennesaw, Georgia.

4. **Silver Medal, Department Rank 1, IIT Kharagpur (2020)**
Awarded the silver medal for securing the top rank in the Manufacturing Science & Engineering dual degree (B.S. + M.S.) program at IIT Kharagpur.
5. **Institute Proficiency Award, IIT Kharagpur (2019)**
Recognized with the institute-wide award for the best Bachelor's project in Manufacturing Science & Engineering.
6. **Winners, Smart India Hackathon (2019)**
National-level recognition as winners of the 3rd edition of the Ministry of Human Resource Development's Smart India Hackathon, competing among teams from across the country.
7. **Change of Major Opportunity, IIT Kharagpur (2016)**
Earned an opportunity for changing major into Manufacturing Science & Engineering by placing within the top 7% of a cohort of over 1300 students after the first year of study.

INTERNSHIPS AND RESEARCH PROJECTS

1. **Prognostics in Hydraulic Turbine Components [Certificate]** **Argonne National Lab, USA**
Research Intern – Advisors/Collaborators: [Dr. Feng Qiu](#), [Dr. Murat Yildirim](#) *Summers 2023*
 - Developed LSTM-based degradation detection and Bayesian exponential degradation models for Remaining Useful Life (RUL) prediction in hydraulic turbines using real-time data streaming *Hydropower Research Institute (HRI)*
2. **Industrial Optimization for Inclusive Manufacturing Framework** **IIT Kharagpur, India**
Research Assistant — Advisor: [Prof. Manoj Kumar Tiwari](#) *Sep 2019 – Sep 2020*
 - Formulated multi-objective constrained optimization and solved with chaotic MOPSO for cost- and emission-aware manufacturing planning. The work is published in the *ASME Journal of Computing and Information Science in Engineering*.
3. **Metrological Investigation of Industrial X-ray CT Data [Certificate]** **Warwick Manufacturing Group, England**
Visiting Researcher — Advisor: [Prof. Mark A. Williams](#) *Summers 2019*
 - Designed histogram-based CT data characterization and implemented image processing algorithms, achieving noise reduction in X-ray CT images of a metallic artifact.
4. **Intelligent Racking System Design for Aquaponics Industry [Certificate]** **University of Alberta, Canada**
Visiting Research Assistant — Advisor: [Prof. Rafiq Ahmad](#) *Summers 2018*
 - Designed energy-efficient, Industry 4.0-aligned intelligent racking system prototypes for aquaponics production.
5. **Parameters Estimation of Quadcopters & Kinodynamic Path Planning [Certificate]** **MathWorks, India**
Project Intern — Supervisor: [Dr. Venkatesh B. Subburaman](#) *Summers 2017*
 - Wrote a white paper to estimate black-box quadcopter parameters for a MATLAB toolbox
 - Implemented kinodynamic RRT* algorithm for 3D UAV motion planning.

KEY PRESENTATIONS

1. **Interpretable Causal Models for Cascading Failures in Distributed Manufacturing Networks**
Novelis Global Research & Technology Center, Kennesaw 2025
2. **Federated Causal Reasoning for Dynamic Systems with Interdependent Clients**
ASA Quality and Productivity Research Conference, Seattle 2025
3. **Learning Unknown Interdependencies in Distributed Manufacturing**
Thesis Pitch Competition, IISE Doctoral Colloquium, Atlanta 2025
4. **Federated Granger Causality Learning For Interdependent Clients With State Space Representation**
International Conference on Learning Representations (ICLR), Singapore 2025
5. **Federated Anomaly Detection in Vertically Partitioned Datasets**
INFORMS Annual Meeting, Seattle, 2024
6. **A Two-Stage Prognostics Framework for Guide Bearing Failures in Hydropower Operations**
CEESA Seminar, Argonne National Laboratory, Chicago, 2023
7. **Condition-based Task Scheduling for Self-Aware Robotic Manipulators**
IISE Annual Conference, New Orleans, 2023
8. **Operational Self-Awareness of Robotic Manipulators Performing Tasks with Time-Varying Severity Levels**
INFORMS Annual Meeting, Indianapolis, 2022
9. **Operational Self-Awareness of Robotic Manipulators Performing Tasks with Dynamic Severity Levels**
International Workshop on Interdisciplinary Paradigms for Semi-Autonomous Deep-Space Habitation, San Antonio, 2022

10. **A Diagnostics Model for Detecting Leak Severity in a Regenerable CO2 Removal System**
International Conference on Environmental Systems (ICES), St. Paul, 2022
11. **Improvement of Crow Search and Bat Algorithms Using Two Novel Mutation Operators**
International Conference on Computers & Industrial Engineering, Auckland, 2018
12. **A Novel Approach for Optimal Speed Control of the Vehicle Using Drive Envelope Based Analysis**
IEEE International Transportation Electrification Conference, Pune, 2017

REFERENCES

1. **Nagi Gebraeel** (Thesis Advisor),
Georgia Power Early Career Professor and Professor,
School of Industrial & Systems Engineering,
Georgia Institute of Technology
Contact: nagi.gebraeel@isye.gatech.edu
2. **Stephen K. Robinson** (Director of [NASA HOME STRI](#), PhD Thesis Committee Member, and Collaborator)
NASA Astronaut (retired) & Professor,
Department of Mechanical and Aerospace Engineering,
University of California Davis
Contact: stephen.k.robinson@ucdavis.edu
3. **Sanjay Joshi** (PI in [NASA HOME STRI](#) and Collaborator)
Professor,
Department of Mechanical and Aerospace Engineering,
University of California Davis
Contact: maejoshi@ucdavis.edu
4. **Pascal Van Hentenryck** (PhD Thesis Committee Member),
A. Russell Chandler III Chair and Professor,
School of Industrial & Systems Engineering,
Georgia Institute of Technology
Contact: pvh@gatech.edu
5. **Paritosh Ramanan** (Collaborator and Mentor),
Assistant Professor,
Industrial Engineering and Management,
Oklahoma State University
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