Saunak Kumar Panda

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Research Interests

My research integrates reinforcement learning, large language models, and optimization to advance intelligent and interpretable decision-making under uncertainty. As a Postdoctoral Scholar I develop LLM-augmented RL frameworks for personalized recommendation systems in behavioral healthcare and policy-compliant decision support in regulatory domains, bridging statistical learning, natural language reasoning, and operations research to design trustworthy, human-centered AI systems.

Education

University of Houston – PhD in Industrial Engineering, GPA: 3.96 — Aug 2025

- **Specialization:** Operations Research

Texas Tech University (Transferred) – PhD in Industrial Engineering, GPA: 4.0 — Aug 2022

University of Washington – MS in Mechanical Engineering, GPA: 3.82 — June 2020

- **Specialization:** Robotics

PES Institute of Technology – BE in Mechanical Engineering, GPA: 3.7 — June 2018

- **Minor:** Electronics and Communication

Publications

- Saunak Kumar Panda, Yisha Xiang, and Ruiqi Liu, "Dynamic resource matching in manufacturing using deep reinforcement learning".
  In: *European Journal of Operational Research (EJOR)*.
  URL: https://doi.org/10.1016/j.ejor.2024.05.027
- Saunak Kumar Panda, Yisha Xiang, and Ruiqi Liu, "Online Statistical Inference of time-varying sample-averaged Q-learning".
  In: *IEEE Transactions on Information Theory (IEEE TIT)*.
  URL: https://doi.org/10.1109/TIT.2025.3569421
- Saunak Kumar Panda, Ruiqi Liu, and Yisha Xiang, "Online Statistical Inference of Sample-averaged Q-Learning".
  In: *First Reinforcement Learning Safety Workshop, Reinforcement Learning Conference (RLC 2024)*.
  URL: https://openreview.net/forum?id=bKXRTxxmey
- Saunak Kumar Panda, Tong Li, Yisha Xiang, and Ruiqi Liu, "Empirical Variance-Penalized Risk-Sensitive Reinforcement Learning".
  Preparation for Submission: *Informs Journal of Data Science (IJDS)*.
- Saunak Kumar Panda, Masoud Heidary, Biresh Kumar Joardar, and Yisha Xiang, "Deep reinforcement learning for optimization of machine learning on manycore circuit design".
  Preparation for Submission: *International Symposium on Quality Electronic Design (ISQED)*
- Tong Li, Saunak Kumar Panda, and Yisha Xiang, "Certifying Lower Bounds for Risk-Sensitive Reinforcement Learning under Adversarial State Perturbations".
  Under Review: *IEEE Transactions on Automatic Control (IEEE TAC)*

Research Experience

Postdoctoral Scholar, HAI Institute, University of Houston – Houston TX Sep 2025 – *Present*

- Conducting research on developing and applying large language models (LLMs) to real-world challenges across business, healthcare, and education domains at Human-Centered AI Institute.

Graduate Research Assistant, University of Houston – Houston TX Aug 2020 – Aug 2025

- Working on multiple projects in large-scale optimization intended for publication in reputable OR and optimization journals
- Research Assistant for Dr. Yisha Xiang

BARC Graduate Researcher, Boeing Advanced Research Center – Seattle, WA Jul 2019 – Sep 2019

- Developed an automated inspection technique for tube bending using computer vision and linear regression, achieving a 75% accuracy improvement and reducing bend angle errors to ± 0.1 degrees
- **Concepts:** Computer vision, Machine Learning
- **Technical Skills:** OpenCV, PyTorch, MATLAB

Precision Controls Researcher, Microsoft Research Labs – Redmond, WA Jan 2019 – Dec 2019

- Designed PID control algorithms for robotic eye-tracking systems, improving laser dot detection and calibration accuracy, and enhancing system robustness
- **Concepts:** PID Control, Computer vision
- **Technical Skills:** OpenCV, Python

Research Intern, Indian Institute of Technology (IIT) Bombay – Mumbai, India Jan 2017 – Jun 2017

- Achieved more efficient shape optimization of plates under various loading conditions by developing a novel variant of Particle Swarm Optimization (PSO)
- Conducted comprehensive benchmark comparisons between PSO and other contemporary optimization algorithms to evaluate performance improvements

Teaching Experience

Instructor, Data Analysis and Visualization, HAI Institute, University of Houston *Fall 2025*

- Teaching a class of approximately 60 students on applied data analysis and visualization using Excel and Power BI, with hands-on assignments integrating real-world business analytics applications.

Teaching Assistant, Deterministic OR, IMSE Department, Texas Tech University Fall 2021

- Assisted Dr. David Huckleberry Gutman in course delivery, grading, and supported problem-solving sessions focused on linear programming, simplex methods, and network optimization.

Work Experience

Systems Modeling & Simulation Intern, MicroVision Inc. – Redmond, WA Jan 2020 – Mar 2020

- Developed system-level models and low-level controls for automotive LiDAR systems using LTSpice, enhancing accuracy and robustness through comprehensive unit and functional testing
- Reduced model error and identified additional faults, ensuring reliable system deployment in real-world conditions

Project Intern, Robert Bosch Engineering and Business Solutions – Bangalore, India Jan 2018 – Apr 2018

- Developed an Excel tool for material quantity and price calculations, optimizing cost estimation for additive manufacturing
- Collaborated with the marketing team to design a brochure for the Additive Manufacturing division, improving communication of technical capabilities

Recognition and Awards

Finalist - INFORMS Railway Applications Section (RAS) 2025 Data Challenge

- Recognized among the top six international teams for developing an end-to-end predictive maintenance pipeline for railway wheel failure prediction.

Distinguished Scholarship Award - University of Houston

- Awarded for exceptional research contributions and academic performance in operations research.

Skills

Programming Languages: Python, R, MATLAB, C, C++, Java, SQL, Linux
Libraries & Frameworks: PyTorch, TensorFlow, Scikit-learn, OpenAI Gym, OpenCV, ROS, Pandas, NumPy, JAX, Git
Solvers & Software: Gurobi, CPLEX, Simulink, LabVIEW, SolidWorks, Ansys, COMSOL, PLC, HMI

Invited & Contributed Talks

2025 INFORMS Annual Meeting *Oct 2025*
RAS Data Challenge - Predictive Maintenance in Rail Operations: Railway Wheel Failure Prediction
Empirical Variance-Penalized Risk-Sensitive Reinforcement Learning

2024 INFORMS Annual Meeting Oct 2024
Online Statistical Inference of time-varying sample-averaged Q-learning

Reinforcement Learning Conference (RLC) 2024 Aug 2024
Online Statistical Inference of sample-averaged Q-learning

2023 INFORMS Annual Meeting Oct 2023
Online Statistical Inference for dynamically-changing batch Q-learning

University of Houston Industrial Engineering (UHIE) Friday Seminar Series Oct 2022
Solving Dynamic Resource Matching in Manufacturing using Reinforcement Learning

2022 INFORMS Annual Meeting Oct 2022
Solving Dynamic Resource Matching in Manufacturing using Reinforcement Learning

Institute of Industrial and Systems Engineers Annual Conference & Expo 2022 May 2022
Dynamic matching of demand-supply types with manufacturing resources

Services

President, INFORMS Student Chapter, University of Houston Aug 2022 – Present

- Led a student chapter of over 20 members, promoting academic excellence and advancing operations research through coordinated efforts.
- Organized seminars, facilitated weekly meetings, and developed materials for social and academic events to foster a cohesive and collaborative research community.

Student Board Member, IISE QCRE Aug 2022 – May 2024

- Edited and published the quarterly newsletter, ensuring timely and accurate communication of chapter updates, events, and achievements.

Conference Session Chair

- *2023 INFORMS Annual Meeting*: Advances in Reinforcement Learning 2023
- *IISE Annual Conference & Expo 2022*: Operations Research 2022