Sreejeet Maity

Raleigh, North Carolina, U.S.A

Education

North Carolina State University — Raleigh, NC, U.S.A
Ph.D. Electrical Engineering — Aug 2023 - Present

Indian Institute of Science, Bangalore — Bangalore, India
M.Tech Robotics and Autonomous Systems — Aug 2021 - June 2023

Jadavpur University — Kolkata, India
B.E Electrical Engineering — Aug 2017 - July 2021

Research Interests

My research develops provably robust reinforcement learning algorithms with finite-sample guarantees under uncertainty and adversarial corruption. I focus on corruption-tolerant distributed and federated RL, together with tight minimax lower bounds characterizing the fundamental limits of robust learning. My broader interests include violation-constrained RL under model uncertainty and robust LLM post-training through adaptive adversarial curricula and distributionally robust optimization.

Experience

North Carolina State University — Raleigh, NC, U.S.A
Graduate Research/Teaching Assistant — Aug 2023 - Present
Ph.D. Advisor: Dr. Aritra Mitra.

- **Finding Robust Optimal Policy from Corrupted and Correlated Observations.**
  - Showed that vanilla Q-learning is provably fragile under reward corruption, and designed a robust synchronous variant that employs robust Bellman targets. Established non-asymptotic, finite-time convergence, with tightness certified by a matching minimax lower bound.
  - Extended these guarantees to the *asynchronous* setting under temporal dependence, relaxing strong distributional assumptions on rewards.
  - Results disseminated across ICML 2026, NeurIPS 2025, and CDC 2024, and CDC 2026.
- **Robust Policy Evaluation under Adversarial Influences and Markovian Data.**
  - Established the first finite-time theory for robust `TD` learning under time-correlated (Markovian) noise and function approximation: (i) proved divergence of vanilla `TD` under adaptive corruption; (ii) designed `Robust-TD` with clean-case rates up to a small additive bias; and (iii) derived a near-tight lower bound certifying inevitability of the corruption term.
  - This research is published in AISTATS 2025.
- **Hybrid Algorithms and Extension to the Multi-Agent Federated Learning Setting.**
  - Developed adversarially robust, communication-efficient RL for federated multi-agent settings; introduced a novel hybrid model-free and model-based class of algorithms with finite-time guarantees under reward corruption.
  - Extended to fully decentralized MARL with Byzantine tolerance and logarithmic communication, preserving collaborative speedups; and proved conditions under which the corruption bias diminishes with sample size.
  - Two papers (-1, -2) published at ACC 2026.

Columbia University, New York
Collaborator: Prof. James Anderson, Leonardo Felipe Toso. — New York, NY, U.S.A
Research Collaboration — May 2026 - Present

- **Byzantine-Robust Personalized Federated TD Learning with Shared Representations**
  Developing Byzantine-robust representation learning for heterogeneous RL agents interacting with distinct MDPs and temporally dependent data. The framework combines a shared low-dimensional value-function representation with personalized local parameters, accommodating differences in transition dynamics, rewards, policies, and value functions while avoiding persistent heterogeneity bias.

Selected First-Authored Publications

- *Sreejeet Maity*†, Aritra Mitra. **Corruption-Tolerant Optimal Asynchronous Q-Learning**, **International Conference on Machine Learning (ICML 2026)**.
[Summary] [Paper] [Poster] [Slides] [Code]
- *Sreejeet Maity*†, Aritra Mitra. **Adversarially-Robust `TD` Learning with Markovian Data**, **International Conference on Artificial Intelligence and Statistics (AISTATS 2025)**.
[Summary] [Paper] [Poster] [Slides] [Code]

■ *Sreejeet Maity*†, Aritra Mitra. **Robust Asynchronous Q-Learning under Reward and State Corruption via Batching**,
IEEE Conference on Decision and Control (CDC 2026).
[Summary] [Paper] [Poster] [Slides] [Code]

■ *Sreejeet Maity*†, Aritra Mitra. **Robust Q-Learning under Corrupted Rewards**,
IEEE Conference on Decision and Control (CDC 2024).
[Summary] [Paper] [Poster] [Slides] [Code]

■ *Sreejeet Maity*†, Aritra Mitra. **Robust Federated Q-Learning with Almost No Communication**,
2026 American Control Conference (ACC 2026).
[Summary] [Paper] [Poster] [Slides] [Code]

■ *Sreejeet Maity*†, Feng Zhu, Robert Heath, Aritra Mitra. **Variance-Reduced Q-Learning over Static and Time-Varying Networks**,
2026 American Control Conference (ACC 2026).
[Summary] [Paper] [Poster] [Slides] [Code]

Accepted Workshop Presentations

1. **Multi-Agent Robust FRL with Sparse Communication** NCSU Robotics Symposium 2026.
2. **Corruption-Tolerant Agnostic Q-Learning** NeuRIPS 25-Reliable ML Workshop.
3. **Robust Federated RL with Byzantine Agents** Applied AI Symposium 2025, NESCW 2026.
4. **Theoretical Limits of Robust TD Learning** New York RL Workshop (NYRL 2025), Amazon.
5. **Finite-Time Theory for Robust RL** Northeast Systems and Control Symposium (NESCW 2025).
6. **Adversarially-Robust Deep Q-Network for Algorithmic Trading** MLSS 2025, NCSU.
7. **Robust Algorithms for Adversarial Reinforcement Learning** Applied AI Symposium 2024.

Invited Talks/Seminars

■ **Towards Finite-Time Rates for Adversarially-Robust RL** CORAL Seminar, NCSU.

Works Under Review/Preparation

■ **Resilient RL Algorithms using Batch Robustification Under Corruptive Events**
We develop novel RL Algorithms for adversarially corrupted rewards and transitions. It groups the online trajectory into batches and, for each state-action pair within a batch, forms a corruption-tolerant Bellman update by robustly estimating the mean reward and robustly aggregating next-state value evaluations. We yield stable learning and finite-time ℓ_∞ guarantees with an explicit, unavoidable degradation that scales with the corruption level.

■ **Byzantine-Robust Representation Learning for Heterogeneous Reinforcement Learning**
We study collaborative representation learning among heterogeneous reinforcement learning agents, each interacting with a distinct Markov decision process under a fixed policy and generating temporally dependent data. Our approach decomposes each agent's value function into a shared low-dimensional representation and a personalized local parameter, allowing agents to learn common structure while accommodating differences in transition dynamics, rewards, policies, and value functions. We aim to develop finite-time guarantees under Byzantine clients without incurring a persistent bias due to agent heterogeneity.

■ **Decentralized Q-Learning over Random Networks with Near-Optimal Rates**
We consider a decentralized reinforcement learning setup with M agents collaboratively interacting with a common Markov Decision Process. We investigate the potential for sample-complexity speedups in this distributed setting, where agents exchange information over a random network. To this end, we propose `Decentralized Fed-Q`, a decentralized Q-learning algorithm that integrates model-based and model-free techniques. We establish that `Decentralized Fed-Q` achieves near-optimal finite-time sample complexity while leveraging collaboration among agents.

■ **Learning Robust Trading Policies under Adversarial Market Signal Corruption**
Deep Q-Learning (`DQN`) has become a widely used and effective method for algorithmic trading, enabling agents to learn sequential decision-making strategies directly from market data. Its ability to model complex temporal patterns and adapt to evolving financial environments makes it a strong candidate for real-world deployment. However, financial datas encountered in practice are often noisy or corrupted—either due to technical issues, reporting errors, or even adversarial manipulation. Such data imperfections can significantly impair the learning process and arbitrarily degrade the performance of standard `DQN`-based strategies. To address this challenge, we propose a robust variant of `DQN` designed to operate effectively in environments with adversarially corrupted signals.

Projects

- Federated MARL-GYM : We introduce a custom multi-agent reinforcement learning environment built with Gymnasium and Pygame, designed for evaluating federated RL (FRL) algorithms. The environment models a grid world where multiple agents navigate to accomplish spatially distributed tasks, like reaching delivery points.

Skills

Programming Languages: Python, MatLab, Simulink, C++, R.
Softwares and Libraries: Tensorflow, PyTorch, Scikit-learn, Numpy, Pandas, Gymnasium, MuJoCo.
Mathematical Skills: Linear Algebra, Probability, Robust Statistics, Stochastic Optimization.
Research Skills: Reinforcement Learning, Statistical Learning Theory, Optimization, Control Theory.

Relevant Courses

Learning Theory: Theoretical Foundations of Large-Scale Machine Learning, Machine Learning for Signal Processing, Theory and Applications of Bayesian Learning, Physics Modelling with Neural Networks, Deep Learning and Neural Networks, Distributed Learning.
Mathematics: Analysis, Probability and Stochastic Process, High-Dimensional Statistics, Stochastic Models and Applications, Convex Optimization for Data Science, Detection and Estimation Theory.
Control Theory: Safety-Critical Control, Dynamics of Linear Systems, Networked and Distributed Control, Formal Analysis for Control Theory.

Academic/Professional Services

- Served as the Head Teaching Assistant for ECE 516: Systems and Control Engineering and ECE 308: Elements of Control Systems at the Department of Electrical and Computer Engineering, North Carolina State University, during the Spring and Fall of 2025.
- Served as a reviewer for 40+ papers in multiple flagship control/ ML venues, including the American Control Conference (ACC), the IEEE Conference on Decision and Control (CDC), Learning for Dynamics and Control (L4DC), Annual Conference on Neural Information Processing Systems(NeuRIPS), Journal of Machine Learning Research (JMLR), Transactions in Machine Learning Reserach (TMLR), IEEE Transactions in Automatic Control (TACON), Transactions in Signal and Information Processing over Networks (TSIPN), and Transactions in Signal Processing (TSP).

Awards

ACC 2026 Travel Award	May 2026
L4DC 2025 Student Support Grant	May 2025
NESCW 2025 Student Support Grant	May 2025
IEEE CDC 2024 Student Support Award	August 2024
NC State ECE Student Research Support Award	August 2024
College of Engineering Graduate Merit Award	August 2023-24, 2024-25