Sourav Chakraborty

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Research Interests

My research spans machine learning and decision-making under uncertainty: **reinforcement learning**, **multi-armed bandits**, **online learning**, and stochastic and online **optimization**. I also work on sequential decision-making, statistical modeling and prediction, and ranking and retrieval, and, most recently, on the mathematical foundations of **efficient attention** and long-context sequence modeling for **large language models**. I pair rigorous analysis with production implementation, with emphasis on non-stationary environments and learning from noisy, biased feedback.

Education

University of Colorado Boulder, Colorado, USA
Ph.D. Computer Science, Dec 2026 (Expected).
M.Sc. Computer Science, May 2022; GPA: 4.0.
Thesis: *Incentivized Exploration in Non-stationary Stochastic Bandits* (thesis)
Advisor: Lijun Chen

Birla Institute of Technology, Mesra, Ranchi, India
B.E. Information Technology, June 2016.

Work Experience

California Institute of Technology (Caltech), Pasadena, CA, USA 2026–Present
Visiting Student Researcher, NetLab (CMS).

- Hosted in the Department of Computing and Mathematical Sciences by **Profs. Steven Low and Adam Wierman**; **ongoing collaboration** on **scalable multi-agent reinforcement learning** and optimization over large-scale networked systems.

University of Colorado Boulder, Colorado, USA 2019–Present
Graduate Research Assistant & Instructor.

- Conduct **independent research** in reinforcement learning, multi-armed bandits, online learning, and optimization under uncertainty, including exploration/exploitation and learning from noisy, biased, and non-stationary feedback; bridge rigorous **analysis** with **implementation and simulation**.
- Employed as **Instructor of Record** (2 semesters), **Graduate TA** (10+ semesters), and Departmental **Lead TA** (3 consecutive years), overseeing instructional operations and mentoring 280+ staff members.

Flipkart, Bangalore, India 2016–2019
Software Engineer

- Built and shipped an end-to-end **query recommendation** (related-search) pipeline for a **product-search** system serving **50M+ daily sessions**, improving search discovery (Java, Cascading).
- Developed **ranking signals** via feature engineering (recency, semantic similarity) to improve **search relevance**, evaluated with offline benchmarks and online **A/B testing** on a **10M-query** set.
- Architected the **BRaaS** (Backup-as-a-Service) platform (MySQL) adopted by **20+ microservices**, centralizing backup/recovery and removing single points of failure.
- Collaborated across engineering and product-search teams, writing **production-ready code** and improving system reliability at scale.

Research and Publications

Papers Under Review *(*Denotes equal contribution)*

1. **S. Chakraborty***, A. K. Rege*, C. Monteleoni, L. Chen, Characterizing the Impact of Communication Delay in Networked Multi-Agent Reinforcement Learning, 2026.
2. **S. Chakraborty***, A. K. Rege*, C. Monteleoni, L. Chen, Decentralized Lipschitz Bandits with Proximity Collisions, 2026.
3. J. Hu, W. Chen, **S. Chakraborty**, L. Chen, On Regret Bounds of Quantum Bandit Algorithms, 2026.
4. J. Hu, **S. Chakraborty**, L. Chen, Non-Stationary Quantum Bandits under a Variation Budget, 2026.
5. A. Ghriss, **S. Chakraborty**, Kernelized Linear Attention: Breaking the Capacity Wall with Symmetric Cones, 2026. (arXiv: 2607.17419)

Peer-Reviewed Conference Publications *(*Denotes equal contribution)*

1. **S. Chakraborty***, A. K. Rege*, C. Monteleoni, L. Chen, Learning from Local Walks on Dynamic Graphs with Bandit Feedback, *IEEE Conference on Decision and Control* (**CDC 2026**), Honolulu, USA. (arXiv: 2607.10571)
2. **S. Chakraborty***, A. K. Rege*, C. Monteleoni, L. Chen, Multi-Agent Lipschitz Bandits, *International Conference on Artificial Intelligence and Statistics* (**AISTATS 2026**), Tangier, Morocco. (arXiv: 2602.16965)
3. **S. Chakraborty***, A. K. Rege*, C. Monteleoni, L. Chen, Flickering Multi-Armed Bandits, *Learning for Dynamics & Control Conference* (**L4DC 2026**), Los Angeles, USA. (**Oral Presentation**). (★ **Best Paper Runner-Up**). (arXiv: 2602.17315)
4. **S. Chakraborty***, A. K. Rege*, C. Monteleoni, L. Chen, A Unified Framework for Locality in Scalable MARL, *Learning for Dynamics & Control Conference* (**L4DC 2026**), Los Angeles, USA. (arXiv: 2602.16966)
5. **S. Chakraborty***, A. K. Rege*, C. Monteleoni, L. Chen, Bandit Learning on Dynamic Graphs, *ARLET Workshop at Neural Information Processing Systems* (**NeurIPS 2025**), San Diego, USA. (OpenReview)
6. **S. Chakraborty***, A. K. Rege*, C. Monteleoni, L. Chen, Incentivized Lipschitz Bandits, *IEEE Conference on Decision and Control* (**CDC 2025**), Rio de Janeiro, Brazil. (IEEE / arXiv: 2508.19466)
7. **S. Chakraborty** and L. Chen, Incentivized Exploration in Non-stationary Stochastic Bandits, *IEEE American Control Conference* (**ACC 2024**), Toronto, Canada. (IEEE / arXiv: 2403.10819)

Honors and Awards

- Recipient, **Best Paper Runner-Up**, **L4DC 2026** (for *Flickering Multi-Armed Bandits*).
- Recipient, **Summer Research Fellowship** (2026).
- Recipient, **Graduate Research Assistant Fellowship** (2026).
- Recipient, **Outstanding Teaching Assistant Award** (CS Department).
- Recipient, **Outstanding Service Award** (CS Department).
- Recipient, **Outstanding Research Paper Award** (2024 & 2026 CS Dept.).
- Recipient, **Full Conference Travel Fellowship** (IEEE ACC 2024, Toronto; IEEE CDC 2025, Rio de Janeiro).
- Recipient, CU Research Expo **Poster Award** (AY 2021–22 and AY 2023–24).
- Recipient, **Publication Recognition Award** (AY 2023–24).
- Recipient, **Early Career Development Fellowship** (CS Department).
- Recipient, **Lloyd Botway Award**, **the department's highest honor for a graduating master's student**, recognizing excellence in academics, teaching, research, and service.
- Selected as **Lead Teaching Assistant** (department lead; 2022–2025).

Teaching

University of Colorado Boulder, Colorado, USA

- **Instructor of Record** 2020 – 2021
  - Introduction to Computational Thinking (∼**200** students) and Introduction to Data Science with Probability & Statistics (∼**50** students).
  - Managed end-to-end course delivery, including lecture planning, assessments, and coordination of instructional staff.
- **CS Department Lead Teaching Assistant** 2022 – 2025
  - Selected via performance review to lead department-wide instructional quality.
  - Managed TA hiring, onboarding, and training of **280**+ instructional staff.
- **Graduate Teaching Assistant** 2020 – 2025
  - Facilitated recitations, office hours, and grading for Algorithms, Data Structures, and Introduction to Computing across **10+ semesters**.

Professional Service

Peer Reviewer: ICML, NeurIPS, AAAI, IEEE CDC, ACC, and TCNS (Journal).

Technical Skills

Methods: Machine Learning, Reinforcement Learning and Multi-Armed Bandits, Online Learning, Convex/Stochastic/Online Optimization, Optimization under Uncertainty, Statistical Modeling and Prediction, Search Ranking and Recommendation, Experimentation and A/B Testing.
Languages: Python, C++, Java, SQL, Shell, R, Julia.
ML & Data: PyTorch, NumPy, Pandas, scikit-learn, Matplotlib, Seaborn.
Systems & Tools: Docker, Kubernetes, (Py)Spark, Git, Flask, Django.

Relevant Coursework

Theory of Machine Learning, Convex Optimization, High-Dimensional Probability, Deep Learning, Decision-Making Under Uncertainty, Advanced Algorithms, Algorithmic Game Theory.