

Siddharth Chandak | CV

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EDUCATION

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| • Stanford University | Stanford, CA, USA |
| • <i>Ph.D., Electrical Engineering</i>
Advisor: Prof. Nicholas Bambos | 2021–present (expected June 2026) |
| • Stanford University | Stanford, CA, USA |
| • <i>M.S., Electrical Engineering, GPA: 4.15/4</i> | 2021–2023 |
| • Indian Institute of Technology Bombay | Mumbai, India |
| • <i>B.Tech., Electrical Engineering, CPI 9.89/10</i>
Project Advisor: Prof. Vivek S. Borkar | 2017–2021 |
| - President of India Gold Medal | |
| - Honours in Electrical Engineering & Minor in Computer Science | |

Research Interests

Multi-Agent Learning and Control: My research focuses on multi-agent systems and games, with an emphasis on developing algorithms for distributed learning of equilibria for unknown systems. I also study problems in game control, where the aim is to steer players toward equilibria that satisfy both the local and global objectives.

Stochastic Approximation: I am interested in developing new frameworks for stochastic approximation schemes which enable the design and analysis of algorithms in optimization and reinforcement learning. In addition, I work on obtaining tighter finite-time guarantees for reinforcement learning algorithms.

Selected Awards

- Centennial Teaching Assistant Award from Stanford University in 2025.
- Stanford Graduate Fellowship from 2021 to 2026.
- President of India Gold Medal at IIT Bombay for the highest GPA among graduating students in 2021.
- Prof. K. C. Mukherjee Award at IIT Bombay for best B.Tech. project among EE students in 2021.
- Among the top 50 candidates in the Indian National Olympiads in Chemistry and Physics and chosen to attend respective Selection Camps for International Olympiads in 2017.

Publications

Submitted Articles

1. **S. Chandak**, I. Bistritz and N. Bambos, “Choose Your Battles: Distributed Learning Over Multiple Tug of War Games”, *Submitted to IEEE Transactions on Automatic Control*.
2. **S. Chandak**, “ $O(1/k)$ Finite-Time Bound for Non-Linear Two-Time-Scale Stochastic Approximation”, *Submitted to IEEE Transactions on Automatic Control*.
3. **S. Chandak**, “Non-Expansive Mappings in Two-Time-Scale Stochastic Approximation: Finite Time Analysis”, *Submitted to SIAM Journal on Control and Optimization*.
4. **S. Chandak**, I. Bistritz and N. Bambos, “Learning to Control Unknown Strongly Monotone Games”, *Submitted to IEEE Transactions on Control of Network Systems*.

Journal

1. **S. Chandak** and V. S. Borkar, "A Concentration Bound for TD(0) with Function Approximation", *Stochastic Systems*, to appear.
2. **S. Chandak**, P. Shah, V. S. Borkar and P. Dodhia, "Reinforcement Learning in Non-Markovian Environments", *Systems and Control Letters*, 2024.
3. **S. Chandak**, V. S. Borkar and H. Dolhare, "A Concentration Bound for LSPE(λ)", *Systems and Control Letters*, 2023.
4. **S. Chandak**, V. S. Borkar and P. Dodhia, "Concentration of Contractive Stochastic Approximation and Reinforcement Learning", *Stochastic Systems*, 2022.
5. S. U. Haque, **S. Chandak**, F. Chiariotti, D. Gündüz and P. Popovski, "Learning to Speak on Behalf of a Group: Medium Access Control for Sending a Shared Message," *IEEE Communications Letters*, 2022.
6. V. S. Borkar and **S. Chandak**, "Prospect-theoretic Q-learning", *Systems and Control Letters*, 2021.
7. **S. Chandak**, F. Chiariotti and P. Popovski, "Hidden Markov Model-Based Encoding for Time-Correlated IoT Sources", *IEEE Communications Letters*, 2021.

Conference

1. **S. Chandak**, S. U. Haque and N. Bambos, "Finite-Time Bounds for Two-Time-Scale Stochastic Approximation with Arbitrary Norm Contractions and Markovian Noise", to be presented at *IEEE Conference on Decision and Control (CDC)*, 2025.
2. **S. Chandak**, I. Thapa, N. Bambos and D. Scheinker, "Optimal Control for Remote Patient Monitoring with Multidimensional Health States", *IEEE International Conference on Communications (ICC)*, 2025.
3. **S. Chandak**, I. Thapa, N. Bambos and D. Scheinker, "Tiered Service Architecture for Remote Patient Monitoring", *IEEE Healthcom*, 2024.
4. **S. Chandak**, I. Bistritz and N. Bambos, "Tug of Peace: Distributed Learning for Quality of Service Guarantees", *IEEE Conference on Decision and Control (CDC)*, 2023.
5. **S. Chandak**, I. Bistritz and N. Bambos, "Equilibrium Bandits: Learning Optimal Equilibria of Unknown Dynamics", *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2023.

Manuscripts in Preparation

1. **S. Chandak**, "A Unified Framework for Finite-Time Analysis of Contractive Stochastic Approximation".
2. **S. Chandak**, I. Bistritz and N. Bambos, "Learning Optimal Equilibria of Unknown Dynamics".
3. **S. Chandak**, R. Singh, V. S. Borkar and N. Bambos, "High-Probability Regret for Q-Learning using Concentration of Stochastic Approximation with Time-Inhomogeneous Markov Chains".

Invited Talks

- O(1/k) Finite-Time Bound for Non-Linear Two-Time-Scale Stochastic Approximation
 - INFORMS Annual Meeting, October 2025.
- Learning to Control Unknown Multi-Agent Systems
 - Department of Electrical Engineering Seminar, IIT Bombay, September 2025.
 - STCS Seminar, Tata Institute of Fundamental Research (TIFR) Mumbai, September 2025
- Non-Expansive Mappings in Two-Time-Scale Stochastic Approximation
 - INFORMS Applied Probability Society Conference, July 2025.

Teaching Experience

Course Instructor at Stanford University.....

- ENGR 76: Information Science and Engineering Winter 2025-26
 - Course aimed at introducing undergraduate students at Stanford to the fundamentals behind modern information and communication systems.

Teaching Assistant at Stanford University.....

- ENGR 76: Information Science and Engineering Spring 2023-24, Spring 2024-25
Instructor: Prof. Ayfer Ozgur
 - Head TA, leading a team of 10+ TAs for a class of around 300 students.
 - Helped restructure the class by redesigning projects, and designing exams and discussion sessions.
 - Awarded the Centennial Teaching Assistant Award for contributions to the course.
- MS&E 130: Information Networks and Services Winter 2022-23, Winter 2024-25
- EE 263: Linear Dynamical Systems Autumn 2024-25
- MS&E 232: Introduction to Game Theory Winter 2023-24

Teaching Assistant at IIT Bombay.....

- MA106: Linear Algebra Spring 2019-20
- MA105: Calculus Autumn 2019-20
- PH108: Basics of Electricity and Magnetism Spring 2018-19
- PH107: Quantum Physics and Applications Autumn 2018-19

Experience

- **Uber** | *Risk and Trusted Identity* Jun. - Sep. 2025
PhD Machine Learning Engineering Intern
Developed machine learning models for fraud detection.
- **Morgan Stanley** | *Institutional Equities Division* Jun. - Aug. 2024
Quantitative Finance Summer Associate
Developed a statistical factor model for the Central Risk Book desk in Institutional Equities Division.
- **Aalborg University** | *Supervisor - Prof. Petar Popovski* May - Jul. 2021
Summer Intern
Proposed a multi-agent multi-armed bandit based approach for transmission of a shared message over multiple shared channels while avoiding collision.
- **Aalborg University** | *Supervisor - Prof. Petar Popovski* Apr. - Jul. 2020
Summer Intern
Proposed encoding and decoding scheme for transmitting short IoT packets with time correlation across a noisy channel by modeling source dynamics using Hidden Markov Models.
- **Imperial College London** | *Supervisor - Prof. Nick S. Jones* May - Jul. 2019
Summer Intern
Investigated the difference between social networks in UK, ICL and "Hackspace" - a smaller technical community at ICL, by analyzing survey data on friendships, and modeling social networks using Stochastic Block Models.