

Sayan Chakraborty

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RESEARCH INTERESTS

- ◇ Resilient reinforcement learning for robust performance under cyberattacks and uncertainties.
- 3D motion planning for vehicles with active suspension.
- ★ Safe autonomous driving solutions, integrating sensor fusion and real-time motion planning.

EDUCATION

New York University

PhD Candidate, CAN Lab, Dept. of Electrical & Computer Engineering

New York City, USA

Fall 2021 – Present

Thesis Advisor: Prof. Zhong-Ping Jiang

CGPA: 3.8/4

Expected graduation: Spring 2026

Indian Institute of Technology (IIT) Hyderabad

Master of Technology in Electrical Engineering (Systems & Control)

Hyderabad, India

Fall 2018 – Fall 2021

Thesis Advisors: Prof. Chandrika Prakash Vyasarayani, Prof. Ketan P. Detroja

Thesis Title: *Unknown input reconstruction for nonlinear dynamical systems using B-spline basis and convolutional neural networks*

CGPA: 9.58/10

WORK EXPERIENCE

Summer Research Fellow

ClearMotion, Billerica

June 2023 – August 2023

Massachusetts, USA

- **3D safe motion planning for on-road autonomous vehicles**
 - Developed a perception-driven 3D-motion planner for a full car model with active suspension.
 - Implemented a two-phase nonlinear optimizer to first derive an XY-path from road events, then extend it to an XYZ-trajectory with vertical motion and speed optimization.
 - Extensively validated with both synthetic and real-world road data, demonstrating practical efficacy.

TECHNICAL SKILLS

- **Programming:** Python, MATLAB, R, C/C++
- **Libraries & Frameworks:** PyTorch, NumPy, scikit-learn, pandas, Keras, OpenCV
- **Modeling & Simulation Tools:** Simulink, CasADi, SUMO, Maple

PUBLICATIONS

Journal Publications

- ★ Leilei Cui, Sayan Chakraborty, Kaan Ozbay, and Zhong-Ping Jiang, “Data-driven combined longitudinal and lateral control for the car following problem”, IEEE Transactions on Control Systems Technology, 2025.
- ◇ Sayan Chakraborty, Weinan Gao, Kyriakos G Vamvoudakis, and Zhong-Ping Jiang, “Active learning-based control for resiliency of uncertain systems under DoS attacks”, IEEE Control Systems Letters, 2024.
- ★ Sayan Chakraborty, Leilei Cui, Kaan Ozbay, and Zhong-Ping Jiang, “Automated lane changing control in mixed traffic: An adaptive dynamic programming approach”, Transportation Research Part B: Methodological, 2024.

Conference Publications

- ◇ Sayan Chakraborty, Weinan Gao, Kyriakos G Vamvoudakis, and Zhong-Ping Jiang, “Active learning-based control for resiliency of uncertain systems under DoS attacks”, in 2025 American Control Conference (ACC) (accepted for presentation), Denver, Colorado: IEEE, 2025
- ◇ Sayan Chakraborty, Weinan Gao, Kyriakos G Vamvoudakis, and Zhong-Ping Jiang, “Resilient learning-based control under denial-of-service attacks”, in 2024 63rd IEEE Conference on Decision and Control (CDC), IEEE, Milano, Italy, 2024.
- Sayan Chakraborty, Yu Jiang, and Zhong-Ping Jiang, “On xyz-motion planning using a full car model”, in 2024 American Control Conference (ACC), IEEE, 2024.
- Sayan Chakraborty, Weinan Gao, Kyriakos G Vamvoudakis, and Zhong-Ping Jiang, “Adaptive optimal output regulation of discrete-time linear systems: A reinforcement learning approach”, in 2023 62nd IEEE Conference on Decision and Control (CDC), IEEE, 2023.
- Sayan Chakraborty, Weinan Gao, Leilei Cui, Frank L. Lewis, and Zhong-Ping Jiang, “Learning-based adaptive optimal output regulation of discrete-time linear systems”, in IFAC World Congress, Yokohama, Japan, 2023.
- ★ Won Yong Ha, Sayan Chakraborty, Yujie Yu, Samin Ghasemi, and Zhong-Ping Jiang, “Automated lane changing through learning-based control: An experimental study”, in 2023 IEEE 26th International Conference on Intelligent Transportation Systems (ITSC), IEEE, 2023.
- ★ Sayan Chakraborty, Leilei Cui, Kaan Ozbay, and Zhong-Ping Jiang, “Automated lane changing control in mixed traffic: An adaptive dynamic programming approach”, in 2022 IEEE 25th International Conference on Intelligent Transportation Systems (ITSC), IEEE, 2022.

Under Review

- ◇ Sayan Chakraborty, Weinan Gao, Kyriakos G Vamvoudakis, and Zhong-Ping Jiang, “Adversarially robust learning-based output regulation under denial-of-service attacks”, IEEE Transactions on Automatic Control (under review), 2025.

PATENT

Yu Jiang, Sayan Chakraborty, Marco Giovanardi, and William Graves, “XYZ motion planning for vehicles,” USA Patent Application US63 410 815, filed Apr. 28, 2023.

PROJECTS

Graduate Research Assistant

New York University

Fall 2021 – Present

CAN Lab, NYU, New York

◇ Cyber-resilient reinforcement learning (RL) for dynamic systems

- Developed learning-based frameworks that integrate RL and control theory to strengthen system resiliency.
- Devised active learning strategies for real-time adaptation of RL policies under evolving cyber attacks.
- Identified critical attack thresholds from real-time data, safeguarding closed-loop performance under attacks.

★ Safe autonomous driving

- Developed real-time, learning-based lane-changing controllers using RL and control theory for uncertain, parameter-varying AV dynamics.
- Integrated advanced sensor fusion (GPS, IMU, camera) on Nvidia Jetson AGX, ensuring robust lane-change decisions, safety mechanisms under cyberattacks.
- Demonstrated rapid learning and robust adaptation in high-fidelity simulations and scaled RC tests, effectively bridging RL-based lane-changing from theory to practice.

SERVICES

Journal Reviewer

- Automatica
- IEEE Transactions on Automatic Control
- IEEE Control Systems Letters
- IEEE Transactions on Control Systems Technology

Conference Reviewer

- IEEE American Control Conference
- IEEE Conference on Decision and Control
- Learning for Dynamics & Control Conference
- IEEE Intelligent Transportation Systems Conference

ACHIEVEMENTS

- **Excellence in Research Award 2019:** *Awarded for excellence in research by the Director of IIT Hyderabad.*
- **Chemistry Olympiad:** *Secured a 6th position out of 1000+ candidates in state ranking.*
- **Scholarships:** *Two times recipient of Oil India Limited Merit Scholarship 2011 & 2013.*
- **Regional Institute of Talent Search:** *Secured state rank 38 out of 1000+ candidates.*