

# Sayan Chakraborty

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## RESEARCH INTERESTS

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- ◇ 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

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### 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

## PUBLICATIONS

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### 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. [[Link](#)]
- ◇ 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. [[Link](#)]
- ★ 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. [[Link](#)]

### 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. [[Link](#)]
- ◇ 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. [[Link](#)]
- 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. [[Link](#)]
- 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. [[Link](#)]
- 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. [[Link](#)]
- ★ 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. [[Link](#)]
- ★ 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. [[Link](#)]

### 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

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

## WORK EXPERIENCE

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### 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

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

## PROJECTS

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### 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

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### 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