Sayan Chakraborty

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EDUCATION

New York University　　　　　　　　　　　　　　　　　　CAN Lab, NYU, New York
PhD Candidate, Dept. of Electrical & Computer Engineering　　　　　　　　*Fall 2021 – Present*

- Thesis Advisor: Prof. Zhong-Ping Jiang
- CGPA: 3.8/4

Indian Institute of Technology (IIT) Hyderabad　　　　　　　　　　Hyderabad, India
Master of Technology in Electrical Engineering (Systems & Control)　　　　*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

Journal Publications

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, 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.

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*, vol. 187, p. 103 026, 2024.

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.

Conference Publications

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, Itlay, 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, pp. 245–250.

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, pp. 7950–7955.

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.

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, pp. 1823–1828.

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, pp. 4215–4220.

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.

EXPERIENCE

Graduate Research Assistant   Fall 2021 – Present
New York University   *CAN Lab, NYU, New York*

- **Cyber-resilient learning-based optimal control for dynamic systems**
  * Developed data-driven frameworks to reconstruct lost measurements and ensure real-time robust control under cyber attacks, eliminating the need for full system models.
  * Unified reinforcement learning and small-gain theory to guarantee global asymptotic stability in uncertain or partially known systems under cyber attacks.
  * Developed an active learning-based control strategy leveraging switching systems theory and adaptive dynamic programming to adapt in real time to evolving cyber attack patterns.
  * Developed data-driven learning techniques to identify critical bounds on DoS attack duration and frequency from real-time data, safeguarding closed-loop performance under adversarial network conditions.

- **Safe autonomous driving**
  * Developed real-time, data-driven lane-changing controllers using adaptive dynamic programming and gain scheduling to handle uncertain, parameter-varying AV dynamics—all without requiring an accurate system model.
  * Developed real-time, data-driven lane-changing controllers using adaptive dynamic programming and gain scheduling to handle uncertain, parameter-varying AV dynamics—all without requiring an accurate system model.
  * Integrated advanced sensor fusion (GPS, IMU, camera) on an Nvidia Jetson AGX Xavier, enabling robust lane-change decisions and safety mechanisms (e.g., lane abortion) in both high-fidelity simulations (MATLAB, SUMO, NGSIM) and scaled experimental setups (RC cars).
  * Ensured resilience to cyber-adversaries (e.g., DoS attacks) by deriving attack duration bounds that guarantee closed-loop stability, showcasing safe lane changes even under network disruptions.
  * Demonstrated rapid learning and robust adaptation on scaled RC vehicles in sensor-rich, dynamic conditions, bridging RL-based lane-changing from theory to practice.

Summer Research Fellow   June 2023 – August 2023
ClearMotion, Billerica   *Massachusetts, USA*

- **XYZ safe motion planning for on-road autonomous vehicles**
  * Developed XYZ-motion planning for a full car model with active suspension by integrating perception data into the planning algorithm.
  * Implemented a two-phase nonlinear optimization algorithm using MATLAB and CasADi: first deriving an XY-path (based on road events), then generating a full XYZ-trajectory including vertical movement and speed optimization.
  * Validated the algorithm with extensive numerical analysis, using synthetic and real-world data to demonstrate practical efficacy.

TECHNICAL SKILLS

MATLAB, CasADi, SUMO, Python, Simulink, Maple, PyTorch, NumPy, scikit-learn, pandas, Arduino

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.*