Soovadeep Bakshi

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Summary

Senior staff planning and controls engineer in autonomy at Rivian with 6+ years delivering production-intent motion planning, vehicle control, and scene-understanding systems shipped across all Rivian platforms, enabling hands-free driving on **3.5 million+** miles of roads. Deep expertise across classical and optimal control, path/motion planning, and applied ML/AI, complemented by 20+ peer-reviewed publications in dynamic systems and control (widely cited — see Google Scholar).

Professional Experience

Rivian – Sr. Staff Engineer, Motion Planning (ML/AI), Autonomy

Palo Alto, CA (June 2020 – Present)

- Currently working on **post-training** and **guardrail design** for Rivian's **large driving model**
- Led multiple **zero-to-one** launches across the autonomy planning/control stack — lateral controller design, scene-understanding and lane-geometry engines, migration to in-house perception, and HD/standard-map integration — expanding hands-free availability to **3.5 million+ miles** of roads
- **Technical lead**: set architecture and roadmap, ran design and code reviews, and mentored on planning/controls and production-intent V&V
- Own scene understanding, scene fusion, motion planning, and trajectory optimization powering **L2 Universal Hands-Free**, **Automated Lane Change**, and **Intelligent Speed Assist** across all vehicle platforms
- Designed and shipped **lane-level localization** — a Bayesian filter fusing BEV lane topology, SD-map, and barrier cues with turn-signal intent to estimate lane count and ego-lane index with calibrated confidence
- Delivered in-house **L0/L1 safety features** (LKA, LDW, AEB, FCW) from prototype through production-intent validation
- Led lateral/longitudinal control design (PID, LQR, MPC, adaptive control) with prototyping and production-intent V&V on Gen 1 vehicles

Lyft Level 5 – Motion Controls (Hardware)

Palo Alto, CA (June 2019 – August 2019)

- Built a **high-fidelity vehicle model** for control design and closed-loop simulation; benchmarked against standard frameworks over specified trajectories
- Designed and tested a **steering-angle controller** on Level 5's autonomous fleet

Rivian – Powertrain / Self-Driving Controls (Intern)

San Jose, CA (May 2018 – August 2018)
Livonia, MI (May 2017 – August 2017)

- Integrated long-range and corner radar, ultrasonic, and driver-monitoring sensors; built **fault detection and tolerance monitors** for longitudinal and lateral actuation
- Built physics-based vehicle models and automated Simulink logging/replay frameworks for the real-time prototyping rig (**dSPACE MicroAutoBox-II**)

Education

- PhD/MS, Dynamic Systems and Control, **Mechanical Engineering** (August 2015 – May 2020)
  Graduate Portfolio in Applied Statistical Modeling, **Statistics and Data Sciences**
  The University of Texas at Austin
  GPA: **4.0/4.0**
- MS, **Computer Science** (January 2021 – August 2024)
  Georgia Institute of Technology
  GPA: **4.0/4.0**
- B.Tech., **Mechanical Engineering** (July 2011 – August 2015)
  Indian Institute of Technology Bombay, Mumbai, India
  GPA: **8.97/10.00**, Core GPA: **9.18/10.00**

Research

PhD Dissertation — On-Demand Planning of Autonomous Mobile Robots (Advisor: Prof. Dongmei Chen, UT Austin, 2020): fast task assignment for the prioritized **multi-AMR problem** via task-space clustering, **real-time** scheduling using **convex relaxations** and **reinforcement learning**, and **energy-optimal** trajectory/recharge planning.

MS Thesis — Modeling and Control of a Two-Piston Toroidal Blood Pump (Advisor: Prof. Raul G. Longoria, UT Austin, 2017): **multi-energetic hybrid model**, **model-based observer**, and **robust sliding-mode controller** for piston transition on the TORVAD^{TM} VAD, with an energy-optimal transition trajectory.

Technical Skills

Languages: C++, Python, MATLAB/Simulink • **ML**: PyTorch, TensorFlow • **Tools**: ControlDesk, Vector tools, CarMaker/CarSim, dSPACE MicroAutoBox-II
Domains: motion/path planning, optimal & model-predictive control, state estimation, sensor & scene fusion

Awards and Achievements

- **NSF award** for modeling and control of a roll-to-roll dry-transfer manufacturing process for 2D materials and printed electronics (2020)
- **Institute Technical Citation**, IIT Bombay (**top 0.7%** of graduating class) (2015)
- **Narotam Sekhsaria Foundation Excellence Award**, overall performance (1 in ∼5000) (2015)
- **Core Team Member, Formula Student UK**, IIT Bombay — led powertrain; built the team's **first electronic differential** (**+23%** acceleration, **-46%** weight); **first Indian team** to complete endurance at Formula Student with an EV (Silverstone) (2011–2015)

Selected Publications

20+ peer-reviewed publications and preprints; full list on Google Scholar.

Journal Articles

- Li, J., Li, S., **Bakshi, S.**, Xu, J., and Chen, D., 'Influence Functions for Data Attribution in System Identification and Linear Quadratic Regulator Control,' **ASME Lett. Dyn. Sys. Control** (2026)
- **Bakshi, S.**, Feng, T., Yan, Z., Ma, Z., and Chen, D., 'Energy-Conscientious Trajectory Planning for an Autonomous Mobile Robot in an Asymmetric Task Space,' **J. Int. Robot. Sys.** 101(18) (2021)
- **Bakshi, S.**, Feng, T., Chen, D., and Li, W., 'Real-Time Bradycardia Prediction in Preterm Infants using a Dynamic System Identification Approach,' **J. Eng. Sci. Med. Diag. Therapy** 3(1) (2020)
- **Bakshi, S.**, Feng, T., Yan, Z., and Chen, D., 'Fast Scheduling of Autonomous Mobile Robots under Task Space Constraints with Priorities,' **J. Dyn. Sys., Meas., Control** 141(7) (2019)
- **Bakshi, S.**, Yan, Z., Chen, D., Qian, Q., and Chen, Y., 'A Fast Algorithm on Minimum-Time Scheduling of an Autonomous Ground Vehicle Using a Traveling Salesman Framework,' **J. Dyn. Sys., Meas., Control** 140(12) (2018)

Conference Papers

- Li, J., Li, S., **Bakshi, S.**, Xu, J., and Chen, D., 'Stochastic Trajectory Influence Functions for LQR: Joint Sensitivity Through Dynamics and Noise Covariance,' **IEEE CDC** (2026)
- Li, J., **Bakshi, S.**, Chu, J., Li, S., and Chen, D., 'Auction-Based Task Allocation with Energy-Conscientious Trajectory Optimization for AMR Fleets,' **IEEE SMC** (2026)
- Li, J., Li, S., **Bakshi, S.**, Li, W., and Chen, D., 'VLM-in-the-Loop: A Plug-In Quality Assurance Module for ECG Digitization Pipelines,' **IEEE BIBM** (2026)
- Li, J., Li, S., **Bakshi, S.**, Li, W., and Chen, D., 'ECG-OOD-Trust: Auditing Cross-Dataset Generalization, Explanation Faithfulness, and Shortcut Leakage in 12-Lead ECG Models,' **IEEE BIBM** (2026)
- Chu, J., Huang, J., **Bakshi, S.**, Zhu, Y., Ohman, E., and Chen, D., 'Optimizing Energy Efficiency with Configuration Constraints for AMR Trajectory Planning,' **AACC ACC** (2024)
- Chu, J., Zhao, F., **Bakshi, S.**, Yan, Z., and Chen, D., 'Risk-Aware Path Planning with Uncertain Human Interactions,' **AACC ACC** (2021)
- **Bakshi, S.**, Feng, T., Yan, Z., and Chen, D., 'A Regularized Quadratic Programming Approach to Real-Time Scheduling of Autonomous Mobile Robots in a Prioritized Task Space,' **AACC ACC** (2019)
- Woo, S., Keller, A. M., Choudhry, W., Trakhtengerts, R., **Bakshi, S.**, Yan, Z., and Chen, D., 'A Development Platform for Real-Time Routing of an Autonomous Ground Vehicle to Complete Prioritized Tasks,' **AACC ACC** (2019)

Patents

Driver-assistance safety feature — U.S. provisional patent application, filed March 2026 (first-named inventor).

Review Experience

TPC member, IEEE International Automated Vehicle Validation Conference (2023 Austin, 2024 Pittsburgh). Reviewer for **100+ papers** across IEEE TIE, TCST, T-ASE, TMECH, JBHI, and L-CSS; ASME JDSMC and L-DSC; and the ACC, CDC, DSCC, and MECC conferences.