

Raj Deshmukh *PhD*

Staff Software Engineer at Plus

☎ 765-607-3957

🏠 South Bay Area, CA

🔗 Google Scholar link

🌐 rajdeshmukh1.github.io

✉ raj130294@gmail.com

🌐 /rajdeshmukh

WHAT I HAVE TO OFFER

- **4.5+ years** of industry experience in next-gen research and production intent **AD/ADAS** software
- Excellent project management, collaborative problem-solving, and programming skills
- Strong research and technical background demonstrated by **5 journal** publications, and **6 conference** publications with **165+ citations** and h-index of 8
- **Research interests:** Multi-modal sensor fusion, Multi-target detection and tracking, State estimation, Bayesian filtering, Deep learning, Probability and statistics, Physics/dynamics-based modeling, Smart automotive systems, Autonomous navigation, Network-based operations

WHAT I AM LOOKING FOR

- Opportunity to learn and apply emerging technologies
- Leading and mentoring a fast-paced engineering team with directed research involvement
- Opportunity for growth in a company impacting future mobility solutions with positive ethical stance

SKILLS

- Programming languages and scientific software: MATLAB, C++, Python, R, Simulink, SolidWorks
- Documentation and technical writing: L^AT_EX, MS Office, Polarion

EDUCATION

Purdue University, West Lafayette, IN

Ph.D., Aeronautics and Astronautics Engineering

2017 - 2020

Major: Dynamics and Control, *Minor:* Systems Engineering

Dissertation: Data-driven Learning for Anomaly & Precursor Detection in Metroplex Airspace Operations

Purdue University, West Lafayette, IN

M.S., Aeronautics and Astronautics Engineering

2015 - 2017

Major: Dynamics and Control, *Minor:* Systems Engineering

Thesis: Development of Optimal Kalman Consensus Filter and its Application to Distributed Hybrid State Estimation

Indian Institute of Technology Kharagpur, India

B.Tech. with Honors, Aerospace Engineering

2011 - 2015

Minor: Electronics & Electrical Communication Engineering

Graduated top of class with **University Silver Medal**

WORK EXPERIENCE

Plus, Santa Clara, CA

Research & Development

- **Staff Software Engineer, Scene Understanding** Nov 2024 - *present*
 - Development of multi-modal, multi-view end-to-end lane tracking models depending on camera, radar, and lidar sensing setups
 - Research and prototyping novel solutions that tackle long-tail of real-world problems in challenging and diverse scenarios to safely enable L4 autonomous driving

Aptiv, Troy, MI

Advanced Safety & User Experience

- **Senior Object Tracking Developer** Dec 2022 - Nov 2024
 - Spearheading research efforts to enhance all-round tracking in cluttered scenarios, implemented within automotive-grade processor requirements
 - Collaborating for ideation and development of ‘next gen’ AD/ADAS intended for ambitious automotive software needs of the next decade
 - Training and mentoring new developers and interns within Object Fusion team
 - Conducted industry-related quality assurance tests for ASPICE and MISRA compliance
- **Product Owner – Stellantis Platform Lines** Jan 2022 - Apr 2024
 - Delegating tasks within Object Tracker team – comprising 14 engineers and function owners – by defining and managing a product backlog based on resource constraints and business requirements
 - Primary point-of-contact for staging customers’ issues and requirements through triage, root-cause analysis, solution design, reviews, and final integration with Aptiv’s ADAS product
 - Leveraging support and coordination between management and technical teams within Aptiv’s Advanced Safety umbrella to ensure that production timelines are met for 2022-2025 Stellantis releases

RESEARCH PROJECTS

Aptiv, Troy, MI

Advanced Safety & User Experience

- **Stationary Object Tracking** Oct 2022 - Nov 2024
 - Researching and prototyping algorithms that generate driveable boundary using sensor inputs corresponding to non-driveable structures – guardrails, buildings, parked cars, etc.
- **Improving Target Vehicle and State Initialization** May 2021 - Aug 2021
 - Investigated into radars to leverage their underlying technology for tracking, subsequently reducing vehicle acquisition and stable state initialization times by half

Purdue University, West Lafayette, IN

Purdue Flight Dynamics & Control/Hybrid Systems Lab

- **Optimal State Estimation over a Network** Aug 2015 - Jan 2020
 - Addressed decade-long problem of suboptimality in Kalman consensus filtering utilized in sensor network theory and network fault detection
 - Developed optimal Kalman consensus filter applied to stochastic LTI and hybrid targets; applicable to fully-distributed state estimation for connected and autonomous vehicles
- **NASA Big Data Analytics Project** Nov 2017 - Sep 2019
 - Investigated data-driven methods to discover previously unknown safety threats within large, heterogeneous datasets representing operations of the National Airspace System
 - Designed machine learning-based anomaly detection and prognosis algorithms for operational and safety issues using real air traffic datasets recorded at LGA, JFK, and EWR airports in NY metroplex
 - Collaborated with Mosaic ATM and Honeywell Aerospace to develop a rapidly deployable, scalable, and versatile simulation environment, to enhance decision-making in air traffic management systems
- **NASA Next-Gen Concept Technology and Development Project** May 2016 - Oct 2017
 - Designed novel hierarchical supervised learning algorithm to generate conflict resolution strategies learned from flight plans and aircraft track data, collaborating with Optimal Synthesis Inc.
 - Emulated ATC's decision for more than 72% events and generated safe resolutions for 100% events
- **Relaxation of Min-max Strategies to Control Autonomous Vehicles** Jan 2016 - May 2016
 - Investigated a dynamically evolving balance between performance and safety of connected autonomous ground vehicles characterized by likelihood of collision, as a novel extension to conventional min-max navigation strategies

NOTABLE ARTICLES

Deshmukh, Raj, et al. "Distributed State Estimation for a Stochastic Linear Hybrid System over a Sensor Network." *IET Control Theory & Applications* 12.10 (2018): 1456-1464.

Deshmukh, Raj, and Inseok Hwang. "Incremental-Learning-Based Unsupervised Anomaly Detection Algorithm for Terminal Airspace Operations." *Journal of Aerospace Information Systems* (2019).

Deshmukh, Raj, et al. "Reactive Temporal Logic-Based Precursor Detection Algorithm for Terminal Airspace Operations." *Journal of Air Transportation* 28.4 (2020): 155-163.

Deshmukh, Raj, et al. "Temporal Logic Learning-based Anomaly Detection in Metroplex Terminal Airspace Operations." *Transportation Research Part C: Emerging Technologies* 126 (2021): 103036.

Deshmukh, Raj, and Inseok Hwang. "Anomaly Detection Using Temporal Logic Based Learning for Terminal Airspace Operations." *AIAA Scitech 2019 Forum* (Finalist for Best Student Paper).

Deshmukh, Raj, Dawei Sun, and Inseok Hwang. "Data-Driven Precursor Detection Algorithm for Terminal Airspace Operations." *FAA/Eurocontrol ATM Seminar 2019* (Best paper in Complexity track).

SCHOLASTIC HONORS

Best Paper in Complexity Track

Awarded at the 13th FAA/Eurocontrol ATM Seminar held in Vienna, Austria, for the paper titled 'Data-Driven Precursor Detection Algorithm for Terminal Airspace Operations'; subsequently invited and accepted for a journal publication in the Journal of Air Transportation.

University Silver Medal

Awarded University Silver Medal for graduating at the top of my undergraduate class

Jagadis Bose Scholar

Scholarship through Jagadis Bose National Science Talent Search, aimed to identify and nurture young talented STEM students in India with potential for leadership in innovation