

Rahul Moghe

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Education

The University of Texas at Austin

Aug '17 - May '21

PhD, Aerospace Engineering and Engineering Mechanics: *Control, Autonomy and Robotics*

GPA: 3.9/4.0

Advisors: Dr. Renato Zanetti & Dr. Maruthi Akella

Dissertation: Adaptive estimation of covariance matrices using differential geometric approaches

The University of Texas at Austin

'15 - '17

MSE, Mechanical Engineering: *Dynamics, Systems and Controls*

GPA: 3.88/4.0

Indian Institute of Technology Bombay

Jul '11 - '15

B.Tech., Mechanical Engineering with Honors

GPA: 8.44/10

Minors in Systems and Control Engineering

Professional Experience

Applied Scientist

Jun '21 - Ongoing

Amazon Scout, *Seattle, WA*

- Deployed production-grade planning and tracking algorithms on 100+ autonomous sidewalk delivery robots
- Implemented dynamic and static obstacle avoidance techniques for real-time planning under uncertainty
- Enhanced existing planning algorithms with paths generated using Reinforcement and Imitation learning
- Led cross-functional efforts with Perception and Mapping teams to improve key autonomy metrics
- Improved Hardware-in-the-loop testing for autonomous operations with unmodeled delays and uncertainties
- Triaged robot behavior during live operations and drove improvements by performing a root cause analysis

Applied Scientist Intern

Jun-Aug '20

Amazon Scout, *Seattle, WA*

- Developed an efficient algorithm to compute allowable speed limits for the robot in a perceived environment
- Implemented code on the robot which resulted in smoother robot navigation in production

Robotics Intern

Jun-Sep '19

Schlumberger-Doll Research Center, *Cambridge, MA*

- Developed state estimation algorithms to predict control failures based on experimental time series data
- Containerized Simulink models into a microservice architecture and deployed it on the physical system
- Tested least squares and dynamics estimators for parameter estimation on physically collected data

Skills

C++, Python, Simulink, SQL, ROS, Cython, Tensorflow, MATLAB, LabVIEW

Notable Publications

- **R. Moghe** and M. Akella, 'Projection Scheme and Adaptive Control for Symmetric Matrices with Eigenvalue Bounds,' in **IEEE Transactions on Automatic Control**, doi: 10.1109/TAC.2022.3153458
- **R. Moghe**, R. Zanetti and M. Akella, 'Adaptive Kalman Filter for Detectable Linear Time-Invariant Systems', **Journal of Guidance, Control, and Dynamics**, doi: 10.2514/1.G004359
- **R. Moghe** and R. Zanetti, 'A Deep learning approach to Hazard detection for Autonomous Lunar landing,' **The Journal of the Astronautical Sciences**, doi: 10.1007/s40295-020-00239-8
- **R. Moghe** and R. Zanetti, 'On-line hazard detection algorithm for precision lunar landing using semantic segmentation', **AIAA SciTech Conference**, 2020.
- M. Almeida, **R. Moghe** and M. Akella, 'Real-Time Minimum Snap Trajectory Generation for Quadcopters: Algorithm Speed-up Through Machine Learning', **IEEE Int. Conf. on Robotics & Automation**, 2019.
- **R. Moghe**, R. Zanetti and M. Akella, 'Covariance Matching filter for IMU error estimation', **AAS/AIAA Astrodynamics Specialist Conference**, 2018.
- **R. Moghe**, R. Zanetti and M. Akella, 'Covariance Matching Kalman filter for observable LTI systems', **IEEE Conference on Decision and Control**, 2018.

Key Research Projects

- Robot Soccer competition with Aldebaran Nao robots
- NASA Space robotics challenge: Created locomotion planner for Valkyrie robot in simulation
- Mixed-Integer Convex Optimization for optimal sensor alignment for surveillance
- Variable Structure and Fuzzy controller on a double inverted pendulum

Relevant Courses

Optimal Control Theory	Nonlinear & Adaptive Control	Advanced Topics in Estimation Theory
Convex Optimization	Neural Networks for Control	Verification/Synthesis of Cyberphysical Systems