# Rahul Moghe

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## Education

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| **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**
Graduate Portfolio Program in Robotics
Advisors: Dr. Renato Zanetti & Dr. Maruthi Akella
Dissertation: Adaptive estimation of covariance matrices using differential geometric approaches

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| **The University of Texas at Austin** | '15 - '17 |

MSE, Mechanical Engineering: *Dynamics, Systems and Controls* **GPA: 3.88/4.0**

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| **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 Intern** Jun-Aug '20
Amazon, *Seattle, WA*
- Developed efficient collision detection and avoidance algorithms
- Calculated speed limits for the path and motion planners to enable safe and fast navigation
- Deployed the algorithm to the fleet of robots which resulted in faster deliveries

**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

## Publications

- **R. Moghe**, R. Zanetti and M. Akella, 'Adaptive Kalman Filter for Detectable Linear Time-Invariant Systems', **Journal of Guidance, Control, and Dynamics**, 42(10):2019, doi:10.2514/1.G004359
- **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.

## Research Projects

**Robot Soccer for Aldebaran Nao Robot: Robotics Course Project** Aug '18
- Implemented Extended Kalman filters and Particle filters for localization using camera based object detection
- Stood $4^{th}$ out of 10 teams in the penalty shootout competition on a miniature soccer field
- Tested complete coverage D* path planning algorithm with landmark weighted paths on the robot

**Variable Structure and Fuzzy Inference control on a double inverted pendulum** May '16
- Implemented a hybrid unstable energy-based controller for stabilizing the inverted pendulum
- Tested the controller on the double inverted in LabVIEW with NI CRIO Module
- Designed an Adaptive Neuro-Fuzzy Inference System (ANFIS) to control the system at its unstable position

## Skills

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

## Relevant Courses

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

## Positions, Awards & Achievements

- Graduate Research Assistant at ReNeu Robotics Lab, NEAR lab, and C-DUS Lab, UT Austin  '16 - '19
- Travel Award, IEEE Conference of Decision and Control  '18
- Professional Development Award, Cockrell School of Engineering, UT Austin  '18
- Graduate Teaching Assistant, Mechatronics Lab, UT Austin  '15 - '16