PRATHAMESH SARAF

psaraf@ucsd.edu | +1-(619)-953-8290 | Website | Google Scholar | Github | LinkedIn | La Jolla, CA

EDUCATION

University of California, San Diego — San Diego, USA
MS in Electrical & Computer Engineering (Intelligent Systems, Robotics, & Controls) — *Expected 2024*
Courses: Robot Motion Planning, Sensing & Estimation, Linear Algebra, Non-Linear Controls,
Convex Optimization, Co-operative Control of Multi-Agent Systems

Birla Institute of Technology & Science, Pilani — Hyderabad, India
B.E. Electronics & Instrumentation; Minor in Robotics & Automation — *2017-2021*
Courses: Modern Control Systems, Control Systems, AI for Robotics, Robotics

SKILLS

Software & Tools: MATLAB, Simulink, Gazebo, Webots, PyBullet, MuJoCo, Solidworks, Fusion 360, AUTOCAD, Solidworks Electrical, DraftSight, Git
Programming Languages/Frameworks: ROS, Python, C/ C++, HTML, Verilog

EXPERIENCE

Dynamics and Controls Intern, **N Robotics GmbH** — *May 2023 - Present*
- Building a biped robot from scratch and designing its gait patterns, state estimator, and whole-body model predictive controller. Simulations are carried out using the ROS-PyBullet framework.

Research Assistant, **Stochastic Robotics Lab, Indian Institute of Science** — *June 2021 - May 2022*
- Led a team of 4 in the development of velocity-based gait transitions, a state estimator, and a whole-body impulse control + model predictive controller, thereby increasing the stability of the 'Stoch' quadruped robot.
- Verified and optimized controllers using the OROCOS framework and ROS-Gazebo simulation, and presented our results to a space organization, paving the way for future collaboration. [project]

Research Intern, **Multi-Agent Robotic Motion Lab, National University Singapore** — *Jan 2021 - Nov 2021*
- Developed an inexpensive cost function using a gradient descent analysis of the ground reaction forces to obtain the required body pose, thus empowering stable multi-terrain hexapod robot locomotion.
- Increased the robot's stability by ~40% in PyBullet and Webots environment. [project]

SELECTED PROJECTS

Mobile Robot SLAM | *Python* — *Jan 2023 - Mar 2023*
- Generated panoramic images of robot surroundings by optimizing quaternion trajectories via gradient descent.
- Constructed 2D occupancy grid maps of environments using Particle Filter SLAM via encoder and IMU odometry, 2D LiDAR scans, and RGBD measurements for texture map creation.
- Developed visual-inertial SLAM algorithm by synchronizing IMU and stereo camera measurements and incorporating Extended Kalman Filter based on stereo-camera observations. [project]

Articulated Robotic Manipulators: Modeling, Simulation & Control | *MATLAB, ROS* — *Sept 2020 - June 2021*
- Formulated a simplified and efficient Lagrange-Euler dynamic model requiring 30% fewer tunable parameters.
- Improved the accuracy of a KUKA IIWA LBR7 manipulator by 15%, with 90% less overshoot and 20% faster response using an impedance controller compared to optimal control in MATLAB & ROS environment. [project]
- Publication: *Implementation and Testing of Force Control on a Spherical Articulated Manipulator*, IEEE ICMA'22

OTHER PUBLICATIONS / PROJECT REPORTS

1. **P. Saraf**, "Traffic Wave Dampening using Autonomous Vehicles," Project Report MAE 247 [project]
2. **P. Saraf**, M. Shaikh, M. Phan, "*Convex Optimization in Legged Robots*," Project Report MAE 227
3. **P. Saraf**, A. Sarkar, A. Javed, "*Terrain Adaptive Gait Transitioning for a Quadruped Robot using Model Predictive Control*," IEEE International Conference on Automation and Control (ICAC), 2021 [project]
4. **P. Saraf**, et al, "*Onboard Electrical, Electronics, and Pose Estimation System for Hyperloop Pod Design*," IEEE 7th International Conference on Control, Automation and Robotics (ICCAR), 2021 [project]
5. **P. Saraf**, R. N. Ponnalagu, "*Modeling and Simulation of a Point-to-Point Spherical Articulated Manipulator Using Optimal Control*," IEEE International Conference on Automation, Robotics, and Applications (ICARA), 2021
6. **P. Saraf**, M. Gupta, and A.M. Parimi, *"A Comparative Study Between a Classical and Optimal Controller for a Quadrotor,"* IEEE 17th India Council International Conference (INDICON), 2020
7. A. Agnihotri, **P. Saraf**, and K.R. Bapnad, "*A Convolutional Neural Network Approach Towards Self-Driving Cars*," IEEE 16th India Council International Conference (INDICON), 2019 [project]

TEACHING / LEADERSHIP

- **Bollywood Dance and Art Instructor,** UCSD Recreation — *Jan 2023 - Present*
- **Electrical Subsystem Lead,** Hyperloop India, BITS Pilani — *Aug 2019 - Oct 2020*
- **Treasurer,** Phoenix - Electronics Association, BITS Pilani — *June 2019 - May 2020*
- **Teaching Assistant** - Control Systems Laboratory, BITS Pilani — *Jan 2020 - May 2020*
- **Joint Secretary**, Shades - Fine Arts Club, BITS Pilani — *June 2018 - May 2019*
- **Robotics Mentor** - Student Mentorship Program, BITS Pilani — *Aug 2019 - Dec 2019*