Resume

Sharath Matada

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Summary

Robotics researcher and engineer working at the intersection of machine learning and motion planning/control. ICLR 2025 co-first author on generalizable, learning-based motion planning; also ship production robotics — real-time collision avoidance and surgical-grade control on deployed hardware.

Education

- **University of California, San Diego** — La Jolla, United States of America
  Master of Science - Mechanical and Aerospace Engineering(Robotics) — *Sep, 2022 - Aug, 2024*
  Relevant Coursework:
  ECE276A: Sensing and Estimation in Robotics, ECE276B: Planning and Learning in Robotics, ECE271A: Statistical Learning
- **National Institute of Technology, Karnataka(NITK)** — Surathkal, India
  Bachelor of Technology - Mechanical Engineering — *Aug, 2014 - May, 2018*

Publications

- **Generalizable Motion Planning via Operator Learning**
  International Conference on Learning Representations(ICLR), 2025
  Sharath Matada*, Luke Bhan*, Yuanyuan Shi, Nikolay Atanasov
  arXiv — Website — Github

Skills Summary

- **Robotics:** Kalman Filter, Motion Planning(A*, RRT, RRT*, RRT-Connect, EST), Optimal Control, RL
- **Machine Learning:** JAX, PyTorch, Numpy, Kubernetes
- **Programming Languages:** Python,C, C++
- **Simulation:** CoppeliaSim, MuJoCo, PyBullet, RViz, Gazebo
- **CAD:** Creo, Solidworks
- **Others:** Linux, Arduino, Raspberry Pi, MATLAB, Labview, Git, ROS2, MS Office

Experience

- **Senior Engineer, Horizon Surgical Systems, Inc.**
  Oct 2024 - Current
  - Engineered and deployed **real-time collision avoidance** at **200 Hz** for surgical subsystems, enforcing safe instrument–imaging system separation during tele-operation and autonomous motion planning.
  - Built **motion planning modules** generating collision-free trajectories for surgical manipulators in confined workspaces, with **cubic-spline post-processing** enforcing joint velocity and acceleration limits for dynamically feasible motion.
  - Developed a **high-fidelity physics simulation** of the patient-side cart and surgeon console, parameterized from **CAD kinematics and inertial properties**, enabling algorithm validation, regression testing, and edge-case reproduction without hardware time.
  - Architected **automated calibration data-collection pipelines** capturing **500+ poses in 20 minutes**, enabling on-site calibration in place of manual test procedures.
  - Identified and deployed **calibrated kinematic models** across robotic subsystems, driving end-effector positioning error **below 100 microns** for surgical-grade accuracy.
  - Drove hardware design of manipulator subsystems through **Cartesian stiffness and dynamic analysis**, informing structural and actuator sizing decisions.
- **Graduate Research Assistant, Existential Robotics Lab**
  Jul 2023 - Oct 2024, Advisor: Prof. Nikolay Atanasov, Associate Professor
  - Developed a novel learning-based motion planning framework using **neural operators**, enabling robust generalization to previously unseen environments by mapping **environment representations** to **value functions** on the fly.
  - Developed neural operator architectures that generate **ϵ-consistent** heuristic functions to boost the efficiency of search-based motion planning algorithms like A* to achieve close to optimal paths on large real-world maps
  - Co-led authorship on a research paper detailing this approach, currently accepted for publication at ICLR 2025
- **Senior Robotics Engineer, Systemantics India Pvt. Ltd**
  Jun 2018 - Aug 2022
  - **Motion Control**
    - Designed feedback controller and modeled friction, inertial and gravity effects for a robotic manipulator
    - Reduced visible vibrations using flexible joint control with full-state feedback
  - **Robot Kinematics and Dynamics**
    - Optimized kinematic architectures of hybrid mechanisms (combination of serial and parallel linkages) for maximum dexterity and minimum inertial load on each joint
    - Characterized the effect of joint elasticity coupled with parallel mechanisms on robot performance in task space