SHARACHCHANDRA BHAT

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EDUCATION

Master of Electrical and Computer Engineering, UT Austin — 2021 - 2023 (Expected)
Graduate Portfolio Program in Robotics
GPA: 3.87/4

Master of Automotive Engineering, IIT Madras — 2017 - 2018
Bachelor of Engineering Design, IIT Madras — 2013 - 2017
Minor in Environmental Engineering
GPA: 8.93/10 (Top 5 in Department)
Awarded the KVPY national research fellowship in 2013

SKILLS AND COURSEWORK

Coursework Statistical Machine Learning, Probabilistic Robotics, Reinforcement Learning, Data Mining, Formal Verification, Robot Learning, Convex Optimization, Mechanics of Robot Manipulators

Skills C++, Python, PyTorch, C, MATLAB, Mathematica, Javascript, ROS, Git

ACADEMIC RESEARCH

Robust task-aware representation learning. *Autonomous Robots 2023* (Under Review)
Large image compression gains can be obtained by focusing on downstream task performance at the cost of **interpretability**. Showed that this trade-off can be balanced by **adversarial training** an encoder-decoder network to give similarly high compression while providing human-interpretable reconstruction.

Towards formal verification of networked robotics. *RSS 2023* (In Progress)
Developed a shield that provides **probabilistic safety guarantees** for a remotely controlled robot in the presence of stochastic network delays. The shield monitors the network latency and overrides control commands if necessary to ensure **LTL** safety specifications are satisfied by the robot.

Real-time correlative scan matching using CNNs. Trained a neural network regression model to achieve faster **point-cloud registration** of rasterized 2-D Lidar scans with comparable accuracy to search-based methods.

Mobile robot navigation. Implemented a full autonomous stack to run on an F1/10th car in a mapped environment: global navigation via Jump Point Search A*, localization via **Particle Filters**, obstacle avoidance via Path Scoring, and local navigation via Optimal Control.

Imitation learning with transformer policy for robot manipulation. Evaluated the effects of transformer design choices like cross-modal attention, featurizer networks, and input sequence size on task performance.

PROFESSIONAL EXPERIENCE

Robotics Engineer — Jul 2018 - Jul 2021
Systemantics India Pvt Ltd — *Bengaluru, India*
C, C++, MATLAB, Mathematica, ROS, Git

- *Motion Planning.* Improved trajectory smoothness using a real-time closed-form jerk-limited **trajectory generation** algorithm. Developed a **path-blending** algorithm with quaternion spline interpolation that provides higher-order continuity for arbitrary curves in both rotation and translation space.
- *Robot Kinematics and Dynamics.* Developed an efficient control algorithm for a novel 6DOF hybrid manipulator by deriving a closed-form solution to the forward and inverse kinematics and dynamics problems. Designed a **robot singularity avoidance** algorithm to navigate safely through the workspace.
- *Motion Control.* Implemented low-level **robot axes controllers** with dynamic load and friction compensation. Achieved robust control performance via system identification and gain scheduling.