

SHRUTHEESH RAMAN IYER

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EDUCATION

University of California, San Diego (UCSD) SEP 2021 – JUN 2023

M.S. in Computer Science & Engineering | GPA: 4.0/4.0

Thesis: Improvisational Robot Tool Use using Affordance based Planning. *Advisor:* [Henrik I Christensen](#)

R.V. College of Engineering, Bangalore (RVCE) AUG 2016 – AUG 2020

Bachelor of Engineering in Computer Science & Engineering | CGPA : 9.6/10.0

RESEARCH & PROFESSIONAL EXPERIENCE

Aurora Inc.

Perception Software Engineer (Intern Previously)

Long-range Lidar Detection

JUL 2023 – PRESENT | JUN 2022 – SEP 2022

- [Aurora Innovation](#) is a self-driving organization primarily focused on developing autonomous trucking solutions
- Primarily working on long-range lidar 3D object detection for the autonomy stack
- Implemented and tested latest research ideas in lidar-based 3D detection, in addition to developing novel ideas to improve the capabilities
- Responsibilities include maintaining the quality of datasets, improving detector capabilities, and developing visualization
- Evaluated the performance of the full autonomy system on ground through autonomous rides in Texas
- Skills used: 3D Object Detection, Lidar Processing, PyTorch, Python, C++, CUDA

Cognitive Robotics Lab, Contextual Robotics Institute, UCSD

Improvisational Robot Tool Use using Affordance Planning | Advisor: [Henrik I. Christensen](#) OCT 2021 – JUN 2023

- **Master's thesis** (available at [Proquest](#)): Created an affordance-based task-planning framework for creative robot tool use, by encoding states and actions with physics-based semantics
- Modeled robot-tool-object interactions to provide an abstraction layer to interface with Planning Domain Definition Language (PDDL) like problem domains
- Developed a simple backward-chaining task planner to exploit the semantics abstraction layer to provide more constraints for motion planning and evaluating tool-fit for tasks
- Implemented atomic actions (e.g. grasping, pushing) on the Fetch Robot using C++, Python, ROS, and MoveIt and orchestrated control using Behavior Trees

Experience-based Constrained Motion Planning | Advisor: [Henrik I. Christensen](#) MAY 2023 – MAY 2024

- Developed an experience-based Task and Motion planning in foliated manifolds, presented at [Robotics Science and Systems \(RSS\) 2024](#) as a co-first author
- By encoding prior motion planning experience in an abstract repetition roadmap, the framework demonstrates state-of-the-art results in various manipulation problems such as navigating a maze, and opening doors and cabinets
- Headed the effort towards abstract encoding of states into a Gaussian Mixture Model for partitioning the robot space, and to the execution and benchmarking of results

Home Robot | Advisor: [Henrik I. Christensen](#)

JAN 2023 – MAY 2024

- Primary researcher in a collaborative project in developing a home-robot to integrate different capabilities of a robot such as constrained manipulation, navigation, and common-sense reasoning to tidy a house
- Worked on task planning with behavior trees, system integration of modules, and conducting real-world tests and simulations
- Presented the work at the [International Robotics Conference \(IRC\), 2023](#)

Robert Bosch Centre for Cyber-Physical Systems, Indian Institute of Science

Intern & Technical Associate

Teleoperation of Humanoid Robot | Advisor : Bharadwaj Amrutur, Raghu Krishnapuram

APR 2020 – JAN 2021

- Research project to develop a teleoperated humanoid robotic nurse as part of ANA Xprize Avatar challenge which aims to deploy real-time senses in remote environments. <https://aham-avatar.org>
- Worked on tracking human arm movements on the robot using optical trackers and VR technology
- Developed an in-house data glove with finger tracking and haptic feedback for hand teleoperation
- Project was done in collaboration with Hanson Robotics and Tata Consultancy Services R&D

Visual Odometry aided Autonomous Parking | Advisor: Raghu Krishnapuram

OCT 2019 – APR 2021

- Research project to explore the challenges and applications of Visual Odometry
- Compared learning-based feature extractors and traditional features for indoor and outdoor navigation tasks, and developed a data pipeline for synchronized collection of navigation information
- Used research findings to develop an autonomous parking system using the appropriate feature encoder using visual odometry

Indian Institute of Management, Bengaluru

Part-time Research Assistant

Analysis of financial filings | Advisor : Srinivasan Rangan

AUG 2020 – FEB 2021

- Built a Natural Language Processing (NLP) pipeline to extract textual and numeric data from public financial filings of firms for an academic project that seeks to develop a new measure of Disclosure Quality for predicting firm performance
- Implemented large-scale web-scraping tools and compared traditional NLP methods like n-gram analysis with learned techniques such as LSTM

LightMetrics Pvt. Ltd.

Research Intern

Neural Network Pruning & Automatic Report Generation

MAY 2019 – AUG 2019 | JUN 2018 – JUL 2018

- Compared the performance of various techniques for compressing neural networks for real-time performance on edge computing by implementing filter-based and activation-based pruning algorithms
- Evaluated their performance regarding the speed, accuracy, and size of the neural networks. Achieved 6× speed-up and 12× size reduction with no significant decrease in accuracy for object detection

PUBLICATIONS

- [1] J. Hu*, S. R. Iyer*, J. Wong, and H. I. Christensen. Motion planning in foliated manifolds using repetition roadmap. In *Robotics Science and Systems (RSS)*, Delft, Netherlands, July 2024. URL: <https://www.roboticsproceedings.org/rss20/p036.pdf>.
- [2] S. R. Iyer, A. Pal, J. Hu, A. Adeleye, A. Aggarwal, and H. I. Christensen. Household navigation and manipulation for everyday object rearrangement tasks. In *International Conference on Robotic Computing (IRC)*. IEEE, Dec. 2023. URL: <https://arxiv.org/pdf/2312.06129>.
- [3] S. R. Iyer. *Improvisational Robot Tool Use using Affordance based Planning*. Master's thesis, UC San Diego, 2023. Available at <https://escholarship.org/uc/item/8622p2rs>.
- [4] S. R. Iyer, V. P. Kuruvilla, R. Krishnapuram, and P. Bhamidipati. Deep-feature-based visual odometry for autonomous emergency parking. In *Proceedings of the 2023 6th International Conference on Advances in Robotics*, pages 1–6, July 2023.
- [5] P. R. Iyer, S. R. Iyer, R. Ramesh, M. Anala, and K. Subramanya. Adaptive real time traffic prediction using deep neural networks. *IAES International Journal of Artificial Intelligence*, 2019.

TEACHING EXPERIENCE

Computer Vision I

Sep 2022 – Dec 2022

CSE, UCSD

UNDER PROF. BEN OCHOA

- Teaching Assistant for a graduate-level Computer Vision course - [CSE252A](#) - Computer Vision I
- Responsibilities include grading assignments, holding office hours, and setting tests

Beyond Relational Data Models

Sep 2021 – Dec 2021

DSE, UCSD

UNDER PROF. ALIN DEUTSCH

- Teaching Assistant for a graduate-level Database course - [DSE250](#) - Beyond Relational Data Models
- Responsibilities include grading assignments and holding office hours

Introduction to Statistics

Psychology, UCSD

Jan 2022 – Jun 2022 | Jan 2023 – Jun 2023

UNDER PROF. ERIC STEINER AND FRED ROSE

- Teaching Assistant for an undergraduate level course for the psychology department - PSYC60 - Introduction to Statistics
- Responsibilities include - grading assignments and tests, holding office hours, and setting tests

PROJECTS

3D Reconstruction using Simultaneous Localization and Mapping (SLAM)

Mar 2022 – June 2022

- In a team of 3, developed an end-to-end VR application for 3D reconstruction and VR rendering of archaeological sites with an inertial RGBD camera using SLAM. Code available at [Github](#)
- Primarily contributed to the development and interface of SLAM to obtain 6D pose trajectory
- Implemented using C++, Python, ROS, Unity and Docker; as part of Embedded Systems course CSE237D

Extended Kalman Filter and Particle Filter for SLAM

Jan 2022 – Mar 2022

- Implemented Visual Inertial SLAM using Extended Kalman Filter (EKF), and Particle Filter (2 independent projects)
- EKF implemented using stereo camera observation model, and IMU measurement model to localize the autonomous robot
- Using Particle Filter, built a 2D occupancy grid map using laser correlation observation model, and differential drive odometry. Performed texture mapping using RGB information

Project Jatayu, RVCE

Team Lead

Unmanned Aerial Vehicles with Project Jatayu

AUG 2017 – AUG 2020

- Created drones with Project Jatayu, the flagship autonomous unmanned aerial vehicle (UAV) team of the RVCE
- Enabled perception in noisy and poorly-lit environments by developing image and video processing protocols for drone footage, and designed communication pipelines
- Led the team in the AUVSI Student Unmanned Aerial Systems Competition 2019 (SUAS 2019), Maryland, USA

SKILLS

- *General Programming:* Python, C/C++, R, MATLAB
- *Software/Tools:* ROS, PyTorch, Moveit, CoppeliaSim, Bullet, PCL, OpenCV, Git, Tensorflow
- *Robotics Hardware:* Experience with Fetch Robot, Raspberry Pi, Arduino, Pixhawk, Yaskawa Motomini

EXTRACURRICULAR ACTIVITIES & OUTREACH

RoboGrads, UCSD

JAN 2022 – PRESENT

Academic Chair

- Member and later academic chair of RoboGrads, a graduate student organization for robotics students at UCSD
- Hosted high-school visits, demos, social events, and biweekly talks on recent developments in robotics by students and industry

Volunteer Judge, FIRST Challenge

MAR 2023

- Volunteered to serve as a judge for the San Diego chapter of the high-school robotics FIRST tech challenge.
- Interacted with and evaluated 30+ teams participating in the competition
- Invited and hosted the finalists' teams to tour our robotics lab at UC San Diego

Project Jatayu, RVCE

AUG 2017 – AUG 2020

Team Lead

- Successfully planned and constructed custom unmanned aerial vehicles for autonomous tasks
- Successfully led a team of over 30 members at the AUVSI Student Unmanned Aerial Systems Competition 2019 (SUAS 2019), held in Maryland, USA, where we were ranked 27th rank among 75 participating teams

RV QuizCorp, RVCE

AUG 2016 – AUG 2020

Coordinator

- Host and organizer of Under The Peepal Tree (UTPT) in 2018, 2019 & 2020, one of Asia's largest quiz festivals
- Organized and participated in inter and intra-college quizzes with 100+ participants