

PRAHAR M. BHATT

RESEARCH INTEREST

Artificial Intelligence, Computational Geometry, Computer Vision, Motion Planning, Machine Learning, Optimization, and Robotics

EDUCATION

University of Southern California, CA, USA <i>Doctor of Philosophy (Ph.D.), Mechanical Engineering</i> <i>Dissertation Title - Process Planning for Robotic Additive Manufacturing</i>	December 2021 GPA: 4.00/4.00
University of Illinois at Urbana-Champaign, IL, USA <i>Masters of Science, Aerospace, Aeronautical, and Astronautical Engineering</i>	December 2017 GPA: 3.87/4.00
Nirma University, Ahmedabad, India <i>Bachelor of Technology, Mechanical Engineering</i>	May 2016 GPA: 8.69/10.00

EXPERIENCE

Divergent Technologies Inc. - <i>Software Engineering Manager, Robotic Assembly</i> - <i>Senior Software Developer, Robotics & Motion Planning</i> - <i>Motion Planning Intern</i>	March 2023 - Present January 2022 - March 2023 May 2020 - August 2020
<ul style="list-style-type: none">Managed a team of 2 software engineers researching and developing novel software for robot task and motion planningSolved complex and challenging planning problems using search and optimization for robotic advanced manufacturingDelivered multiple software products and new features to automate the manufacturing process utilizing industrial robots	
Bosch Rexroth (India) Ltd - <i>Project Intern</i>	May 2015 - July 2015

SKILLS

Programming Languages - C#, C++, HTML, Java, JavaScript, MATLAB, Python, TypeScript, Visual Basic

Robot Programming - ABB RAPID, Epson RC+, Kuka Sunrise, UR Polyscope, Yaskawa INFORM II

Frameworks & Libraries - Angular, Docker, KDL, MoveIt2, NetworkX, NLOpt, NX-Open, OMPL, Open CASCADE, OpenCV, PCL, RL, Scikit-learn, Tecnomatix.NET, Temporal, TensorFlow, Three.js

Tools - ANSYS, Blender, CATIA, Confluence, Git, Jira, LabVIEW, NX, Process Simulate, PTC Creo, ROS2, SolidWorks, Webots

Courses - Foundations of Manufacturing Automation, Machine Learning and Computational Physics, Mechatronic Systems Engineering

RESEARCH PROJECTS

Robot Motion Planning and Optimization - <i>Center for Advanced Manufacturing, University of Southern California</i> <ul style="list-style-type: none">Realized a search-based tool-path planner for robotic manipulators by incorporating tool contact considerationsDesigned an automated redundant robotic manipulator calibration system using non-linear optimization frameworkBuilt a sequential optimization-based path contained trajectory planner for redundant robotic manipulatorsDeveloped a multi-robot path planner using non-planar slicing for performing supportless and conformal additive manufacturing	
Machine Learning and Computer Vision - <i>Center for Advanced Manufacturing, University of Southern California</i> <ul style="list-style-type: none">Designed an artificial neural network architecture to compensate robot controller errors for high accuracy trajectory trackingDeveloped an unsupervised learning framework to detect anomalies in the point cloud data of robotic weldingModeled process parameters for robotic additive manufacturing using Gaussian process regressionClassified different deep learning approaches like convolutional neural networks for image-based surface defect detectionPerformed online refinement of grasp plan using haptic and vision feedback control loop and a sim-to-real approach	
Setup Planning and System Design - <i>Center for Advanced Manufacturing, University of Southern California</i> <ul style="list-style-type: none">Developed a search-based robot base placement algorithm to meet the task reachability under kinematic and dynamic constraintsCreated multi-robot cells for performing sheet lamination, material extrusion additive manufacturing, and surface finishingDesigned and manufactured a robotic bird by using a multi-robot cell and performed numerous flight experiments	

SELECTED PUBLICATIONS (full list consisting of 12 journal and 19 conference publications on website)

- Optimizing Part Placement for Improving Accuracy of Robot-Based Additive Manufacturing. *IEEE International Conference on Robotics and Automation, 2021*
- Image-based Surface Defect Detection Using Deep Learning: A Review. *ASME Journal of Computing and Information Science in Engineering, 2020*
- Incorporating Tool Contact Considerations in Tool-Path Planning for Robotic Operations. *ASME Manufacturing Science and Engineering Conference, 2020*
- Context-Dependent Compensation Scheme to Reduce Trajectory Execution Errors for Industrial Manipulators. *IEEE International Conference on Robotics and Automation, 2019*
- A Robotic Cell for Multi-Resolution Additive Manufacturing. *IEEE International Conference on Robotics and Automation, 2019*

AWARDS

Society of Manufacturing Engineers - <i>Thirty Under 30 Honoree</i>	September 2023
ASME Computer & Information Engineering Division - <i>Best Dissertation Award</i>	August 2023
University of Southern California - <i>Best Research Assistant Award</i>	May 2022
ASME MSEC 2021 - <i>Best Paper Finalist (2nd Place) and NSF Student Support Award</i>	June 2021
University of Southern California, Viterbi Graduate School - <i>Ph.D. Fellowship Award 2018-19</i>	August 2018

REFERENCE

Satyandra K. Gupta - *Director, Center for Advanced Manufacturing, University of Southern California* **guptask@usc.edu**