omey-manyar.com | manyar@usc.edu | linkedin.com/in/omey-manyar | Google Scholar

Research Interests

Robotic Manipulation; Perception; Motion Planning; Imitation Learning; Physics-Informed Learning; Reinforcement Learning; Physics-based Simulation

Education

University of Southern California Ph.D. in Mechanical Engineering (Robotics)	May 2021 – May 2025 (Expected) Los Angeles, CA
University of Southern California Master of Science in Mechanical Engineering	Aug. 2019 – May 2021 Los Angeles, CA
National Institute of Technology Karnataka Bachelor of Technology in Mechanical Engineering	Jul. 2012 – May 2016 Surathkal, India
Experience	
 Robotics Research Intern Toyota Research Institute Worked on Visual Place Recognition task with RGB-D images for Trained a ResNet style model that predicts goal pose for navigation 	May 2024 – Aug. 2024 Los Altos, CA an indoor grocery picking robot on given a query target image
 Graduate Research Assistant Advisor: Dr. S. K. Gupta. Realization of Robotics Systems Lab, USC Developed a self-supervised GNN-based physics-informed learning object dynamics for safe manipulation. Augmented small scale rea Devised an inverse reinforcement learning-based methodology to n for sequential planning problems for an autonomous agent 	Jan 2020 – Present Los Angeles, CA methodology for identification of compliant al data with synthetic data generated in Mujoco model expert behavior from sparse demonstrations
 Developed a LSTM (GRU)-based multi-modal model that fused vision anomaly detection. Validated the framework on a real-world set of the provided of the provided set of the provided set of the provided of the provided set of the provided s	ision and wrench data for object state estimation crewdriving task ges for training a ResNet-50-based segmentation t mAP of 0.98. Link: code and dataset
Applied Science Intern Amazon Robotics	$\begin{array}{llllllllllllllllllllllllllllllllllll$
 Implemented a 3D pose estimation feature of heterogeneous object manipulation team (Link) Trained a Vision Transformer-based model for effective feature ma Perspective-n-Point with RANSAC algorithm for accurate pose estimations. 	ts placed in cluttered bins as a part of stow atching and subsequently employing the timation
 Robotics & Automation Technologist Rolls-Royce Plc. Spearheaded the deployment of an AI-based smart predictive tool Developed a collaborative robotic solution that improved Cpk value 	Jan. 2018 – Jul. 2019 Singapore for robotic surface finishing processes ae of filleting operations to 1.98
 Graduate Engineer General Motors India Pvt. Ltd. Streamlined robotic welding process in the body shop unit of the result of the stream of the s	Aug. 2016 – Jul. 2017 Bengaluru, India manufacturing facility of GM India obal Vehicle Development Program at Level 0 ustomer satisfaction in the west zone of GM India
Summer Undergraduate Researcher Advisor: Dr. Howie Choset. Biorobotics Lab, Carnegie Mellon Universi	$May \ 2015 - Aug. \ 2015$ Pittsburg, PA

• Designed a compliant gripper based on pseudo-rigid body modelling technique for snake robots

Honors and Awards

- Runner up at the AeroDef Student Research Poster Challenge. Secured 2nd place for presenting a poster on Physics-Informed AI for Multi-Robot Cells
- Best Conference Paper Award. Won the conference wide best paper award at the 42nd ASME's IDETC-CIE Conference 2022
- Viterbi Graduate School Fellowship. Receipient of the Viterbi Graduate School Fellowship awarded to selected Ph.D. students by the Viterbi School of Engineering, USC
- Academic Excellence Award. Given to the best outgoing Master of Science student by the Aerospace and Mechanical Engineering Department at the Viterbi School of Engineering, USC

List of Publications

Journal Publications

- Omey M. Manyar, Junyan Cheng, Reuben Levine, Vihan Krishnan, Jernej Barbic and Satyandra K. Gupta. (November 22, 2022). Physics Informed Synthetic Image Generation for Deep Learning based Detection of Wrinkles and Folds. ASME. Journal of Computing and Information Sciences and Engineering. doi: https://doi.org/10.1115/1.4056295
- Yi-Wei Chen, Rex Jomy Joseph, Alec Kanyuck, Shahwaz Khan, Rishi Malhan, Omey M. Manyar, Zachary McNulty, Bohan Wang, Jernej Barbic, and S. K. Gupta. A Digital Twin for Automated Layup of Prepreg Composite Sheets. ASME Journal of Manufacturing Science and Engineering, September 2021. https://doi.org/10.1115/1.4052132
- Vigneashwara Pandiyana, Tegoeh Tjahjowidodo, Wahyu Caesarendra, Omey M. Manyar and David Then. In-process virtual verification of weld seam removal in robotic abrasive belt grinding process using deep learning. Robotics and Computer Integrated Manufacturing Journal, Volume 57, June 2019. https://doi.org/10.1016/j.rcim.2019.01.006
- Lakshminarayanan, Srinivasan, Sreekanth Kana, Dhanya Menoth Mohan, **Omey M. Manyar**, David Then, and Domenico Campolo. "An adaptive framework for robotic polishing based on impedance control." The International Journal of Advanced Manufacturing Technology 112 (2021): 401-417.https://doi.org/10.1007/s00170-020-06270-1
- Caesarendra, Wahyu, Bobby K. Pappachan, Tomi Wijaya, Daryl Lee, Tegoeh Tjahjowidodo, David Then, and Omey M. Manyar. An AWS Machine Learning-Based Indirect Monitoring Method for Deburring in Aerospace Industries Towards Industry 4.0 Applied Sciences, 2018. 8, no. 11: 2165. https://doi.org/10.3390/app8112165.

Conference Publications

- Omey M. Manyar, Hantao Ye, Meghana Sagare, Siddharth Mayya, Fan Wang and S. K. Gupta. Simulation-Assisted Learning for Efficient Bin-Packing of Deformable Packages in a Bimanual Robotic Cell. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Abu Dhabi, UAE, Oct 2024.
- Jeon Ho-Kang, Neel Dhanaraj, **Omey M. Manyar**, Siddhant Wadaskar, and Satyandra K. Gupta. A Task Allocation and Scheduling Framework to Facilitate Efficient Human-Robot Collaboration in High-Mix Assembly Applications. In ASME International Manufacturing Science and Engineering Conference. Knoxville, Tennessee, USA, June 2024. (Best Paper Award Runner-up)
- Omey M. Manyar, Santosh V. Narayan, Rohin Lengade, and S. K. Gupta. Physics-Informed Learning to Enable Robotic Screw-Driving Under Hole Pose Uncertainties. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Detroit, MI, USA, Oct 2023. https://doi.org/10.1109/IROS55552.2023.10342151*
- Omey M. Manyar, Zachary McNulty, Stefanos Nikolaidis, and S. K. Gupta. Inverse Reinforcement Learning Framework for Transferring Task Sequencing Policies from Humans to Robots in Manufacturing Applications. *IEEE's International Conference on Robotics and Automation, London, UK, May 2023.*. https://doi.org/10.1109/ICRA48891.2023.10160687
- Neel Dhanaraj, Omey M. Manyar, Vihan Krishnan, and Satyandra K. Gupta. "A Physics-Informed Action Selection Framework for Robotic Heating." In International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, vol. 87295, p. V002T02A074. American Society of Mechanical Engineers, 2023. https://doi.org/10.1115/MSEC2023-105271
- Neel Dhanaraj, Niraj Ganesh, Rohit Gurav, Minseok Jeon, **Omey M. Manyar**, Santosh Narayan, Jaehyun Park, Zhao Yu, and Satyandra K. Gupta. "A human robot collaboration framework for assembly tasks in high mix manufacturing applications." In International Manufacturing Science and Engineering Conference, vol. 87240, p. V002T07A011. American Society of Mechanical Engineers, 2023.

- Rishabh Shukla, **Omey M. Manyar**, Devsmit Ranparia and Satyandra K. Gupta, "A Framework for Improving Information Content of Human Demonstrations for Enabling Robots to Acquire Complex Tool Manipulation Skills," 2023 32nd IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), Busan, Korea, Republic of, 2023, pp. 2273-2280, https://doi.org/10.1109/RO-MAN57019.2023.10309492.
- Omey M. Manyar, Junyan Cheng, Reuben Levine, Vihan Krishnan, Jernej Barbic and Satyandra K. Gupta. Synthetic Image Assisted Deep Learning Framework for Detecting Defects During Composite Sheet Layup. ASME IDETC-CIE Conference, St. Louis, MO, USA, August 2022.https://doi.org/10.1115/DETC2022-90084. Best Paper Award
- Omey M. Manyar, Alec Kanyuck, Bharat Deshkulkarni and Satyandra K. Gupta. Visual Servo-Based Trajectory Planning for Fast and Accurate Sheet Pick and Place Operations. ASME MSEC, Purdue University, IN, USA, June 2022. https://doi.org/10.1115/MSEC2022-85952
- Omey M. Manyar, Jaineel Desai, Nimish Deogaonkar, Rex Jomy Joesph, Rishi Malhan, Zachary McNulty, Bohan Wang, Jernej Barbic, and S. K. Gupta. A Simulation-Based Grasp Planner for Enabling Robotic Grasping during Composite Sheet Layup. *IEEE's International Conference on Robotics and Automation, Xi'an, China, May 2021.* https://doi.org/10.1109/ICRA48506.2021.9560939
- Srinivasan Lakshminarayanan, **Omey M. Manyar**, Domenico Campolo. Toolpath Generation for Robot Filleting. Advanced Surface Enhancement. INCASE 2019, Singapore. https://doi.org/10.1007/978-981-15-0054-1_28

Poster Presentations

- Omey M. Manyar, Neel Dhanaraj, Meghana Sagare, Gabriel Maymon, Satyandra K Gupta. AI-Powered Smart Robotic Cells for Prepreg Composite Layup Automation. AeroDef Student Research Poster Pitch Presentation Challenge 2023. Long Beach, CA, USA. Runner-up for best student poster award
- Omey M. Manyar, Neel Dhanaraj, Rishabh Shukla, Vihan Krishnan, Santosh V Narayan, Rohin Lengade, Devsmit Ranparia, Satyandra K Gupta. Physics-Informed AI for Enabling Robots to Learn Autonomous Tool Manipulation. In SoCal Robotics Symposium 2023. Irvine, CA, USA

Projects

Suction-based Manipulation of Deformable Packages

• Built a system with a minimalist suction-based gripper for handling of complaint packages

• Trained a GNN-based physics-informed model to learn package dynamics to identify failure modes in manipulation by observing packages under motion capture system

Aug. 2023 – Present

Mobile Manipulation-based System for Fastening | Video Link Jan. 2023 – May. 2023

• Extended a mobile manipulator platform to perform insertion and screw-driving operations under high perception uncertainties

Human-Robot Teaming for Sheet Manipulation Task | Video Link Jan. 2020 – Sep. 2021

- Developed a hybrid cell demonstrating the use of robots as assistants in sheet manipulation tasks on an industrial application
- Integrated multiple software modules developed in C++, Java and Python with ROS to accomplish a system that reduced cycle time by 30%

Technical Skills

Programming: Python, C/C++, Java, MATLAB
Libraries and Frameworks: ROS, ROS2, PyTorch, Tensorflow, OpenAI Gym, MoveIt, OpenCV, Open3D
Simulators: MuJoCo, Nvidia Issac Sim, WeBots, Gazebo, Unity
Robots: KUKA LBR iiwa, ABB, UR5, Yaskawa
Developer Tools: Git, Docker, CUDA

Leadership and Involvement

Viterbi CURVE Fellowship Mentor: Mentored Undergraduate CURVE Fellowship Recipients Reviewer and Session Chair: RAL (2022-2024), RCIM(2023,2024), ICRA (2021-2024), IROS (2024), IDETC-CIE (2022)