

Omey M. Manyar

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Research Interest

Robot Learning; Motion Planning; Physics-based Simulation; Reinforcement Learning; Inverse Reinforcement Learning; Computer Vision

Education

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| University of Southern California <i>Ph.D. in Mechanical Engineering</i> | May 2021 – Present Los Angeles, CA |
| University of Southern California <i>Master of Science in Mechanical Engineering</i> | Aug. 2019 – May 2021 Los Angeles, CA |
| National Institute of Technology Karnataka <i>Bachelor of Technology in Mechanical Engineering</i> | Jul. 2012 – May 2016 Surathkal, India |

Experience

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| Graduate Research Fellow <i>Advisor: Dr. S. K. Gupta. Realization of Robotics Systems Lab, USC</i> | May 2021 – Present Los Angeles, CA |
| <ul style="list-style-type: none">Developed a learning framework to model expert behavior from sparse demonstrations for sequential planning problems for an autonomous agentWorked on compliant object manipulation of sheet like objects by training differentiable simulators for robotic manipulation of sheetsDeveloped a framework to generate physics-informed synthetic images for detection of wrinkles and folds in a sheet | |
| Graduate Research Assistant <i>Advisor: Dr. S. K. Gupta. Center for Advanced Manufacturing, USC</i> | Jan. 2020 – May 2021 Los Angeles, CA |
| <ul style="list-style-type: none">Project lead for development of a multi-robot system for automation of composite sheet layup in collaboration with a leading aerospace companyDevised a multi-constraint sheet grasping planner for robots using a high fidelity physics based simulatorIntegrated multiple software modules in ROS framework to accomplish a system that reduced cycle time by 30% | |
| Automation Technologist <i>Rolls-Royce Plc.</i> | Jan. 2018 – Jul. 2019 Singapore |
| <ul style="list-style-type: none">Seconded from Nanyang Technological University for leading the technological development in advanced robotics at the manufacturing facility of Rolls RoyceSpearheaded the deployment of an AI-based smart predictive tool for surface finishing processesDeveloped a Collaborative Robotic solution that improved Cpk value of filleting operations to 1.98 | |
| Graduate Engineer <i>General Motors India Pvt. Ltd.</i> | Aug. 2016 – Jul. 2017 Bengaluru, India |
| <ul style="list-style-type: none">Streamlined robotic welding process in the Body Shop Unit of the Manufacturing Facility of GM IndiaDevised an Investment Forecasting Tool with savings of 25% for Global Vehicle Development Program at Level 0Formulated a dealership improvement strategy, focusing towards customer satisfaction in the west zone of GM India | |
| Summer Undergraduate Researcher <i>Advisor: Dr. Howie Choset. Biorobotics Lab, Carnegie Mellon University</i> | May 2015 – Aug. 2015 Pittsburg, PA |
| <ul style="list-style-type: none">Designed a compliant gripper based on pseudo-rigid body modelling technique for snake robots | |

Awards and Recognitions

- Best Conference Paper Award. *Won the conference wide best paper award at the 42nd ASME's IDETC-CIE Conference 2022*
- Viterbi Graduate School Fellowship. *Recipient 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*
- National Science Foundation Travel Award. *Awarded at ASME MSEC Conference in 2022 and 2021, ASME IDETC-CIE 2022 and 2021*

List of Publications

- **Omei 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>
- **Omei 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. Best Paper Award*
- **Omei 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*
- Yi-Wei Chen, Rex Jomy Joseph, Alec Kanyuck, Shahwaz Khan, Rishi Malhan, **Omei 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>
- **Omei 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>
- Vigneashwara Pandiyana, Tegoeh Tjahjowidodo, Wahyu Caesarendra, **Omei 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>
- Srinivasan Lakshminarayanan, **Omei M. Manyar**, Domenico Campolo. Toolpath Generation for Robot Filletting. Advanced Surface Enhancement. INCASE 2019, Singapore. https://doi.org/10.1007/978-981-15-0054-1_28

Projects

- Multi-Robot Cell for Automation of Composite Layup** | Project Link Nov. 2020 – Sep. 2021
- Developed a multi-robot cell accomplishing sheet grasping/manipulation, sheet transport, sheet heating and sheet draping task
 - Developed vision-based defect detection system for contingency planning for robotic manipulation of sheet
 - Work was done in collaboration with a leading aerospace corporation
- Human-Robot Teaming for Sheet Manipulation Task** | Video Link Jan. 2020 – Oct. 2020
- Developed a Hybrid Cell demonstrating the use of robots as assistants in sheet manipulation task on an industrial application
 - Employed a Physics Based Simulation to generate feasible grasp plans for Robots to support with sheet manipulation
- COVID-19 Disinfection Robot- ADAMMS-UV** | Forbes Link, Viterbi News Link Apr. 2020 – May 2020
- Extended a mobile manipulator platform to autonomously perform deep uv disinfection of indoor environments
 - Examined varied methods that can be deployed for sterilizing surfaces exposed to the coronavirus

Technical Skills

Languages: Python, C/C++, Java, MATLAB

Libraries and Frameworks: PyTorch, Tensorflow, OpenAI Gym, ROS MoveIt, OpenCV, Open3D

Middleware: Robot Operating System

Simulators: VegaFEM, WeBots, Gazebo, Unity, MuJoCo

Robots: KUKA LBR iiwa, ABB, UR5, Yaskawa

Developer Tools: Git, Docker, CUDA

Mentorship and Service

Viterbi CURVE Fellowship Mentor: Mentored Undergraduate CURVE Fellowship Recipients

Reviewer and Session Chair: ICRA (2023, 2022), IDETC-CIE (2022)