

# Omey M. Manyar

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## Research Interest

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

## Education

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

## Experience

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<b>Graduate Research Fellow</b> <i>Advisor: Dr. S. K. Gupta. Realization of Robotics Systems Lab, USC</i>	May 2021 – Present Los Angeles, CA
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- Developed a learning framework to model expert behavior from sparse demonstrations for sequential planning problems for an autonomous agent
- Worked on compliant object manipulation of sheet like objects by training differentiable simulators for robotic manipulation of sheets
- Developed a framework to generate physics-informed synthetic images for detection of wrinkles and folds in a sheet

<b>Graduate Research Assistant</b> <i>Advisor: Dr. S. K. Gupta. Center for Advanced Manufacturing, USC</i>	Jan 2020 – May 2021 Los Angeles, CA
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- Project lead for development of a multi-robot system for automation of composite sheet layup in collaboration with a leading aerospace company
- Devised a multi-constraint sheet grasping planner for robots using a high fidelity physics based simulator
- Integrated multiple software modules in ROS framework to accomplish a system that reduced cycle time by 30%

<b>Automation Technologist</b> <i>Rolls-Royce Plc.</i>	Jan. 2018 – July 2019 Singapore
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- Seconded from Nanyang Technological University for leading the technological development in advanced robotics at the manufacturing facility of Rolls Royce
- Spearheaded the deployment of an AI-based smart predictive tool for surface finishing processes
- Developed a Collaborative Robotic solution that improved Cpk value of filleting operations to 1.98

<b>Graduate Engineer</b> <i>General Motors India Pvt. Ltd.</i>	Aug 2016 – July 2017 Bengaluru, India
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- Streamlined robotic welding process in the Body Shop Unit of the Manufacturing Facility of GM India
- Devised an Investment Forecasting Tool with savings of 25% for Global Vehicle Development Program at Level 0
- Formulated a dealership improvement strategy, focusing towards customer satisfaction in the west zone of GM India

<b>Summer Undergraduate Researcher</b> <i>Advisor: Dr. Howie Choset. Biorobotics Lab, Carnegie Mellon University</i>	May 2015 – August 2015 Pittsburg, PA
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- Designed a compliant gripper based on pseudo-rigid body modelling technique for snake robots

## Awards and Recognitions

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- 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

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- **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. 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.*
- 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>
- **Omey M. Manyar**, Jaaneel 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, **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>
- Srinivasan Lakshminarayanan, **Omey 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](https://doi.org/10.1007/978-981-15-0054-1_28)
- 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>.

## Projects

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| <b>Multi-Robot Cell for Automation of Composite Layup</b>   Project Link  | Nov 2020 – Sep 2021   |
| <ul style="list-style-type: none"><li>• Developed a multi-robot cell accomplishing sheet grasping/manipulation, sheet transport, sheet heating and sheet draping task</li><li>• Developed vision-based defect detection system for contingency planning for robotic manipulation of sheet</li><li>• Work was done in collaboration with a leading aerospace corporation</li></ul> |                       |
| <b>Human-Robot Teaming for Sheet Manipulation Task</b>   Video Link   | Jan 2020 – Oct 2020   |
| <ul style="list-style-type: none"><li>• Developed a Hybrid Cell demonstrating the use of robots as assistants in sheet manipulation task on an industrial application</li><li>• Employed a Physics Based Simulation to generate feasible grasp plans for Robots to support with sheet manipulation</li></ul>  |                       |
| <b>COVID-19 Disinfection Robot- ADAMMS-UV</b>   Forbes Link, Viterbi News Link  | April 2020 – May 2020 |
| <ul style="list-style-type: none"><li>• Extended a mobile manipulator platform to autonomously perform deep uv disinfection of indoor environments</li><li>• Examined varied methods that can be deployed for sterilizing surfaces exposed to the coronavirus</li></ul>   |                       |

## Technical Skills

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**Languages:** Python, C/C++, Java, MATLAB  
**Libraries:** PyTorch, Tensorflow, OpenAI, ROS MoveIt, OpenCV, PCL, Stable Baselines3 for RL  
**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

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**Viterbi CURVE Fellowship Mentor:** Mentored Undergraduate CURVE Fellowship Recipients  
**Reviewer and Session Chair:** ICRA (2022, 2021), IDETC-CIE (2022)