Koushik Alapati

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Education

University of Maryland	**College Park, MD**
Master of Engineering, Robotics	*Aug 2023 - May 2025*
Osmania University, Vasavi College of Engineering	**Hyderabad, India**
Bachelor of Engineering, Mechanical Engineering	*Jul 2017 - Jun 2021*

Skills

Programming Languages	Python, C++, Java, MATLAB, Simulink
CAE & Design Tools	SolidWorks, Siemens NX, Catia V5, ANSYS (Static Structural, Fluent, APDL)
Frameworks & Libraries	PyTorch, TensorFlow, OpenCV, NumPy, RTDE
Software & Tools	ROS 1/2, Gazebo, RViz, Nav2, Git, GitHub, VSCode, Jupyter, CMake, Linux
Areas of Expertise	Robot modelling, Perception, Path Planning, Finite Element Analysis, Controls

Experience

Robotics Software Intern — **Sep 2024 – Present**
Onki Robotics - Smart Carrier Inc — *New York, New York*

- Migrated the simulation setup from Gazebo to Isaac Sim and deployed it to a cloud-based environment, enhancing accessibility and performance.
- Engineered and implemented **SLAM algorithms** in **ROS2**-based simulation environments, achieving a **20% boost in navigation accuracy** and a **30% enhancement in simulation performance**, supporting essential perception capabilities.
- Constructed a 3D robot model and simulation framework using **SolidWorks**, enabling thorough testing in **Gazebo** and proactively identifying deployment challenges, cutting debugging time by **25%**.
- Partnered with cross-functional teams to integrate Unmanned Ground Vehicles systems efficiently and conducted comprehensive risk assessments.

Research Assistant — **Mar 2024 – Sep 2024**
Perception & Robotics Group — *College Park, Maryland*

- Designed and fabricated high-precision tactile sensor mounts for the UR5e robotic arm, utilizing **Python and RTDE** to refine robotic motion and improve dexterous manipulation.
- Conducted extensive data acquisition and analysis using **3D-printed** prototypes, simulating diverse real-world contact scenarios and increasing learning algorithm accuracy by **8%**.
- Developed an adaptive motion planning framework incorporating **Gelsight Mini** sensor feedback and neural network outputs for force-controlled grasping, enhancing robotic object manipulation in unstructured environments.

Systems Engineer — **Oct 2021 – Jul 2023**
Infosys Private Limited — *Mysuru, India*

- Automated UI performance testing through Selenium WebDriver and Java, expanding test coverage by **60%** and decreasing manual workload by **30 hours/week**.
- Enhanced data infrastructure, streamlining system operations by **30%** and accelerating data retrieval speeds by **2 seconds/query** across multiple testing levels.

Research & Publications

[1] Amir Hossein Shahidzadeh, Gabriele Mario Caddeo, **Koushik Alapati**, Cornelia Fermuller, Lorenzo Natale, Yiannis Aloimonos. *"FeelAnyForce: Estimating Contact Force Feedback from Tactile Sensation Vision-Based Tactile Sensors,"* in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, 2025. **(Accepted)**.

Projects

Leader Follower Network Control for Robots (MATLAB)

- Programmed a MATLAB-based leader-follower robot network utilizing the **Lloyd Algorithm** to dynamically adjust robot positions within their respective **Voronoi cells**. Designed a waypoint navigation strategy ensuring minimal communication overhead, effectively deploying **swarm intelligence** for synchronized motion in the Robotarium simulator.

ARIAC - Agile Robotics for Industrial Automation Competition (Gazebo, MoveIt, C++, Python)

- Engineered a perception-integrated motion planning system leveraging **ROS2 publishers/subscribers**, **RViz visualization**, and multi-threaded C++ nodes, improving efficiency in kitting tasks by **30%** through real-time sensor-driven decision-making.

Modeling and Simulation of Emergency Evacuation Robot (SolidWorks, Gazebo, Python)

- Designed and simulated a 4WD mobile robot equipped with a UR10 arm, implementing a **6D pose estimation** framework through **inverse kinematics** to enhance precision in artifact retrieval and survivor identification during emergency response scenarios.

Real-Time Depth Sensing for Robotic Navigation (OpenCV, Python)

- Enhanced a self-supervised depth estimation model by integrating a **MobileNetV2** encoder and applying post-training quantization techniques, achieving real-time inference at **258.4 FPS** while preserving accuracy through optimized feature extraction and minimized latency.