Koushik Alapati

College Park, MD — 925-895-5012 — akoushik2k@gmail.com — Linkedin — Github — Portfolio

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, MatPlotLib, RTDE
Software & Tools	ROS 1/2, Gazebo, RViz, Nav2, Git, GitHub, VSCode, Jupyter, CMake, Linux
Robotics & Embedded Systems	Robot Modeling, Perception, SLAM, Path Planning, Motion Planning, Controls, Embedded Systems, Real-Time Inference, Robotics Operations
Machine Learning & AI	Machine Learning, ML Model Inference, ML Feature Engineering, Model Training & Deployment, Computer Vision, Neural Networks, Predictive Modeling
System Design & Infrastructure	Distributed Systems, ML Serving Infrastructure, High-Performance Data Streaming, Data Processing Pipelines, Production-Scale Systems, Versioning & A/B Testing, Self-Healing Mechanisms
Development Practices	Algorithm Development, System Design & Architecture, Full Software Development Life Cycle, Coding Standards, Code Reviews, Source Control Management, Build Processes, Testing, Operations, Debugging Production Systems, Monitoring & Alerting, Test Coverage & Documentation

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 by optimizing **system performance and reliability across cloud and edge computing environments**.
- 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 through **real-time processing of sensor data** and **motion planning**.
- 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%**, while enabling **debugging production issues in robotics systems**.
- Partnered with cross-functional teams to integrate Unmanned Ground Vehicles systems efficiently and conducted comprehensive risk assessments, contributing to **architectural decisions** and **technical design discussions**.

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 through **embedded systems** and **control systems expertise**.
- Conducted extensive data acquisition and analysis using **3D-printed** prototypes, simulating diverse real-world contact scenarios and increasing learning algorithm accuracy by **8%** through **ML feature engineering** and **data processing pipelines**.
- 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 by utilizing **computer vision models in production**, **ML model inference**, and **real-time inference**.

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** by applying best practices in **coding standards**, **test coverage**, and **full software development life cycle**.
- Enhanced data infrastructure, streamlining system operations by **30%** and accelerating data retrieval speeds by **2 seconds/query** across multiple testing levels through implementation of **distributed systems** and **high-performance data streaming solutions**.

Software Programmer — **Mar 2019 – Sep 2021**
HOZI Digital India — *Hyderabad, India*

- Analyzed large-scale datasets (1M+ records) using advanced statistical methods, **Python**, and **SQL** to uncover trends and generate actionable insights, accelerating decision-making processes by **15%** and supporting **ML model inference** pipelines.
- Designed and validated predictive models for market trends and product performance through **regression analysis**, **time-series forecasting**, and **hypothesis testing**, enhancing forecast accuracy by **25%** using **production-scale ML model deployment**, **versioning**, and **A/B testing**.
- Developed forecasting models to project future demand, aiding in production planning. Utilized **TensorFlow and CNN** to enhance forecast accuracy by **20%**.

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 using **control systems**, **motion planning**, and **algorithm development**.

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**, **ML serving infrastructure**, and **self-healing mechanisms**.

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 using **robotics operations**, **real-time inference**, and **embedded systems**.

Real-Time Semantic Segmentation (Python, TensorFlow, Matplotlib, OpenCV)

– Developed a real-time semantic segmentation model for autonomous vehicles with **97%** accuracy, leveraging advanced **FPN and UNET neural network architectures**. Worked closely with cross-functional teams to optimize performance, achieving a minimal loss of **0.2** through **ML model training & deployment workflows**, **computer vision**, **monitoring**, and **AWS services**.

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 using **machine learning**, **real-time processing of sensor data**, and **edge computing**.

Extra-Curricular

Graduate Student Aide

Sep 2024 – Present

UMD College of Information — *College Park, Maryland*

– Assisted in delivering weekly lab sessions and providing technical guidance to students, strengthening their foundational understanding of **object-oriented programming in Python**.

– Evaluated student assignments and projects with attention to program design, implementation, and testing principles, ensuring consistent grading standards across a cohort of 100+ students.

– Designed and implemented **unit test suites** for the **autotrader** platform in gradescope, automating assessment workflows and reducing manual grading time by over **70%** while maintaining a **95% evaluation accuracy**.