Pranay Palem

5820N Sheridan Rd, Chicago, IL | 6025586689 | pranaypalem@gmail.com | LinkedIn | GitHub

SUMMARY

Robotics Engineer with solid experience in hardware-software integration and real-time robotic solutions. Expertise includes simulation and deployment with ROS 2 and Isaac Sim alongside hands-on roles in embedded systems and PLC automation. Demonstrated proficiency in troubleshooting complex systems and driving continuous improvements through data-driven decisions. Adept at collaborating with cross-functional teams to optimize robotic system performance in dynamic environments.

EDUCATION

Arizona State University, Tempe, AZ **May 2025**

Master of Science, Robotics and Autonomous Systems

- **GPA:** 4.0
- **Coursework:** Reinforcement Learning, Deep Learning, Computer Vision, Al for Robotics, Machine Learning

EXPERIENCE

Arizona State University **May 2025 - Present**

Deep Learning Research Assistant – Medical AI *Tempe, United States*

- Engineered and evaluated an OpenAI CLIP-style Vision-Language Model (Mammo-CLIP) to align mammogram images with radiology reports, utilizing data-driven methodologies to enhance clinical decision-making.
- Implemented NLP-integrated multimodal learning alongside attention heatmaps and explainable AI methods (Grad-CAM, attention-based visualization) to improve transparency and technical documentation clarity.
- Developed deep learning models (Faster R-CNN, ResNet) on the VinDr-Mammo dataset to drive performance improvements in AI-based breast cancer detection, emphasizing precision in data collection and reporting processes.
- Enhanced model robustness in low-label scenarios by applying self-supervised and transfer learning techniques, supporting technical troubleshooting and performance validation.
- Applied SimCLR on over 100K NIH Chest X-ray images to derive unsupervised representations, achieving 98.5% clustering accuracy and demonstrating rigorous analysis for continuous improvement.

Arizona State University **Aug 2024 - May 2025**

Machine Learning Assistant – Robotics *Tempe, United States*

- Developed and evaluated deep reinforcement learning models (PPO, Actor-Critic) for robotic decision-making, aligning experimental outcomes with robotics systems troubleshooting and integration objectives.
- Conducted experiments using PyTorch, Stable-Baselines3, and Isaac Lab to assess sequential control performance and streamline technical fault resolution in robotics applications.
- Refined representation learning techniques and model tuning processes, facilitating data-driven decision-making and the creation of technical documentation for robotic systems.
- Led the project 'Reinforcement Learning for Continuous Robotic Control' by benchmarking PPO vs TRPO in OpenAI Gym, optimizing model performance by 35% and supporting iterative improvements and process documentation.
- Tuned reinforcement learning hyperparameters to enhance average episodic reward and training stability, contributing to continuous improvement initiatives in robotics control systems.

DRDO **Apr 2019 - Jul 2019**

Robotics & Embedded Systems Intern *Hyderabad, India*

- Developed an IoT-based home automation and security system using the LPC2148 ARM7 microcontroller and ESP8266 WiFi module for real-time sensor monitoring and control, enhancing home security and automation capabilities
- Programmed in C/C++ for sensor fusion (gas, smoke, motion) and implemented interrupt-driven task scheduling, improving system responsiveness and reliability
- Designed relay control logic with LCD feedback and modular diagnostics for appliance automation and fault detection, ensuring efficient operation and quick troubleshooting
- Acquired foundational experience in hardware-software integration and real-time embedded systems for robotics applications, contributing to enhanced technical proficiency in robotics projects

Rayalaseema Thermal Power Plant **Apr 2018 - Jul 2018**

PLC Automation Intern *Kadapa, India*

- Gained hands-on experience with Allen-Bradley and Siemens PLCs, observing Ladder Logic used in boiler automation, turbine control, and SCADA integration across high-pressure systems, enhancing understanding of industrial automation processes
- Assisted engineers in analyzing real-time diagnostics, configuring safety interlocks, and troubleshooting automation failures, contributing to improved system reliability and safety
- Developed a foundational understanding of thermodynamic systems, instrumentation layouts, and plant-wide control workflows, supporting more efficient plant operations

PROJECTS

Perception Pipeline with SDG & Domain Randomization | Link **Jan 2025 - May 2025**

Arizona State University

- Developed an end-to-end robotic perception pipeline integrating LiDAR-based SLAM, RRT exploration, and YOLOv8 object detection with 95% validation accuracy under Software-in-the-Loop (SIL) testing.
- Simulated dynamic environments in Isaac Sim and generated over 5,000 annotated synthetic images using domain randomization techniques (lighting, texture, object variation), which reduced real-world data collection by 70%.
- Deployed the trained YOLOv8 model to NVIDIA Jetson using TensorRT optimization, achieving 40% faster inference with consistent sub-50ms latency, enabling real-time performance for edge deployment.

Design Optimization of a Foldable Robot in MuJoCo | Link **Aug 2024 - Dec 2024**

Arizona State University

- Simulated 196+ foldable robot configurations in MuJoCo using adaptive initialization, improving simulation stability by 60%.
- Modeled quaternion-based kinematics and servo dynamics to reduce the sim-to-real gap, using scikit-optimize for tuning control parameters across 2–100 segmented-body configurations and enhancing robustness across dynamic environments.

Cleanroom Robotics and Industrial Manufacturing | Link **Aug 2023 - Sep 2023**

Arizona State University

- Developed motion planning pipelines for SCARA robots in cleanroom environments, improving positioning efficiency by 22%.
- Implemented quaternion-based inverse kinematics to enhance 3D orientation control in constrained robotic workspaces.
- Tuned PID controllers for robotic actuators using classical control theory, reducing end-effector overshoot by 40%

Quaternion based Kinematic Modeling and Analysis | Link **Nov 2024 - Dec 2024**

Arizona State University

- Modeled forward and inverse kinematics for robotic arms using quaternions, improving accuracy in 3D rotational computations.
- Derived Jacobian matrices and torque relationships for four-bar mechanisms to analyze joint-level force interactions.
- Formulated state-space representations to simulate and validate dynamic behavior of mechanical linkages in Python.

SKILLS

- **Programming**: Python (Numpy, Pandas, Scikit-learn), C++, Matlab, Git, Docker, TensorRT, OpenCV, Machine Learning, PostgreSQL, MySQL, MLOps, AWS, SageMaker, VLMs, NLP, WandB
- **Robotics & Simulation**: MuJoCo, Isaac Sim, ROS 2, Movelt 2, Nav2, SLAM (GMapping, MOLA), URDF, RViz, Jetson Nano
- **Reinforcement Learning**: PyTorch, TensorFlow, Stable-Baselines3, Isaac Lab, OpenAI Gym, PPO, SAC, Actor-Critic, Deep Learning
- **Semiconductors**: Cleanroom robotics, Motion Planning Algorithms, Kinematics, SCARA
- **Systems Integration & Troubleshooting**: Network Fundamentals, Software Integration Experience, Problem-solving Initiative, Technical Troubleshooting, Electrical Systems Experience