Hemanth Katikala Muniraj

Dearborn, Michigan   hemanthh@umich.edu   (248) 835 0594   linkedin.com/in/hemanth-muniraj
github.com/Hemanth-Katikala-Muniraj

Summary

- Robotics and Process Automation Engineer with hands-on experience tuning robot pathwork and operating parameters to reduce variation and improve repeatability in production-style cycles.
- Strong controls and validation background using MATLAB and Simulink, with a focus on stable closed-loop behavior, constraints, and repeatable test evidence.
- Experience with ABB RobotStudio, Fanuc ROBOGUIDE, and Universal Robots workcells, including calibration and vision-guided actuation to support reliable robotic operation and launch-style setup.
- Manufacturing mindset with continuous improvement and corrective actions, collaborating with technicians and production teams to diagnose issues and standardize fixes.

Skills

- **Robotics and Automation:** industrial robot programming, robot pathwork optimization, tool/TCP calibration, workcell simulation, I/O concepts, safety interlocks.
- **Manufacturing Quality and CI:** variation reduction, structured problem solving, error-proofing concepts, corrective actions, standard work awareness, PFMEA and control plan awareness, launch support.
- **Process Parameter Optimization:** speed and zone tuning, approach and dwell adjustment, trajectory smoothing concepts, part orientation effects, repeatability validation across runs.
- **Controls and Validation:** MATLAB, Simulink, closed-loop control modeling, PI control, state machines, actuator dynamics, constraints-based validation.
- **Industrial Robotics Tools:** ABB RobotStudio, Fanuc ROBOGUIDE, Universal Robots (UR), vision-guided manipulation concepts.
- **Programming and Platforms:** Python, C++, Linux debugging, Git, Docker.
- **Perception (supporting automation):** OpenCV, camera calibration, basic detection for inspection workflows.

Work Experience

Industrial Automation and Robotics Intern — *Cerritos, CA, USA Sept 2025 – Dec 2025*
AliveMind

- Designed and deployed an automated UR5 robotic workcell integrating motion programming, calibration, and vision-guided actuation to run repeatable production-style cycles.
- Tuned robotic path motions and operating parameters to improve repeatability and stability, achieving ±1.5 mm TCP repeatability through eye-in-hand calibration using OpenCV.
- Adjusted robot pathwork and process parameters including speed, approach, dwell, and tool frames, and documented before and after results to reduce variation across repeated runs.
- Partnered with robot technicians and operations stakeholders to troubleshoot cycle issues, apply corrective adjustments, and align changes with standard work expectations.

Research Fellow - Embedded Systems and Robotics — *Amaravathi, India Dec 2023 – April 2024*
Vellore Institute of Technology

- Designed an embedded automation architecture using ESP32 and Raspberry Pi for real-time sensing and system monitoring, supporting reliable edge-to-cloud workflows.
- Implemented MQTT-based communication and REST APIs for fault-tolerant data transfer, enabling repeatable data logging and validation across test cycles.
- Contributed to an IEEE publication by integrating and validating embedded system components for deployment-oriented scenarios.

Computer Vision and 3D Perception Intern   *Visakhapatnam, India*
BotClub PVT LTD   *June 2023 – Nov 2023*

- Developed vision modules using OpenCV and deep learning to support inspection-oriented automation and object localization workflows.
- Built data preprocessing and evaluation pipelines to improve detection accuracy by 28 percent while maintaining real-time performance targets.

Projects

Automation Simulation with Fanuc & ABB Robots

- Programmed and validated robotic workcells in Fanuc ROBOGUIDE and ABB RobotStudio, developing repeatable path motions for automation tasks.
- Optimized robot pathwork by tuning speeds, zones, approach angles, and part orientation to improve cycle stability and reduce process variation.
- Verified safety signals and interlocks and evaluated robustness through repeated simulation runs.

Automated Driver Incapacitation Detection and Reaction System — Longitudinal Control Module

- Designed a four-state longitudinal control system in MATLAB/Simulink to execute a safe-stop maneuver under safety and comfort constraints.
- Tuned PI control parameters through iterative simulation trials to meet constraints, documenting results and trade-offs similar to manufacturing process validation.
- Modeled actuator dynamics and validated closed-loop performance using repeatable test cases.

Autonomous Warehouse Navigation with ROS2 & LiDAR

- Developed and simulated a ROS2 mobile robot in Gazebo, integrating LiDAR and navigation components for repeatable goal execution.
- Tuned navigation and filtering parameters to improve stability during motion and improve path consistency across runs.

Education

University of Michigan   *Sept 2024 – May 2026*
Masters in Robotics Engineering
GPA: 3.96/4.0

- **Coursework:** Robot Vision, Mobile Robotics, Intelligent Systems, Auto Sensors and Actuators, Pattern Recognition, Mechatronics, Autonomous Vehicles, Total Quality Management and Six Sigma

Vellore Institute of Technology, Amaravathi   *Sept 2020 – May 2024*
Bachelors in Technology in Computer Science with Robotics Engineering
GPA: 3.48/4.0

Certifications: Universal Robots e-Series, ABB RobotStudio, PLC Ladder Logic, Geometric Dimensioning and Tolerancing (GD&T).