

Adhiraj Londhe

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SUMMARY

Robotics Engineer & Researcher with a Master's from Columbia University, specializing in the intersection of autonomous systems engineering and algorithmic research. Proven expertise in integrating high-DoF robotic platforms, SLAM navigation, and real-time embedded C++/Python controls. Adept at conducting data-driven research—leveraging cloud computing, simulation-to-reality (Sim2Real) pipelines, and evolutionary AI—while possessing the practical engineering acumen to scale systems, design mechatronic hardware, and lead field deployment teams.

EDUCATION

Columbia University | *Master of Science in Mechanical Engineering (Robotics and Controls)*

August 2023 – May 2025

University of Mumbai | *Bachelor of Engineering in Mechanical Engineering*

August 2019 – May 2023

SKILLS AND TOOLS

- **Autonomy, AI & Software:** ROS2, SLAM & Navigation, Sensor Fusion, Git, C++, Python, SQL, CARLA Simulator, Machine Vision, High-Performance Computing (GCP), Robot Software (ABB RobotStudio).
- **Controls & Embedded Systems:** PID/MPC Motion Tuning, Non-linear Control Theory, Real-time Systems, Estimation Techniques, PLC (Allen-Bradley), Microcontrollers (Raspberry Pi), Comms (CAN, EtherCAT, RS-485, SPI, I2C).
- **Design, Testing & Hardware Verification:** SolidWorks (CAD), AutoCAD, Ansys (FEA), Electromechanical Assembly, HIL Testing, Oscilloscopes, Logic Analyzers, Multimeters, Test Fixture Design, DfX (DFM/DFA).
- **Quality & Research Methodology:** Design of Experiments (DOE), Root Cause Analysis (RCA), 8D, Fishbone, PFMEA, Lean Six Sigma Green Belt, SPC, SOP & Technical Runbook Authoring.

PROFESSIONAL EXPERIENCE

Humro | **Robotics Deployment Engineer** | **Field-Based (USA)**

Dec 2025 - Present

- **Large-Scale SLAM & Localization:** Executed SLAM mapping for massive fulfillment centers exceeding 1 Million sq. ft., utilizing LiDAR, IMU fusion, and estimation techniques to maintain stable localization with < 2 cm drift over extended operational cycles.
- **Motion Tuning & Controls Development:** Calibrated and optimized PID/MPC-based motion control modules in C++ for real-time autonomous AMR/AGV platforms, reducing path-deviation errors by 15% in high-traffic, dynamic environments.
- **Data-Driven Hardware & Software Iteration:** Owned hardware-software integration and DfX feedback loop; analyzed motor thermal and vibration data to drive hardware revisions, achieving a 30% reduction in structural vibration.
- **Technical Troubleshooting & Escalation:** Acted as Technical Escalation Point for field labs, leading root-cause and failure analysis across embedded compute, power, and comms using oscilloscopes and logic analyzers.
- **Vision Guidance Integration:** Developed and tested vision-guided pick-and-place routines using machine vision for object detection and robot guidance in ABB RobotStudio, improving pick accuracy by 20%.

DRF Valves | **Manufacturing Engineer** | **Pune, India**

January 2022 – December 2022

- **Scientific Process Optimization (DOE):** Designed and executed a 3-factor Design of Experiments (DOE) to optimize machining parameters, resulting in a 12% improvement in First Pass Yield and mapping heat distribution interactions.
- **Automation & Control Systems:** Engineered and implemented PLC-based monitoring and torque controls using Allen-Bradley systems, boosting Overall Equipment Effectiveness (OEE) by 5% and reducing manual oversight.
- **Root Cause Analysis & Quality:** Utilized 8D and Fishbone methodologies to eliminate recurring defects, successfully reducing weekly operational downtime by 200+ minutes while establishing Statistical Process Control (SPC) plans.
- **Industrial Layout & Ergonomics:** Revamped production flow in AutoCAD to implement Lean manufacturing cells, reducing operator travel and improving workstation efficiency.

PROJECT EXPERIENCE

Evolutionary AI & Robotics Simulation | **Columbia University**

May 2024

- **End-to-End Learned Systems:** Developed evolutionary algorithms to optimize soft-robot morphologies, executing 100,000+ automated search iterations on Google Cloud Platform to achieve complex gait locomotion milestones.
- **Simulation-to-Reality (Sim2Real):** Built custom physics engines in C++ to validate non-rigid robot gaits, integrating sensor fusion models to provide data-driven insights for foundation model training and adaptive manipulation.
- **Cloud-Scale Research:** Leveraged high-performance computing and Git version control to automate morphology generation, reducing the R&D design-cycle time for complex robotic structures.

Bio-Inspired Crocodile Robot | **Columbia University**

August 2024

- **Biomimetic Mechanism Design:** Designed and assembled a multi-link robotic platform in SolidWorks, integrating a Raspberry Pi, high-torque servo motors, encoders, and feedback loops to translate biological gait patterns into mechanical constraints.
- **Control Algorithm Development:** Programmed real-time motion routines in C++ and Python using ROS2 and inverse kinematics to replicate the undulating crawl of a crocodile, managing complex multi-joint synchronization and dynamic gait transitions.