

Shivam Bhardwaj

FOUNDER & ROBOTICS ARCHITECT | BUILDING AI-NATIVE HARDWARE SYSTEMS

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shivambhardwaj.com | LinkedIn | GitHub | Resume Source Code

PROFESSIONAL SUMMARY

Visionary Engineer & Founder with 6+ years architecting zero-to-one automation for **Meta, Applied Materials, and Saildrone**. Specialist in collapsing development cycles (100x speedups) via custom **AI-driven CAD & Manufacturing engines**. Now building the next generation of **autonomous industrial robotics**.

EXPERTISE

Robotics & AI:	ROS/ROS2 (Nav2, MoveIt), C++ (14/17), Python (AsyncIO), SLAM (GMapping, Cartographer), Computer Vision (OpenCV, YOLO), Sensor Fusion (Kalman Filters), LLM Agents (LangChain)	Hardware & CAD:	Siemens NX (Open API), SolidWorks, Rhino3D, GD&T (ASME Y14.5), DFMA, Rapid Prototyping, 3D Printing
Embedded & EE:	Embedded C, Rust (Embedded Hal), PCB Design (Altium/KiCad), Microcontrollers (STM32, ESP32, Ambiq), Industrial Protocols (EtherCAT, Modbus), Interfaces (I2C, UART, CAN), PoE	Software & DevOps:	Rust (Tokio, Axum), Docker/Kubernetes, CI/CD (GitHub Actions), Linux/Bash, AWS (IoT Core), React/Next.js

EXPERIENCE

Founder & Lead Engineer Design Visionaries — San Jose, CA <i>Consulting for Applied Materials, Saildrone, Industrial Clients</i>	May 2023 – Dec 2025
<ul style="list-style-type: none">AutoCrate Design Engine: Invented a parametric design engine by reverse-engineering Siemens NX Expressions (bypassing slow NX Open API), reducing design time from 5 days to <1 hour. Built a React/Python GUI to generate ASTM-compliant drawings, increasing custom crate adoption from 20% to 50%.AR Glasses Electronics: Designed a 10-layer Flex PCB for AR glasses, integrating an Ambiq MCU, USB power delivery, micro-projector data path, and I2C ambient light sensing within a compact form factor.Harness Production Scaling: Scaled harness production from 25 to 70 units/day (2.8x increase) and reduced RMA rate from 70% to 10% by implementing lean manufacturing systems and optimizing assembly workflows.Custom Instrumentation: Invented a real-time Laser/LDR soil leveling sensor for slurry injection, solving a critical feedback gap where CV failed. Developed an automated metrology machine for recycled metal classification.MBD & GD&T: Transitioned a major semiconductor lab (Plasma ALD) from 2D drawings to Model-Based Definition (MBD) in NX, defining GD&T and PMI directly in 3D models to meet critical deadlines.	
Engineering Lead Advanced Engineering Services — San Jose, CA <i>Led cross-functional teams for Meta & Applied Materials</i>	Oct 2022 – Apr 2023
<ul style="list-style-type: none">Multi-Modal Robotic Forensics: Architected a robotic workcell for counterfeit detection in server systems, integrating RF, Thermal (+/- 0.5°C), Capacitance, and Optical (85mm industrial lens) sensing to achieve 0.5% repeatability.EV Conversion & Simulation: Led the mechanical reverse-engineering for a Class-8 Diesel-to-Electric conversion (AAA); executed 3D scan post-processing and Harmonic Analysis to validate structural integrity and transient response of mounting systems.AR Hardware Development: Managed the mechanical and industrial design of a Waveguide Frame for a semiconductor research lab; coordinated with vendors for high-fidelity finishing (painting/3D printing) to meet tight tolerance specifications for executive demos.Feasibility & Automation: Conducted feasibility studies for containerized ad-hoc EV charging and datacenter server pin testing automation, delivering technical roadmaps for niche industrial problems.	

Senior Robotics Engineer | Velodyne Lidar — Alameda, CA

Jan 2021 – Sep 2022

R&D Software Team Lead

- **Next-Gen Lidar Validation:** Validated next-generation LiDARs (including **Velarray directional** sensors) at highway cruising speeds. Engineered custom 80-20 testing jigs for diverse platforms, ensuring robust data collection for **all product lines**.
- **Infrastructure Automation (SaaS Deployment):** Pioneered the deployment strategy for Velodyne's **first-ever SaaS compute stack**. Developed **Ansible** playbooks to automate the provisioning of the **Vella vision stack** on **Jetson-based NRU** controllers, enabling scalable customer deployments.
- **Sensor Integration & Development:** Developed onboard IMU capabilities and implemented Precision Time Protocol (PTP) synchronization. Built data collection platforms integrating RTK GPS for high-fidelity georeferencing.
- **Field Engineering & Operations:** Led **7+ standardized IEAB tests** at GoMentum Station. Generated massive data annotation pipelines for **Scale AI**, supporting the training of perception models across the entire product line.
- **Strategic Technical Partnerships:** Acted as a **Hardware-Software Liaison** for key accounts (**Ford, Amazon Scout, Knightscope**). For Bluecity (Smart Cities), conducted **3D blindspot analysis** to optimize Lidar placement and maximize coverage efficiency.

Robotics Software Engineer | ARI — Sunnyvale, CA

Jan 2020 – Dec 2020

Surgical Robotics & Compliance

- **Surgical Registration Algorithm:** Developed a **C++ registration algorithm** using **VTK** and **PCL**, processing **10,000+ points** to compute the transformation matrix between a patient's femur and a surgical drill. Implemented **Iterative Closest Point (ICP)** to align **OptiTrack** motion capture data with MRI-based 3D point clouds.
- **High-Performance Metrics:** Achieved **0.1mm translation** and **0.3° rotation accuracy** with a registration time of **300ms** (data collection: 20s), directly enabling precise robotic milling of the femur head.
- **Robot Control System:** Engineered the control logic for a **6-DOF Kuka Robot** using **Beckhoff PLC**, orchestrating **100%** of the surgical workflow from registration to execution with **1ms** cycle times.
- **FDA Compliance:** Performed system-level risk analysis and contributed to design validation documentation for **FDA 510(k)** submission, ensuring **100%** safety-critical software compliance under **IEC 62304** standards.
- **Data Pipeline Architecture:** Implemented **DDS** middleware and **Protobuf** serialization to process and feed real-time sensor data into the **Computer Vision (CV)** pipeline with **<5ms latency**, ensuring seamless integration between subsystems.
- **Industry Impact:** Pioneered "**Active Milling**" (autonomous cutting), moving beyond standard "jig-holding" robotics. This innovation drove **Zimmer Biomet's acquisition of Monogram** in 2025.

EDUCATION

M.S. Mechatronics & Robotics , New York University - Research: COLMAP-based visual relocalization; swarm robotics**B.Tech Electronics , I.P. University, Delhi** - Award: Top-3 Projects; built ArduPilot autonomous drone