VAISHNAV RAJA

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Experience

Philips **Cambridge, MA**
R&D Engineering Intern, Surgical Robotics ***May 2024 - Dec 2024***

- **Built** a Python pipeline for a proprietary multi-arm surgical robot to map **workspace feasibility**; computed **reachability**, **manipulability**, singularity margins, and inter-arm occupied volume.
- **Swept 8 base layouts** (spacing/angles) under constraints—**coaxial** tool alignment, collision buffers, joint limits, human-safe zones—**shortlisting 3** for design review.
- **Developed** analytical/Jacobian DLS **IK** with joint-limit handling; **scored** configurations near singularities using Jacobian-derived metrics.
- **Refactored** research code **700 → 300 LOC** (∼57%), packaging a **robot-agnostic** module; accelerated scenario sweeps with **multiprocessing** and **Numba**.
- **Prototyped** tool-controller variants and **brought up** initial **EtherCAT** comms between tool controllers and the central node.

Tata Consultancy Services **Chennai, India**
Component Design Engineer, Infotainment Systems & Accessories ***May 2021 - Aug 2023***

- **Led** end-to-end design & release of a **shark-fin antenna**; delivered a **single global-compliant** design reusable across **4 regions** (IND/ASEAN/DMOA/LATAM).
- **Owned late-phase** validation/updates for **8 IVI components** (antennas, USB, speakers, RVC); coordinated suppliers and **ENOVIA** change control through SOP.
- **Executed** CAD/PCB checks (**CATIA**) and CAE (**Simulia**); issued release-ready drawings/BoMs via **ENOVIA PLM**.
- **Eliminated** DRL-induced speaker noise & alternator whine via **EMI/EMC filters**; stabilized the audio path and cleared program quality gates. **Calibrated** IVI audio (speaker placement, EQ, cabin balance) for **4 regions**; met OEM NVH targets and **cleared acoustic DV/PV** validation.
- **Delivered** from requirements freeze to production sign-off in ∼ 1 Year.
- **Tools/Methods:** CATIA, Simulia, ENOVIA PLM, DVP&R, DFMEA, PPAP/APQP, EMI/EMC troubleshooting, diagnostics/OBD .

Projects

6D Pose Estimation for Industrial Bin-Picking

- Built a multi-view RGB-D pipeline: **FoundationPose** initialization with **ICP** refinement for known CAD parts under clutter/occlusion.
- Generated pose overlays and error summaries; packaged evaluation scripts for repeatable runs (**Python, OpenCV, point clouds**).

Warehouse Automation: iWarehouse & Intelligent Stock Management (Accenture & YCH Logistics)

- Integrated **Pick-to-Light** with a warehouse **AGV** and inventory system: **Raspberry Pi** site controller, dual **Arduino** boards for per-wheel **PID**, custom stepper driver; **Node.js/Express** API, **MongoDB**, **React** UI.
- Demonstrated real-time task dispatch & stock updates across multi-modal guidance (**QR**/line/metal-strip); showcased to customers and recognized with **Accenture Best Innovator Award (2019)**.

All-Terrain Vehicle (SAE BAJA Competition)

- Led **CAD/CAE** for chassis per SAE BAJA rulebook; conducted **Ansys** crash/strength cases and translated results into fabrication changes.
- Introduced a **disengageable driveshaft** to improve maneuverability; team placed **9th overall** and **2nd in state** with a constrained budget.

Technical Skills

Languages: Python, C/C++, Bash/Shell, SQL.
Robotics & Control: MATLAB/Simulink, CMake, ROS2, OpenCV, Gazebo, EtherCAT-Technosoft/TwinCAT, Mitsubishi MELFA , KUKA KRC.
CAD/CAE: SolidWorks, Kicad, Inventor-CAM, Ansys, SPICE, MPLabXIDE
Hardware: ESP-IDE, Raspberry Pi, Arduino, 3D-Printing, CNC/Machining Tools, Welding.
Dev Tools: Git, Gitlab CI/CD, Linux, ENOVIA PLM.

Education

Northeastern University **Boston, MA**
Master of Science in Robotics, ***GPA: 3.6/4.0*** ***Aug 2025***

- Relevant Courses: Mobile Robotics, Control Systems, Reinforcement Learning, Computer vision, Algorithms

Anna University **Chennai, India**
Bachelor of Engineering in Mechatronics Engineering, ***GPA: 8.6/10*** ***Apr 2021***

- Relevant Courses: Industrial Automation, Sensors & Signal Processing, Kinematics & Dynamics of Machines, Mechatronics Systems design.