Dev Makwana

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Academic Qualification

Master of Science | Electromobility **Oct 2022 – Present**
Friedrich-Alexander-Universität Erlangen-Nürnberg Germany

Master's Thesis – Learning-Based Force-Guided Insertion **Apr 2025 – Present**
Institute for Factory Automation and Production Systems (FAPS) Nuremberg, Germany

- Developing a **MATLAB-based learning model** to adapt robot behavior using feedback from failed connector insertions.
- Implementing a signal-based correction mechanism that adjusts robot insertion based on abnormal force patterns.

Bachelor of Engineering | Mechatronics **Aug 2019 – Jun 2022**
New Horizon Institute of Technology and Management Mumbai, India
Grade: 1.61/4.00

Diploma in Engineering | Mechanical **Aug 2016 – Jul 2019**
Vidyavardhini's Bhausaheb Vartak Polytechnic [MSBTE] Mumbai, India
Grade: 1.86/4.00

Experience

Student Assistant **Oct 2024 – Present**
Institute for Factory Automation and Production Systems (FAPS) Nuremberg, Germany

- Integrated and commissioned a multi-robot cell with three **UR10e** collaborative robots for automated wireharness spray coating; programmed using **URScript** and configured with supporting UR tools.
- Designed and selected additional components, integrating **Robotiq** grippers, pneumatic/electric actuators, linear axes from **Festo Automation** and **Zimmer Group**, a 3D laser scanner, with Robot and PLC control via **PROFINET**, ensuring safety compliance and mechanical adaptability.
- Developed detailed 3D models and assemblies in Fusion 360 and SolidWorks, including gripper concepts, fixture layouts, and a complete tool head design that provided a more compact and effective solution for robotic cells.".

Process Technology Intern **Apr 2024 – Sep 2024**
KUKA AG Augsburg, Germany

- Developed and tested robotic programs for **KUKA Ultra Series** robots in e-mobility battery tray production, ensuring precise motion control and reliable automated operations.
- Created and optimized digital twins of welding processes in **KUKA.Sim** to validate robot paths, identify collisions, and improve cycle time.
- Performed metrology inspections and applied **Statistical Process Control (SPC)** using **Minitab** to monitor process stability and enhance weld consistency.

Mechanical Trainee **Jul 2022 – Sep 2022**
Kalp Engineering Mumbai, India

- Created **Bills of Materials (BOM)** for mechanical components, including dies, chain links, sprockets, and rollers for conveyor chain manufacturing.
- Developed detailed layout designs, part drawings, and assemblies using **AutoCAD 3D** and SolidWorks for engineering modeling.

Automotive R&D Intern **Sep 2021 – Jan 2022**
Challenger Sweepers Pune, India

- Learned about the performance of conveyor belt drives fitted in automated sweeper trucks in real-world conditions.
- Acquired knowledge in lifecycle testing and maintenance practices.

Projects

SafeX – Immersive Digital Twin Simulation for Autonomous Driving **Jan 2025 – Mar 2025**
Siemens | Immersive Design Challenge Germany

- Developed a true-to-scale immersive simulation using **Siemens NX**, **Simcenter Prescan**, and **Sony HMD**

controllers to evaluate **Autonomous Emergency Braking** and pedestrian safety.

- Designed **3D models**, integrated real-world sensor data (**LiDAR**, **RADAR**, **Camera**) into a simulation loop, and implemented multi-perspective validation (driver, pedestrian, traffic) to reduce physical prototyping.

Project Work: Next2OEM – Automated Wire Harness Assembly **Oct 2024 – Mar 2025**
Institute for Factory Automation and Production Systems (FAPS) Nuremberg, Germany

- Automated wire harness connector mating using a collaborative robot (**FANUC CRX-10iA/L**) and **6-axis force sensor**, targeting reduced manual labor and improved precision in automotive assembly.
- Developed and tested adaptive insertion strategies to handle unreliable visual feedback in complex or occluded settings; simulated in **RoboGuide**, analyzed with **Minitab (DoE)**, and visualized using **MATLAB** and **Matplotlib**.
- Improved process consistency and reduced cycle time, demonstrating automation potential to boost wire harness production efficiency by up to **50%**, especially in **high-mix, high-volume** settings.

Bachelor's Thesis – Hydro Rescuer **Aug 2021 – Apr 2022**
New Horizon Institute of Technology and Management Mumbai, India

- Built a rescue robot unit designed with buoyant materials and equipped with motors, batteries, propellers, flotation guards, sensors, and other components.
- Operated on a semi-automated principle, showcasing engineering expertise in **robotics** and **automation** using **Python** and **Arduino IDE** for the control system.

Design and Fabrication of Drainage Cleaning Machine **Aug 2018 – Apr 2019**
Vidyavardhini's Bhausaheb Vartak Polytechnic Vasai, India

- Developed a drainage cleaning machine with an efficient electric motor for debris removal.
- Utilized ultrasonic sensors for obstacle detection and integrated GPS for precise navigation.

Technical Skills

Robotics & Programming: RoboGuide, FANUC TP, Polyscope, URCap, URScript, URSim, KUKA KRL, KUKA.WorkVisual, Python, C.

Simulation & Analysis: KUKA.Sim, Simcenter Prescan, MATLAB, Matplotlib, Minitab, Statistical Process Contrl (SPC).

Design and Modelling: Autodesk AutoCAD, Fusion 360, SolidWorks, Siemens NX, PrusaSlicer.

Documentation: Microsoft 365 (Excel, PowerPoint, Word, Outlook), LaTeX.

Languages

English: C2 **German:** B1