Dhruv Patel

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ABOUT ME

I am a Master's student in Mechatronics at the University of Duisburg-Essen, specializing in Robotics and Automation. With hands-on experience in ROS 2, embedded systems, and machine learning, I am passionate about building intelligent robotic systems for mobile autonomy. I bring a strong background in C++, Python, and MATLAB, and enjoy bridging hardware and software to solve real-world problems in robotics.

EDUCATION

- **Master of Science (M.Sc.) in Mechanical Engineering, specializing in Mechatronics** [Apr 2023– Present]
  Institute: UNIVERSITÄT DUISBURG-ESSEN
  Grade: 2.2 | **Location**: Duisburg-Essen, Germany

- **Bachelor of Engineering (B.Eng.) in Mechanical Engineering** [Jul 2016 – Nov 2020]
  Institute: SILVER OAK COLLEGE OF ENGINEERING AND TECHNOLOGY
  Grade: 2.0 | **Location**: Gujarat, India
  Bachelor Thesis: Prosthetic Hand | **Final Grade:** 1.0 (20/20)

WORK EXPERIENCE

- **Mechanical Engineer | ITT CORPORATION INDIA PVT. LTD.** [Aug 2021 – Aug 2022]

  Key Responsibilities:
    - Automated CAD/Creo processes using C++, Python, and VB/VBA
    - Streamlined product design to optimize process cycle times
    - Developed user interfaces (GUI)
    - Collaborated closely with cross-functional teams

- **Internship: Diploma in Principles and Applications of Digital Manufacturing** [Jan 2019 – Jul 2019]
  Institute: <u>FAB ACADEMY</u> | **Location:** Boston, Massachusetts, USA (E-Learning)
  Final project: <u>Smart-Bin</u> | <u>Special Project</u> **(in Team)** | <u>Group Work</u>
  Relevant Activities:
    - Applied parametric design techniques in CAD/CAM including 3D printing, CNC milling, and cutting
    - Designed electronic circuits and programmed embedded systems
    - Worked with embedded network protocols and interfaces
    - Gained experience in project management and teamwork

PROJECTS & COURSEWORK

- <u>Modern Robotics</u> **- Mechanics, Planning, and Control** [Apr 2024 – Sep 2024]
    - Completed specialization focused on robot kinematics, dynamics, motion planning, and control using screw theory and the Product of Exponentials (POE) formula
    - Developed robot software and algorithm tests on <u>KUKA YouBot</u> in CoppeliaSim, programmed with MATLAB and Python
    - <u>**Project Video 1**</u> | <u>**Project Video 2**</u> | <u>**Code**</u>

- <u>ROS2</u> - **Actions | Lifecycle | Executors | Gazebo Simulation Project – Level 3** [Apr 5, 2025 – May 2, 2025]
    - Implemented robotic control in Gazebo using ROS2 Actions for goal-directed movements
    - Developed lifecycle nodes for structured initialization and controlled shutdown
    - Efficient runtime management with executors and node composition
    - <u>**Project Video 1**</u> | <u>**Project Video 2**</u> | <u>**Project Video 3**</u> | <u>**Code**</u>

- <u>ROS2</u> - **TF | URDF | RViz | Gazebo Simulation Project – Level 2** [Mar 1, 2025 – Apr 4, 2025]
    - Simulated robots using URDF/Xacro, TF frames, RViz, and Gazebo.
    - Integrated modular structure, sensors, inertia, collision detection, plugins, and world objects
    - Successfully simulated mobile base with robotic arm in Gazebo
    - <u>**Project Video 1**</u> | <u>**Project Video 2**</u> | <u>**Code**</u> – <u>**Launch File (Dir.)**</u>

- <u>ROS2</u> - **Turtle Sim: Catch them All-Project – Level 1** [Dec 1, 2024 – Dec 31, 2024]
    - Gained foundational knowledge of ROS2 nodes, topics, services, and middleware integration
    - <u>**Project Video**</u> | <u>**Code**</u>

- <u>Machine Learning</u> - **Traffic Classification and Prediction with ML** [Apr 1, 2024 – Sep 30, 2024]
    - Classified traffic conditions using decision trees, KNN, Naive Bayes, and SVM
    - Performed regression with linear models achieving high accuracy and minimal MAE; explored LSTM networks for nonlinear trends requiring fine-tuning
    - <u>**Seminar Paper**</u> | <u>**Code**</u>

- <u>Mechanics</u> - **Cycloidal Drive Development** [Oct 4, 2020 – Dec 22, 2022]
    - Developed two versions of a cycloidal drive (V1: 3.24 Nm; V2/V2+: 16.5 Nm) for integration into a modular robotic arm
    - <u>**V1 – Test Video**</u> | <u>**V2 – Test Video**</u> | <u>**V2+ - Offload Run**</u>

SKILLS

•	**Robotics**	C++ / Python / Linux / ROS2 / Gazebo Sim / MATLAB / ATMEGA Microcontrollers
•	**Machine Learning & AI**	ML / Deep RL / Statistics & Optimization / Signal Processing
•	**Product Development**	PTC CREO / SolidWorks / Fusion 360 / Autodesk EAGLE / Autodesk Inventor
•	**Process Automation**	VB (.NET) / VBA / Excel Macro Automation / Data Extraction Programming
•	**Machinery and Tools**	3D Printing / PCB-Milling / Laser Cutting / CNC-Machines

LANGUAGES

- German – B2
- English – C1
- Hindi – C2
- Gujarati – C2

Essen, 21. Jun 2025

Dhruv Prakashbhai Patel