

# Ashwin Chakravartula



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## Education

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<b>RWTH Aachen</b> , M.Sc. Robotic Systems Engineering	Oct 2023 – Present
<b>Birla Institute of Technology and Science, Pilani</b> , B.Sc Mechanical Engineering	Aug 2019 - Jun 2023

## Experience

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<b>Working Student</b> , German Aerospace Center – Munich, DE	Jan 2026 – Present
<ul style="list-style-type: none"><li>Working on Model-based surface generation for offline trajectory planning of a SARA robot.</li><li>Exploring prompt based diffusion pointcloud models for generative surface generation.</li><li>Evaluating surface mesh quality for downstream offline planning.</li></ul>	
<b>Student Research Assistant</b> , Institute for Advanced Mining Technologies – Aachen, DE	July 2025 – Jan 2026
<ul style="list-style-type: none"><li>Developed a stereo camera hardware setup.</li><li>Integrated a Stereo vision pipeline on NVIDIA Jetson Orin using Isaac ROS Image Pipeline for stereo cameras.</li><li>Worked on ROS2 package development, debugging, and Docker-based deployment.</li><li>Analysed Point cloud quality and implemented pointcloud processing techniques for environment perception.</li></ul>	
<b>Project Student</b> , Institute of Industrial Engineering and Ergonomics – Aachen, DE	Apr 2025 – Jan 2026
<ul style="list-style-type: none"><li>Developed a proof of concept VR teleoperative demonstrator for robot grinding applications using Unity.</li><li>Built an integrated Unity-ROS2 pipeline where haptic joint inputs are processed by motion planners and streamed to a digital twin for real-time trajectory optimization and simulation.</li><li>Developed ROS2 packages and evaluated trajectory generation strategies, comparing direct joint mapping against inverse kinematics-based approaches for improved motion smoothness.</li><li>Structured workspace parameterization and collision modeling to ensure scalability, safe deployment, and expert data collection for future imitation learning models.</li></ul>	
<b>Student Research Assistant</b> , Mechatronics and Mobile Propulsion Institute – Aachen, DE	Jan 2024 – Sept 2024
<ul style="list-style-type: none"><li>Developed functional algorithms for autonomous ship navigation</li><li>Evaluated and benchmarked multiple path planning strategies within a ROS-Gazebo simulation framework.</li><li>Developed occupancy grid-based SLAM pipelines to enhance environmental awareness and improve navigation stack performance.</li><li>Implemented GPS-IMU sensor fusion and data synchronization to ensure accurate state estimation and robust real-world deployment.</li></ul>	
<b>Robotics Intern</b> , Wastefull Insights – Vadodara, IN	Jan 2022 – July 2022
<ul style="list-style-type: none"><li>Integrated the robot's software architecture with ROS</li><li>Created unit tests in Python and ROS to verify the robustness of the entire robot framework</li><li>Created digital twin of the robot in Gazebo</li><li>Developed a robot controller based on the robot's hardware architecture and the planning algorithm</li></ul>	

## Projects

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### Sensor simulation of a Humanoid Robot

Nov 2024 - Jan 2025

- Designed a multimodal teleoperation controller for a humanoid robot by integrating IMU, accelerometer, capacitive touch sensors and potentiometers via an ESP8266 microcontroller.
- Developed a Unity-based simulation environment to validate real-time sensor-driven locomotion behaviors (walking, sprinting, jumping).
- Applied Kalman filtering for sensor fusion and noise reduction, improving motion stability and control responsiveness.
- Tools used: Python, Unity, C#, Arduino

### AR Tag Guided Trajectory Planner for Robot Welding

Apr 2024 - May 2024

- Planned and executed a 2D welding trajectory for a UR5 Robot.
- Used ArUco tags for defining waypoints and MoveIt for executing the trajectory.
- Tools used: Python, ROS, MoveIt2

### Multi-Agent-Navigation using Artificial Potential Functions

Jan 2022 - May 2022

- Developed an APF-based path planning and formation control algorithm for multi-agent ground robots.
- Implemented and validated the system in Gazebo across varying swarm sizes.
- Designed cost-function constraints for inter-agent spacing to ensure stable formation behavior.
- Performed Lyapunov-based stability analysis to verify convergence and robustness.
- Tools Used: ROS1, Gazebo, Webots, Python

## Voluntary Experiences

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### Projekt Kratos

July 2020 - Apr 2022

(Student Team Initiative)

- Designed and manufactured chassis of a 6-wheeled Mars rover for the annual university competition URC (Universal Rover Challenge).
- Designed Life-detection setup, which collected soil samples using a digging mechanism and transferring the soil contents which can detect the presence of life using protein tests.
- Project Kratos ranked 2nd in Asia and topped as the best performing Indian Rover at its first attempt at the University Rover Challenge (URC 2022) held at Mars Desert Research Station - Utah, USA. Also ranked 2nd in the Anatolian Rover Challenge held at Istanbul, Turkey.
- Tools Used: SolidWorks, CAD, 3D Printing, CNC Machining

## Skills

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**Programming Languages:** Python, MATLAB, C#, C++

**Robotics Framework:** ROS/ ROS2, Gazebo, Webots, MoveIt2, Unity (AR/ VR), NVIDIA Isaac ROS

**Deep Learning:** PyTorch, Tensorflow, Open3D

**Soft Skills:** Time Management, Problem Solving, Communication Skills, Team player

**Language Proficiency:** English (Fluent), German (Intermediate/ B1 Level)