# Ashwin Chakravartula

Aachen, Germany | ashwin.chakravartula@rwth-aachen.de | +49 176 84915685 | Linkedin | Github

## Education

**RWTH Aachen University**, MSc. Robotic Systems Engineering — Oct 2023 – Current

- **Coursework:** Machine Learning, Robotic Systems, Linear Control Systems, Computer Vision, Advanced Robot Kinematics and Dynamics

**Birla Institute of Technology and Science, Pilani** , B.E. (Hons.) Mechanical Engineering — Aug 2019 - Jun 2023

- **Coursework:** Mechanisms and Robotics, CAD, Manufacturing Processes, Operations Management, Thermodynamics, Fluid Mechanics

## Experience

**Student Assistant**, Mechatronics and Mobile Propulsion Institute – Aachen, DE — Jan 2024 – Sept 2024

- Created functional algorithms for autonomous ship navigation.
- Conducted studies on various control allocation techniques on the Unmanned surface vehicle ( USV) by testing control feasibility on various thruster configurations.
- Tested various trajectory planning algorithms in the Gazebo simulation environment using ROS1.
- Worked on occupancy grid-mapping for performing SLAM and improving the navigation stack.
- Currently working on sensor fusion of the recorded experimental GPS and IMU data and working on the data synchronisation from various sources.

**Manufacturing Intern**, Mercedes-Benz R&D – Bangalore, IN — Jan 2023 – Jun 2023

- Worked on a research project on Topography Optimization for reducing springback in the automotive BIW parts.
- Performed a literature review on the relationship between the stiffness and the springback induced in the sheet metal.
- Performed modal analysis to measure the part stiffness using Altair Hypermesh and modified the part Topography using Siemens NX.
- Worked on the manufacturing feasibility simulations of various parts of the upcoming Mercedes-Benz carlines such as roof parts, floor parts etc. using AutoForm.

**Robotics Intern**, Wastefull Insights – India — Jan 2022 – July 2022
(A waste management based robotics start-up that uses AI and computer vision for dry waste segregation.)

- Reduced the picking time of a 3 axis gantry robot by optimizing the scheduling algorithm.
- Integrated the robot's software architecture with ROS 1.
- Created unit-test cases in python and ROS to check the robustness of the entire robot framework.
- Created the digital twin of robot's environment using Gazebo.

## Projects

**AR Tag-guided path planning of UR3 manipulator for welding application** — Apr 2024 - May 2024

- Worked with a UR3 robot to perform a welding task.
- Performed all the necessary kinematic transformations and inverse kinematics calculations in order to perform trajectory planning.
- Desired 2D welding path was taught pointwise using the AR tags which also involved camera calibration.
- Tools Used: Python, ROS, MoveIt2

**Kinematics modelling of a cable driven continuum robot** — Aug 2022 - Dec 2022

- Performed kinematics modelling of a cable-driven continuum robot using MATLAB.
- Measured robot's behavior such as deflection, by varying tendon routing profiles and comparing the experimental results with the analytical model derived from the kinematics modelling using Cosserat rod theory.

- Tools Used: MATLAB & Simulink, Python

**Multi-agent navigation using Artificial Potential Functions** Jan 2022 - May 2022

- Conducted literature review and studied the various strategies of formation-control techniques for collective payload distribution.
- Conducted simulations for multi-robot agents for formation control and collective navigation using artificial potential functions.
- Applied the formation control algorithm on multi-agent systems such as (n=2, 4, 6).
- Created the simulation environment in Gazebo and Webots and all the necessary packages and launch files using ROS and python.
- Assessed the stability of the system using Lyapunov stability criteria
- Tools Used: Python, ROS, Gazebo, Webots, MATLAB

## Extra-curricular activities

**Project Kratos** July 2020 - Apr 2022

(Student team initiative)

- Designed and manufactured the chassis of a 6-wheeled Mars rover for the annual university competition URC (Universal Rover Challenge).
- Designed the 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 a 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, Turkiye.
- Tools Used: SolidWorks, CAD, 3D Printing, CNC Machining

## Skills

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

**Software:** ROS1, Gazebo, Webots, MoveIt2

**CAD/ CAE:** SolidWorks, Siemens NX, Altair Hypermesh, AutoForm

**Soft Skills:** Time management, Problem Solving, Teamwork

## Certifications

Excel Skills for Business Specialization, By University of Macquaire

Python Programming Specialization, By University of Michigan

Control theory of Mobile Robots, By Georgia Tech

Aerial Robotics, By University of Pennsylvania