CURRICULUM VITAE

ADITYA KAILAS JADHAV

Senior Engineer, ZF Group,
Hyderabad, Telangana-500032 India

Email: jadhav.aditya127@gmail.com
Website: Link
Phone: (+91) 8796042141

SUMMARY

Senior Vehicle Motion Control Engineer with around 1.9 years of experience at ZF Group. Holds a Dual degree with a specialization in Robotics from the Indian Institute of Technology Madras, with a strong Foundation in AI, system modelling, and control system design. Experienced in both academic research and practical engineering development. Interested in applying advanced control and AI techniques to robotic systems.

PROFESSIONAL PREPARATION

ZF Group, India   **Hyderabad, India**
Senior Engineer, Vehicle Motion Control   July 2023 - Current

Indian Institute of Technology Madras   **Chennai, India**
- B.Tech. (Naval Architecture and Ocean Eng.)   July 2018 - July 2023
- M.Tech. (Robotics) (Combined Dual Degree CGPA: 8.65/10)

RESEARCH ARTICLES

Journal Publications
- **Jadhav, A. K.**, Pandi, A. R., & Somayajula, A. (2023). "Collision avoidance for autonomous surface vessels using novel artificial potential fields." *Ocean Engineering, 288*(Part 2), 116011. https://doi.org/10.1016/j.oceaneng.2023.116011

Conference Proceedings
- Deogaonkar, VV, **Jadhav, AK**, Ramachandran, K, & Somayajula, AS. "Data Driven Identification of Ship Maneuvering Coefficients." *Proceedings of the ASME 2023 42nd International Conference on Ocean, Offshore and Arctic Engineering. Volume 5: Ocean Engineering*. Melbourne, Australia. June 11–16, 2023. V005T06A050. ASME. https://doi.org/10.1115/OMAE2023-104644

RESEARCH EXPERIENCE

MAV* Lab, Center for Marine Autonomous Systems, IIT Madras   (May 2021 - July 2023)

Development of Autonomy and Experimental Validation on Institute Lake
- Designed and executed over 15 free-running model-scale experiments to evaluate control and guidance strategies in field.
- Acquired real-world data from field experiments and performed **system identification** for dynamic modeling of the ship.
- Implemented and validated a **PD heading controller** and **Integral Line-of-Sight (I-LoS) guidance** for autonomous waypoint tracking.
- Mapped motor PWM inputs to vessel speed through empirical calibration to enable accurate motion control.
- Facilitated the integration of **ROS-based control architecture** with a **reinforcement learning (RL) agent** using Docker, demonstrating a modular and reproducible pipeline for autonomy in marine systems.

Design and Fabrication of a 1:75.5 Scale Kriso Container Ship (KCS)
- Conducted detailed resistance analysis and hull calculations using theoretical models to estimate hydrodynamic performance at 0.26 Froude Number (1.42 m/s).
- Derived propulsion system specifications from resistance estimates
- Applied CAD tools (Fusion 360) for 3D Modeling of the propulsion system.

PROFESSIONAL EXPERIENCE

ZF Group, India (_Senior Engineer, Vehicle Motion Control_**)**   (July 2023 - Present)

Project 1 - Electromechanical Roll Control for Active Roll Stabilizers
- Implemented and validated a Lyapunov stable control logic to offer better roll comfort of a vehicle for below 4Hz road disturbance frequencies.
- **Analyzed in-vehicle CAN signal data** from experimental trials to evaluate ride comfort and control tracking performance.
- Extracted roll acceleration characteristics and assessed controller behavior using frequency-domain techniques including **FFT** and **Bode plot analysis**.

Project 2 - Adaptive AI-based Feedforward Control for Lateral Vehicle Dynamics
- Developed an end-to-end pipeline emulating a closed-loop data system for **Software Defined Vehicles**, enabling continuous improvement of an AI-based lateral control module in a vehicle.
- Implemented a MATLAB-Simulink simulation of vehicle dynamics and open-loop control to generate training data based on road curvature and vehicle velocity profiles.

- Integrated Python-based Multilayer Perceptron (MLP) training scripts using Azure ML services in MATLAB to iteratively fine-tune the neural network on newly observed data.
- Designed inference and performance analysis routines within MATLAB to evaluate controller tracking accuracy via simulation and ensure robustness of weight updates before deployment.
- Demonstrated Over-the-Air (OTA) update workflows by automating replacement of model weights in the simulation loop, effectively mimicking real-world cloud-to-vehicle integration.

COURSEWORK AND SKILLS

Academic Curriculum IITM
- Principles of Guidance for Autonomous Vehicles
- Control of Automotive Systems
- Field and Service Robotics
- Mechanics and Control of Serial Robots
- Introduction to Robotics
- Ship Dynamic Positioning System
- Reinforcement Learning
- Machine Learning for Ocean Engineers
- Robotics Lab
- Mechatronic Systems

Programming Languages: MATLAB, Python, C++, Mathematica, LaTeX
Tools: Simulink, Robot Operating System (ROS), Gazebo, Docker, Git, Command Line Interface
Operating Systems: Ubuntu Linux

AWARDS AND ACHIEVEMENTS

Virtual RobotX (VRX)   (November 2021 – April 2022)
(A competition organized by RoboNation and Office of Naval Research)
- Placed **5th internationally** among **33 teams all over the globe** in Virtual RobotX Competition.
- Developed **autonomy** solutions for an unmanned surface vessel (USV) in **Gazebo** using **ROS**.
- Implemented **holonomic control** in three degrees of freedom using vectored thrust configuration on the USV.
- Implemented **LOS-Guidance**, Navigation and PID Control Algorithms for the USV to perform autonomous tasks.
- Fused GNSS, IMU sensor data using the **Extended Kalman Filter** (EKF) aided with the Robot Localization Package (ROS package) in the simulator to estimate hidden states.
- Trained a **YOLO v4** Deep Learning Model on a **custom dataset** to perform object localization.
- **Investigated LiDAR and Camera** data stream to localize obstacles to perform obstacle avoidance.

Oceans22 Student Hackathon (February 2022)
(A student hackathon organized by the IEEE OCEANS-22 Conference Chennai)
- **Won** the **first prize** among 15 different teams at the OCEANS22 Student Hackathon in the Hardware Interface module.
- **Interfaced** the provided analog sensors with a single board computer to visualize real-time data

CO-CURRICULAR AND EXTRA-CURRICULAR ACTIVITIES

Teaching Assistant Ship Structures (OE3015) and Ship Maneuvering and Control (OE3036)
<div style="text-align:right">(July- Nov 2022)</div>

*(**Instructor** – Dr. Abhilash Sharma Somayajula)*
- Facilitated effective student learning and doubt clarification under the guidance of the course instructor.
- Designed thought-provoking assignments to reinforce control theory and mechanics concepts and encourage analytical thinking.
- Organized and delivered multiple ROS tutorial sessions for nearly **50 undergraduate students** to extend their learning into robotics and software tools.

4 (TN) Air Sqn Tech NCC (Aug 2018 - March 2020)
- **Volunteered** for the National Cadet Corps (NCC) program of the Institute.
- **Participated** in the 15th August Independence Day of India parade of the Institute.

OTHER

Hobbies

- Passionate follower of Formula 1 racing, with a strong appreciation for strategy, performance engineering, and team dynamics in high-pressure environments.
- Occasionally write blogs on Quora regarding cricket and general stuff.

OBJECTIVE

"I want to strive towards the wellbeing of humanity by contributing towards projects and ideas that assist in the same."