Aditya Kailas Jadhav | NA18B103 | INDIAN INSTITUTE OF TECHNOLOGY MADRAS | PR/22/NA/23/103

EDUCATION AND SCHOLASTIC ACHIEVEMENTS

Program	Institute	% / CGPA	Year
Interdisciplinary Dual Degree in Robotics	Indian Institute of Technology, Madras	8.33	2023
XII (HSC)	Arihant College of Arts Commerce and Science	79.69 %	2017
X (SSC)	KEMS Khandala	94.20 %	2015

- Secured an **AIR**(All India rank) of **6512** in Joint Entrance Exam Advanced (**JEE ADV**) 2018 among 1.65 lakh candidates.
- Secured **13th rank in district in Pre-Secondary Scholarship Examination** for the State of Maharashtra.

PROFESSIONAL EXPERIENCE

Research Work
Guide:
Dr. Abhilash Somayajula
(Sept' 20 – Current)

Design and Fabrication of Kriso Container Ship (KCS) 1:75.5 scale model
- Performed preliminary hull calculations.
- Estimated the **resistance of the model at a design speed** of 0.26 Froude Number.
- Formulated the **propulsion system requirements** from the estimated resistance.
- Used **Fusion 360** for **3D Modeling** of the propulsion system.

Development and Testing of Lower Level Autonomy in the Institute Lake
- Performed and planned several model-scale experiments at the IITM Institute Lake.
- Performed **Speed Calibration** on the model to map the input PWM motor commands to the model speed.
- Implemented a **PD heading controller** on the model to track a desired straight line.
- Collected raw data from the **free running experiments** at the institute lake to perform **System Identification**.

CONFERENCES

OCEANS 2022 Chennai
(December 2021)

Path Planning of marine vehicles using information driven metrics (ABSTRACT ACCEPTED)
- Discusses efficient and effective exploration of the environment based on Information Driven Metrics using a network of cooperative unmanned vehicles.

Virtual Seminar and Exhibition on Trends and Technologies in Underwater Vehicles

Somayajula, A., Deogaonkar, V., Jadhav, A. (2021). **Overview of cooperative autonomy for underwater environments.** In Trends and technologies in underwater vehicles. Indian Navy and SIDM[Ψ]
- Overview of a network of autonomous robots that will cooperatively work for underwater surveillance.
- Data Driven and Mission Driven approaches for surveillance have been discussed

DUAL DEGREE PROJECT

Guide:
Dr. Abhilash Somayajula
(Sept' 20 – Current)

COLREGS compliant Cooperative Autonomy for Collision Avoidance**
- Reviewed scientific articles and papers in the field of Marine Autonomy and Path Planning.
- Analyzed Fast Marching Path Planning Algorithm to generate dynamically feasible waypoints.

COURSEWORK AND SKILLS

Coursework (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: Robot Operating System (ROS), Gazebo, Docker, Fusion 360, SACS, OpenFoam, STAAD

COURSE PROJECTS

Building, Controlling a Robot in Gazebo - **(ID6100)**
- Built a 3RS robotic manipulator in **Gazebo** using Unified Robotics Description Format (**URDF**).
- Controlled the robot using ROS for exploration of the environment.
- Implemented **color segmentation** using **OpenCV for object detection.**

Control System Design - **(ED5330)**
- Designed a **P and PI controller** for an Electro-pneumatic brake system based on system requirements..
- **Modeled the dynamics** and designed a heading angle control for an AGV using **MATLAB Control System Designer**.

Guidance and Control System Design for an ASV - **(AS5570)**
- Programmed a **simulator in Python** from scratch to implement the Guidance and Control Algorithm.
- Implemented **Backstepping Controller** on fully actuated **Cybership**, **(1:70) scale** to track a desired trajectory.

Kinematic and Dynamic Analysis of PUMA 560 - **(ED6007)**
- Implemented Position Kinematics of a **PUMA 560 manipulator** in Mathematica.
- Performed velocity analysis and forward dynamic analysis on the manipulator.

AWARDS AND ACHIEVEMENTS

5th place globally in VRX (A Competition Organized by RoboNation, OSRF)
- 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** in the simulator to estimate hidden states.
- Trained a YOLO v4 Deep Learning Model on a custom dataset to perform object detection.
- **Fused LiDAR and Camera** data stream to localize obstacles to perform obstacle avoidance.

Winners of OCEANS22 Student Hackathon
- Won the OCEANS22 Student Hackathon in the Hardware Interface module.
- Interfaced analog sensors with a computer to visualize real-time data.

EXTRA-CURRICULAR ACTIVITIES

Teaching Assistant**
- Teaching Assistant for an ongoing course Ship Structures (OE3015)

4 (TN) Air Sqn Tech NCC
- An active member of 4 (TN) Air Sqn Tech NCC (Aug 2018 - May 2020)

**** Ongoing Courses Work, *IMU(Inertial Measurement Unit), GNSS(Global Navigation Satellite System), [Ψ]SIDM(Society of Indian Defense Manufacturers)**