Mohammed Azharudeen Farook Deen

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About

Robotics Engineer with a focus on **Deep Robot Learning** and **Optimal Control** to build intelligent and safe robots.

Skills

Programming: Python, C++, MATLAB
Machine Learning & AI: PyTorch, JAX, TensorFlow, Deep Learning (CNNs, RNNs, Transformers), Reinforcement Learning (PPO, SAC), Imitation Learning (BC, DAgger), Robot Foundation Models(NVIDIA GROOT, pi-zero)
Robotics & Simulation: ROS, ROS2, Gazebo, Isaac Sim, Isaac Gym, Mujoco, NVIDIA Warp
Optimization & Control: Model Predictive Control (MPC), Quadratic/Nonlinear Programming (QP, SQP)
Development Tools & Systems: Git, Docker, Testing Frameworks (PyTest, GoogleTest), Linux
Languages: English (Business Fluency), German (Beginner), Tamil (Native), Hindi (Beginner)

Work Experience

Intern / Working Student — *Stuttgart, Germany*
Fraunhofer IPA and IFF University of Stuttgart — *July 2024 – Mar 2025*

- Developed a simulation environment in **MuJoCo**, supporting both state- and vision-based inputs (using **ResNet/Vision Transformers (ViT)**, and data augmentation) for a peg-in-hole assembly task with different difficulty presets for **Learning from Demonstrations(LfD)** and **Human-in-the-Loop RL.**
- Implemented and tuned various controller modules; Integrated **teleoperation** modules for keyboard and spacemouse control, collected demonstration data and explored **synthetic data generation**.
- Built a real arm robot **manipulator(UR5e + Robotiq hand-e Gripper)** interface with **Flask–ROS server** for command execution with **actor–learner asynchronous nodes**.
- Adapted both the simulation and real environment to work with real-time online **Reinforcement Learning** (SAC) and **Imitation Learning** (BC, DAgger) pipelines in both **Pytorch** and **JAX**, and benchmarked them using simulation.

Master Thesis - Robot Learning of Quadrupedal Locomotion on Deformable Terrain — *Aachen, Germany*
RWTH Institute for Data Science in Mechanical Engineering and RWTH Institute of Geomechanics and Underground Technology — *Sep 2023 – Mar 2024*

- Integrated a particle-based contact model to simulate the complex behaviors of granular materials in **NVIDIA Isaac Sim**, developed and evaluated an adaptable and robust controller using Reinforcement Learning (PPO) in PyTorch for **quadruped (Unitree A1)** to follow a unified policy in diverse environments with **sim-to-real** additions.
- Preliminary work presented at **1st German Robotics Conference (GRC2025)**, and a related paper is being finalized.

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Student Assistant — *Aachen, Germany*
RWTH Institute for Automatic Control — *May 2023 – June 2024*

- Extended codebase of a unified C++ interface for various **quadratic programming (QP)** to **nonlinear programming (NLP) solvers** and included coupled tools for MPC, NMPC, SQP, auto differentiation, Hessian regularization methods, polynomial interpolation, collocation methods, etc with appropriate tests.
- Involved in the Fernbin project, where my tasks included developing simple simulation for testing control systems in Python and **ROS2** for ship-vessels/ferry that react dynamically to the surroundings.

Research Project — *Aachen, Germany*
Automated and Connected Driving Challenges — RWTH Institute for Automotive Engineering — *Apr 2023 – Aug 2023*

- Enhanced trajectory planning in autonomous vehicles using **Model Predictive Control (MPC)**.

Teaching Assistant — *Aachen, Germany*
RWTH Institute of Geomechanics and Underground Technology — *Apr 2023 – Sep 2023*

- Implemented programming exercises in Python/ROS, conducted tutorial sessions for “Introduction to Robotics” course.

Project / Research Assistant — *Kancheepuram, India*
Microscale Transport Laboratory, Indian Institute of Information Technology (IIITDM)) — *Aug 2019 – Mar 2021*

- Studied predominant microscale phenomena subjected to acoustic fields and published results in various reputed journals.

Education

RWTH Aachen University *Oct 2021 – Dec 2024*
*Master of Science in **Robotic Systems Engineering***

Shiv Nadar University *Aug 2015 - May 2019*
*Bachelor of Technology with major in **Mechanical Engineering**(Specilization: Computational Techniques) and minor in Electronics and Communication Engineering*

Journal Publications and Accepted Conferences

Rapid Quadrupedal Locomotion on Deformable Terrain - 1st German Robotics Conference March 2025
Mohammed Azharudeen Farook Deen, Omer Kemal Adak, Raul Fuentes
https://www.robotics-institute-germany.de/conference/

Theory of nonlinear acoustic forces acting on inhomogeneous fluids. Journal of Fluid Mechanics. [IF(2022)-3.7] April 2022
Rajendran VK, Jayakumar S,*Azharudeen M*, Subramani K
https://doi.org/10.1017/jfm.2022.257

Heat transfer mechanism driven by acoustic body force under acoustic fields. Physical Review Fluids. [IF(2021)-2.5] July, 2021
Azharudeen M, Kumar V, Pothuri C, Subramani K

A Novel Heat Transfer Mechanism Using Acoustic Waves - Presented at International Heat and Mass Transfer Conference, IIT Roorke Dec 2019
Azharudeen M, Pothuri C, Subramani K
https://doi.org/10.1103/PhysRevFluids.6.073501

Rapid mixing in microchannel using standing bulk acoustic waves. Physics of Fluids. [IF(2020)-3.5] Dec 2019
Azharudeen M, Pothuri C, Subramani K
https://doi.org/10.1017/jfm.2022.257

Honors & Awards

Full Academic Scholarship, 8 Semesters – Shiv Nadar University *Aug 2015*
Issued by Shiv Nadar University

Completed my engineering program with 100% scholarship across all 8 semesters.