Md Saif Ahmad

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Portfolio : saifahmad.github.io| github.com/saifahmadgit | linkedin.com/in/saif-ahmad

Education

Northwestern University – Evanston, Illinois — M.S in Robotics (Sept 2025 – Sep 2026(expected))

IIT Guwahati – Guwahati, India — M.Tech in Mechanical Engineering (July 2018 – May 2020)

Aligarh Muslim University – Aligarh, India — B.Tech in Mechanical Engineering (July 2013 – May 2017)

Skills

Robotics: ROS 2, SLAM, Perception, Navigation, Computer Vision, Path Planning,Legged Locomotion, Control, Optimization

Software Development: C++, Python, C, MATLAB, Git, Linux, Bash Embedded programming, Perforce, Vector CANdb++

Machine Learning: Pytorch, Tensorflow, SKlearn, Deep Reinforcement learning, Autoencoders

Simulation: Simulink, Gazebo, Issac Sim, Issac Lab, Genesis, CoppeliaSim, GT Suite

Hardware: Raspberry Pi, Arduino, NVIDIA Jetson

Professional Experience

Modelling and Simulation Engineer - Daimler Trucks — October 2020 – July 2025

[MATLAB, Simulink, GT-Suite, Python, Pytorch, Tensorflow, Vector CANdb++, Perforce] — Bangalore, India

- Collaborated with the energy management team to develop fuel-cell/battery power-split strategies, improving range by 8%.
- Developed a battery fault-detection algorithm in PyTorch using an LSTM autoencoder for limited labeled fault data.
- Built EKF/UKF-based SOC estimators with the BMS team to correct drift from current sensor error, published in SAE.
- Designed a gain-scheduled PI + feedforward controller for a human driver pedal actuation model, improving velocity tracking.
- Led development and delivery of Hardware-in-the-Loop plant models for a new CAN architecture, managing a 3-engineer team.
- Built and validated EV powertrain digital twins in Simulink and GT-Suite to simulate range, performance, and thermal KPIs, achieving 95% predictive accuracy through CAN-based calibration.
- Validated ECU control logic using Simulink S-functions in closed-loop with a vehicle model for SIL/MIL testing and tuning.

Projects

Quadruped Locomotion on Unitree Go2 (Ongoing)

[Reinforcement Learning, PPO,Python, ROS 2, PyTorch, Genesis, Issac Sim, Issac Lab] — Jan 2026 - Present

- Developing PPO-based reinforcement learning policies for dynamic quadruped locomotion.
- Implementing sim-to-real transfer via domain randomization, modeling sensor noise, latency, contact ans terrain friction.
- Designing reward functions and low-level control interfaces for stable, real-world deployment via ROS 2 and the Unitree SDK.

EKF SLAM pipeline for TurtleBot3 Burger in C++ from scratch (Ongoing)

[ROS 2, SLAM, C++] — Jan 2026 - Present

- Programming a complete ROS 2 pipeline in C++ for SLAM on a Turtlebot, from scratch.
- Developing a kinematics and control library with a simulation framework to enable sim to real deployment on TurtleBot3.

Franka Emika Panda Arm Robot - Vision-Guided Pick and Place

[ROS 2, MoveIt 2, Intel RealSense, OpenCV, YOLO] — Dec 2025

- Built a vision-guided manipulation pipeline for the Franka to detect, match, and autonomously grasp and place objects.
- Integrated Intel RealSense inputs, YOLO, and MoveIt via ROS 2 for autonomous grasp-and-place control.
- Implemented camera-to-robot hand–eye calibration and TF frame alignment to enable accurate 3D pose estimation.

Prompt-to-Pose Grasp Planning in Cluttered Scenes

[Python, Grounding Dino, SAM2, GraspNet] — Dec 2025

- Developed a prompt–based pipeline that identifies target objects in clutter, segments them, and predicts feasible grasp poses.
- Used Grounding DINO and SAM2 to generate segmented point clouds, then applied NVIDIA Contact-GraspNet to compute ranked 6-DoF parallel-jaw grasp poses.

Catching a pen using PincherX Robot Arm

[Python, OpenCV, Intel RealSense] — Dec 2025

- Developed a perception and manipulation pipeline using a RealSense camera to detect a pen and command a robot arm for precise pick-up.

Optimization of bearing parameters

[C++, Genetic Algorithms] — Jan 2020

- Conducted multi-objective optimization of bearing design to maximize load capacity and minimize wear, published in ASME.
- Ensured the optimized design was robust to manufacturing tolerances by incorporating variability into the GA framework.