

# Md Saif Ahmad

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🌐 Portfolio : [saifahmad.github.io](https://saifahmad.github.io) | [github.com/saifahmadgit](https://github.com/saifahmadgit) | [linkedin.com/in/saif-ahmad](https://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, Reinforcement Learning, Legged Locomotion, SLAM, Perception, Navigation, Computer Vision, Path Planning
- 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, Genesis, Gazebo, Issac Sim, Issac Lab, MuJoco, CoppeliaSim, GT Suite
- Hardware:** Raspberry Pi, Arduino, NVIDIA Jetson

## PROFESSIONAL EXPERIENCE

<b>Modelling and Simulation Engineer - Daimler Trucks</b> [MATLAB, Simulink, GT-Suite, Python, Pytorch, Tensorflow, Vector CANdb++, Perforce]	October 2020 – July 2025 Bangalore, India
<ul style="list-style-type: none"><li>Collaborated with the energy management team to develop fuel-cell/battery power-split strategies, improving range by 8%.</li><li>Developed a battery fault-detection algorithm in PyTorch using an LSTM autoencoder for limited labeled fault data.</li><li>Built EKF/UKF-based SOC estimators with the BMS team to correct drift from current sensor error, published in SAE.</li><li>Designed a gain-scheduled PI + feedforward controller for a human driver pedal actuation model, improving velocity tracking.</li><li>Led development and delivery of Hardware-in-the-Loop plant models for a new CAN architecture, managing a 3-engineer team.</li><li>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.</li><li>Validated ECU control logic using Simulink S-functions in closed-loop with a vehicle model for SIL/MIL testing and tuning.</li></ul>	

## PROJECTS

### Quadruped Locomotion on Unitree Go2 (Ongoing)

[Reinforcement Learning, PPO, Python, ROS 2, PyTorch, Genesis, Issac Sim, Issac Lab]	Jan 2026 - Present
<ul style="list-style-type: none"><li>Developing PPO-based reinforcement learning policies for dynamic quadruped locomotion.</li><li>Implementing sim-to-real transfer via domain randomization, modeling sensor noise, latency, contact and terrain friction.</li><li>Designing reward functions and low-level control interfaces for stable, real-world deployment via ROS 2 and the Unitree SDK.</li></ul>	

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

[ROS 2, SLAM, C++]	Jan 2026 - Present
<ul style="list-style-type: none"><li>Programming a complete ROS 2 pipeline in C++ for SLAM on a Turtlebot, from scratch.</li><li>Developing a kinematics and control library with a simulation framework to enable sim to real deployment on TurtleBot3.</li></ul>	

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

[ROS 2, MoveIt 2, Intel RealSense, OpenCV, YOLO]	Dec 2025
<ul style="list-style-type: none"><li>Built a vision-guided manipulation pipeline for the Franka to detect, match, and autonomously grasp and place objects.</li><li>Integrated Intel RealSense inputs, YOLO, and MoveIt via ROS 2 for autonomous grasp-and-place control.</li><li>Implemented camera-to-robot hand-eye calibration and TF frame alignment to enable accurate 3D pose estimation.</li></ul>	

### Prompt-to-Pose Grasp Planning in Cluttered Scenes

[Python, Grounding Dino, SAM2, GraspNet]	Dec 2025
<ul style="list-style-type: none"><li>Developed a prompt-based pipeline that identifies target objects in clutter, segments them, and predicts feasible grasp poses.</li><li>Used Grounding DINO and SAM2 to generate segmented point clouds, then applied NVIDIA Contact-GraspNet to compute ranked 6-DoF parallel-jaw grasp poses.</li></ul>	

### Catching a pen using PincherX Robot Arm

[Python, OpenCV, Intel RealSense]	Dec 2025
<ul style="list-style-type: none"><li>Developed a perception and manipulation pipeline using a RealSense camera to detect a pen and command a robot arm for precise pick-up.</li></ul>	

### Optimization of bearing parameters

[C++, Genetic Algorithms]	Jan 2020
<ul style="list-style-type: none"><li>Conducted multi-objective optimization of bearing design to maximize load capacity and minimize wear, published in ASME.</li><li>Ensured the optimized design was robust to manufacturing tolerances by incorporating variability into the GA framework.</li></ul>	