

# Sachin Thakur

✉ sachint.2306@gmail.com

🌐 sachin-thakur-22558017b

🔗 [https://thakur-sachin.github.io/sachin\\_portfolio/](https://thakur-sachin.github.io/sachin_portfolio/)

## 📁 Professional Experience

### Robotics Engineer, ML, Luminous Robotics

Jan 2026 – Present | South Boston, MA, USA

- Currently collaborating on **Digital Twin** fellowship aimed at using **NVIDIA Isaac Sim** for robot simulation, data collection and testing.
- Worked as duo towards SOTA Physical AI data accumulation pipeline, helping the company win **AWS and NVIDIA Physical AI grant**. We ended up being selected as 1/9 companies globally and am currently working with **AWS and NVIDIA** teams for physical AI challenge.
- Implemented SOTA pose estimation models like **Foundation Pose, Efficient Pose, Center Pose, and DOPE** followed by fine tuning for robust performance in real world.
- Supporting the team across entire stack like ROS2, Networking, Deployment, Debugging, Calibration, etc.

### Machine Learning Scientist, Oxipital AI

Jun 2024 – Dec 2025 | Bedford, MA, USA

- Implemented ReMaX-inspired panoptic segmentation optimizations (ReMask + ReClass) in **PyTorch**, cutting training time 4→3 days, maintaining Panoptic Quality (PQ), and reducing false positives by 15%.
- Developed **DINOv3-style SSL backbone** for panoptic segmentation; build data infra for training foundation vision model.
- Redesigned the vision transformer for memory-efficient, variable-resolution training, enabling higher-resolution inputs that increased **PQ by 5%** while maintaining comparable training cost.
- Designed **binary and sparse data representations (HDF5)** for high-volume sensor and feature data, reducing storage footprint by **~60%** while improving training and inference throughput.
- Led redesign of the inference pipeline spanning **GPU, container, and on-prem environments**, reducing end-to-end latency from **300ms → 200ms** using FP16 quantization and ONNX/TensorRT.
- Debugged pipelines using **NVIDIA Nsight**, optimizing transformer execution paths and reducing inference latency to **~110ms**.

## 🎓 Education

### M.S. Mechanical Engineering, Columbia University

Aug 2023 – Dec 2024 | New York, USA

Minor: Robotics and Control

- Relevant Courses: Intro to Robotics, Artificial Intelligence, Applied Robotics, Robot Studio, Control Theory, Evolutionary Algorithms

### B.E. Mechanical Engineering, Birla Institute of Technology & Science

Aug 2018 – May 2022 | Rajasthan, India

- Relevant Courses: Computer Vision, Maths I, II, & III, Non-Linear Dynamics and Chaos, IoT, Additive Manufacturing

## 📁 Projects

### Trex – Adaptive Bipedal Robot, Technologies: Isaac Sim, ROS2, PyTorch, Docker, URDF, PPO/A3C

- Built a **edge-to-cloud pipeline**, integrating IMU, motor telemetry, and control signals on **embedded hardware (Jetson / Pi)**.
- Implemented **real-time sensor fusion** and validated data flows through simulation and hardware-in-the-loop testing.
- Converted CAD → URDF and designed data capture pipelines aligned with downstream ML and control requirements.

### Autonomous Quadruped Project

- Built a quadruped robot with autonomous navigation and stable gait using state-of-the-art control algorithms.
- Implemented sensor fusion techniques (IMU, LIDAR, and cameras) to enhance terrain adaptability and obstacle avoidance.
- Secured a grant of \$15,000 from BITSAA for the ambitious endeavour of level 4 autonomous, cost-effective quadruped robot.

### Smart Traffic Monitoring System, Technologies: YOLOv5, Flask, IoT, RasPi, OpenCV

- Designed an **IoT data pipeline** ingesting real-time sensor and video data from **Raspberry Pi edge devices** into an on-prem Flask service and downstream analytics.
- Implemented **data cleansing, buffering, and visualization**, enabling actionable decision support and congestion analysis.
- Built the system with **intermittent connectivity and constrained compute** in mind, ensuring resilient data capture.

### Collaborative Delivery Robots, Technologies: OpenCV, SLAM, Path Planning, Micro-controllers

- Developed a swarm of autonomous delivery robots with **multi-agent path planning** and task allocation.
- Implemented a **mono-camera SLAM and navigation** system using OpenCV for fully autonomous package delivery in national robotics competition settings.

### Evolving Soft Robots

- Engineered evolutionary algorithms for optimizing robot morphology and locomotion in PyBullet simulations.
- Refined Genetic Algorithms through hyperparameter tuning, improving convergence speed and robot resilience.

## 📄 Publications

### CPPS for monitoring, visualization, and control, IJCIIM

Mar 2023

- Designed a **tiered edge-fog-cloud data architecture** for real-time sensor monitoring and severity-based storage.
- Implemented **buffering, prioritization, and lifecycle-aware data retention**, directly aligned with large-scale IoT data management.

### End-to-End Deep Reinforcement Learning Platform for Competitive Physical Dynamic Systems, NeurIPS

Dec 2024

- Built a high-fidelity Isaac Sim foosball simulator with realistic dynamics and contact modeling to train AI agents.

## 🧠 Skills

### Deep Learning & Computer Vision:

- **Frameworks:** PyTorch, TensorFlow, ONNX, TensorRT, OpenCV
- **Architectures:** Vision Transformer, ResNet/ConvNeXt, YOLO
- **Optimization:** FP16/INT8 quantization, model pruning, NVIDIA Nsight profiling

### High-Performance Systems:

- GPU-accelerated DDP, Dockerized deployment, edge inference optimization, and scalable containerized pipelines

### Machine Learning Engineering:

- **Languages:** Python, C++, Bash
- **APIs / Services:** FastAPI, Flask, REST
- **Data & Storage:** HDF5, S3, MongoDB, MCAP
- **MLOps:** Docker, Kubernetes, AWS, MLflow, Jenkins, Git

### Robotics & Simulation:

- **Simulation Tools:** ROS2, Isaac Sim, MuJoCo, Gazebo, PyBullet
- **Hardware Platforms:** Pi, Jetson, Arduino, embedded systems
- **Control & Planning:** RL (PPO, A3C), MPC, PID control