

ABHISHEK S

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EXPERIENCE

- **BuildMachineLabs (Founder)** *January 2026 – Present*
Founded and lead a 3-person open-source robotics-research venture addressing the scarcity of robotics data for foundation-model post-training by building curated datasets for niche, hard-to-source domains that established pipelines underserve; research output spans **6 papers at ICRA & RSS 2026**, across Digital Twins, Perception & Multi-Agent Path Finding.
- **Indian Institute of Science, Bengaluru (Control and Optimization Intern)** *August 2025 – Present*
Designed a real-time multi-robot coordinator using a custom quadrant-token abstraction that partitions shared grid cells into sub-cell waypoints, robust to spatio-temporal conflicts and collision-free under quadrant mutual exclusion; validated across 100+ live OptiTrack experiments (4 robots, scalable to 10), cutting average inter-robot wait to about 0.1 s.

CURRENT RESEARCH

- **MineXplore: A RL Exploration Benchmark for GNSS-Denied Environment (ICRA 2026@Xplore)**
Addressing the absent mining-RL benchmark, built an open-source MuJoCo simulation of a **real Chilean copper mine** via a contour-to-MJCF pipeline, achieving **95.38% geometric IoU** and validating PPO policies at **88.9% coverage**.
- **Teaching Robots to Say ‘I Don’t Know’: SENTINEL for Uncertainty-Aware SLAM (ICRA 2026@UOWR)**
Engineered a **training-free** reliability layer flagging silent LiDAR failures on sub-\$300 robots, fusing scan geometry with LiDAR/RGB-D depth consistency to reject corrupted scans via reliability scores, validated across **5 failure modes**.
- **CADENCE: Predicting Realized MAPF Execution Time Beyond Sum of Costs (ICRA 2026@MARS)**
Built a **480-trial robotic hardware corpus** (7 robots) to predict completion time, showing **primitive motion burden** cuts held-out error by **48.6–59.8% MAE** over Sum-of-Costs via scenario-held-out ridge and mixed-effects models.
- **Subterra: A Validated Benchmark for GNSS-Denied Tunnel Navigation (RSS 2026@WPCIS)**
Lacking a real-geometry tunnel-RL testbed, rebuilt a **351 m** metro tunnel from LiDAR scans as a MuJoCo POMDP, validated at **97.1% fidelity** (2.46 cm surface error) across 199 metrics, where a PPO agent reached **90.02% coverage**.

PROJECTS

- **EdgeLIO: LiDAR–Inertial Perception Stack for Edge Mobile Robots** *January 2025 – May 2025*
Engineered an onboard LiDAR–inertial perception stack (**FAST-LIO2**, **Livox MID360**, source-built **ROS 2 Humble** on Ubuntu 20.04) for real-time state estimation and 3D mapping on a custom Jetson NX mobile robot. Integrated LiDAR/IMU sensing and Arduino serial control, sustaining 10 Hz mapping over a 15-minute physical indoor run at ~22% CPU with 15 ms/scan latency and 0.13 m ATE RMSE, enabling downstream autonomous navigation without offboard compute.
- **SceneForge: Interactive 3D Object Transform Editor** *August 2024 – December 2024*
Built an in-browser 3D object-transform editor (**React Three Fiber**, **Three.js**) with draggable numeric inputs for precise position/rotation/scale in real-time two-way sync with an in-viewport gizmo, plus a movable properties panel with per-axis increment locking. [GitHub](#) | [Live Demo](#).

EDUCATION

PES University Bangalore, India
B.Tech, Computer Science and Engineering (CSE) | GPA: 7.7 / 10 *December 2022 – Present*

TECHNICAL SKILLS

Languages: Python, C++
Machine Learning & RL: PyTorch, TensorFlow, Stable-Baselines3, RLlib (Ray); PPO, SAC, DQN, Q-learning
Robotics & Simulation: ROS 1 Noetic, ROS 2 Humble, MuJoCo, Gazebo
Perception & SLAM: FAST-LIO2, LiDAR–inertial odometry, Open3D, PCL, RGB-D
Control & Optimization: MATLAB/Simulink, CVXPY, Eigen
Scientific Computing: NumPy, SciPy, scikit-learn, statsmodels, pandas, Matplotlib
Hardware: NVIDIA Jetson Xavier NX, Arduino, Livox MID360, OptiTrack (motion capture)