Shahan Sahay

Undergraduate researcher in machine learning and robotics. B.Tech in Computer Science and Engineering (AI and Robotics), VIT Chennai, graduating May 2027.

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Research interests

Reliable machine learning for robots and public systems: calibrated uncertainty under distribution shift, evaluation protocols free of leakage and drift, and language models that must follow rules that change. Hardware experience with rovers, drones and embedded vision.

Education

Vellore Institute of Technology, Chennai Aug 2023 – May 2027 (expected)
B.Tech in Computer Science and Engineering, specialisation in AI and Robotics. CGPA 8.24 / 10.

Accepted

1. **S. Sahay**, H. Yadav, A. Jaiswal, B. Dhimar and J. J. Nesam J*. **Browser-Native Presynthesis Estimation and Feasibility-Gated FPGA Device Selection from Verilog Sources.** IEEE INDICON 2026 (accepted, subject to revision).

Papers under review and in preparation

1. **S. Sahay**, H. Yadav, A. Jaiswal and R. Tiwari*. **Joint Field Characterisation of Onboard Perception, Mapping and Manipulation on a Sub-13 kg Rocker-Bogie Rover.** Under review at Discover Applied Sciences. Preprint: doi:10.21203/rs.3.rs-11256718/v1.
2. **S. Sahay**, H. Yadav, A. Jaiswal, A. Sharma, S. Gupta* and R. Tiwari. **Weather-year choice outweighs algorithm choice in sizing standalone hybrid renewable energy systems.** In revision at Results in Engineering, with a preprint on SSRN. Data and code: doi:10.5281/zenodo.23915872.
3. **S. Sahay** and S. Gupta*. **Can open language models classify drone operation risk? A step-by-step audit against JARUS SORA 2.5.** Manuscript. Data and code: doi:10.5281/zenodo.23827295.
4. **S. Sahay**. **Machine-learning weather models as no-fly forecasters for small drones: decision-oriented verification against reanalysis, airport reports and rain gauges over India.** Manuscript. Data and code: doi:10.5281/zenodo.23644034.
5. **S. Sahay** and A. Bhatia. **A Two-Layer Intrusion Detection System for Denial-of-Service and Spoofing Attacks That Persist on CoAP After DTLS and OSCORE.** Manuscript. Data and code: doi:10.5281/zenodo.23529249.
6. **S. Sahay**, B. N. Dwivedi, A. Sharma and R. Tiwari*. **Is E-Governance Quantum-Safe? Post-Quantum TLS Readiness of 9,357 Indian Government Websites.** Submitted to ICCIDSDT 2027. Data and code: doi:10.5281/zenodo.23433325.
7. **S. Sahay**, H. Yadav, A. Jaiswal, S. Gupta and R. Tiwari. **Are fuzzy rule-based classifiers calibrated? A cross-family audit and a rule-preserving recalibration.** Submitted to the International Journal of Computational Intelligence Systems. Data and code: doi:10.5281/zenodo.23425947.
8. **S. Sahay**, B. N. Dwivedi, A. Sharma and S. Gupta*. **Section 302 No Longer Means Murder: Statute Drift in Open Language Models after India's Criminal-Code Replacement.** Submitted to ICCIDSDT 2027. Data and code: doi:10.5281/zenodo.23333395.
9. **S. Sahay**. **How much of crypto deep-learning forecasting skill is leakage? A factorial audit with placebo tests.** Manuscript. Data and code: doi:10.5281/zenodo.23339885.

10. **S. Sahay**, A. Jaiswal, H. Yadav, R. Tiwari* and S. Gupta. **Learned quadrotor force models under flight-regime shift: calibrated uncertainty, miss runs and online recalibration with delayed force feedback.** Manuscript. Data and code: `doi:10.5281/zenodo.23300456`.
11. **S. Sahay**, B. N. Dwivedi, A. Sharma and S. Gupta. **Who Gets the Digital Textbook? A Language-, Grade- and State-Level Equity Audit of India's DIKSHA Platform.** Submitted to ICCIDSDT 2027. Data and code: `doi:10.5281/zenodo.23104308`.
12. **S. Sahay**, R. Tiwari and S. Gupta*. **Benchmark Drift: Silent Revisions of Evaluation Splits on the Hugging Face Hub and What They Do to Scores.** Submitted to IEEE Access. Data and code: `doi:10.5281/zenodo.23110611`.
13. **S. Sahay**, A. Jaiswal, H. Yadav, R. Tiwari and S. Gupta*. **Evaluation leakage inflates reported feature selection accuracy far more than the differences between binary metaheuristics.** Submitted to IEEE Access. Data and code: `doi:10.5281/zenodo.23070325`, `doi:10.5281/zenodo.23070391`.

Patents

1. **Wearable Device, System, and Method for Predicting and Managing Body Focused Repetitive Behavior (BFRB).** Indian patent application `202641053088`, filed 25 Apr 2026, published 8 May 2026 (Journal 19/2026). Applicant: VIT Chennai.
2. **System and Method for Operating Hand Gesture-Based Kiosk.** Indian patent application `202641086679`, filed 15 Jul 2026, published 17 Jul 2026 (Journal 29/2026). Applicant: VIT Chennai.
3. **Sensor-Based Adaptive Washing Machine.** Indian patent application `202641088377`, filed 20 Jul 2026, published 24 Jul 2026 (Journal 30/2026). Applicant: VIT Chennai.
4. **A System and Method for Disaster Management Using Hybrid Locomotion Rover.** Indian patent application `202641107908`, filed 8 Sep 2026. Applicant: VIT Chennai.
5. **Retrofittable Turnstile Energy Harvesting System.** Indian patent application `202641120386`, filed 7 Oct 2026. Applicant: VIT Chennai.

Experience

Machine Learning Engineer Intern, Cestrum
May 2026 – now

Real-time object detection pipelines with YOLOv8 and OpenCV, owned end to end from dataset preparation to inference optimisation, with CNN architectures benchmarked for accuracy against speed. Hybrid.

Deputy Research & Science Lead, Namo Nirvana
Oct 2025 – now

VIT Chennai's official robotics team. Lead the team's research and technical writing, turning builds into design reports and papers. Worked on the rocker-bogie rover for ISRO's IRoC-U challenge: Jetson Nano compute, LiDAR SLAM in ROS and a camera-guided arm.

Joined Namo Nirvana's programming team
Jul 2025

Software for the team's rovers: ROS, sensor integration and onboard computer vision.

ML Engineer & Technical Lead, OneStepGreener
Jun – Aug 2025

A vision system for sorting plastic on conveyor belts: a YOLOv8 detector for five plastic classes, tracking so each item is counted once, and a Gemini-assisted loop that flags uncertain detections for review.

Frontend Software Engineering Intern, TCI Group
May – Jun 2025

Frontend for MYTCI, the company's internal employee portal: responsive components, secure login flows and dashboards built from raw device data.

Projects

Weed-detection rover

Oct 2026 – now

A skid-steer rover that finds weeds on its own. A Raspberry Pi runs the camera and the detector, an Arduino Uno drives four encoder motors through BTS7960 drivers, and three ultrasonic sensors watch for obstacles.

Firefighting drone

Sep – Oct 2026

A three-person project, with its report submitted: a drone designed to count people in smoke from its video feed and drop a foam extinguisher ball from a servo release, with the YOLO detector running off-board on a GPU laptop.

AGRISCAN, final-year project

Jul 2026 – now

Two-tier aerial crop scouting: a light screener on the drone, a heavier diagnosis on the ground.

Autonomous underground exploration rover

Jul – Dec 2025

A rover for spaces where GPS and light disappear, built around LiDAR SLAM and hazard-aware navigation. A patent filing and a paper are in progress.

Desktop companion robot

Summer 2025

An interactive desk robot built on an ESP32.

Vision-guided robotic arm

Jul – Dec 2024

A four-axis arm that uses a camera to find what it should pick up.

Courses

- Supervised Machine Learning: Regression and Classification, Stanford & DeepLearning.AI, Jun 2025
- Advanced Learning Algorithms, Stanford & DeepLearning.AI, Jun 2025
- Unsupervised Learning, Recommenders, Reinforcement Learning, Stanford & DeepLearning.AI, Jun 2025
- Software Engineering Job Simulation, J.P. Morgan via Forage, Jul 2025
- Software Development Job Simulation, Datacom via Forage, Jul 2025

Skills

Python, PyTorch, scikit-learn, LightGBM, NumPy, pandas, OpenCV, YOLO, ROS, Gazebo, Raspberry Pi, Arduino, ESP32, NVIDIA Jetson, LaTeX, Docker, React, Next.js, TypeScript. Experimental design and statistics for ML evaluation: conformal prediction, calibration metrics, bootstrap intervals, multiple-comparison correction.