

SWARNIM BHADALE

B.Tech Computer Science

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Professional Summary

An avid researcher focused on utilizing Computer Vision, edge computation and Artificial Intelligence for aerospace applications. Researched on guided flight control systems for both model rockets and autonomous drones. Worked on satellite imagery analysis, Inertial Navigation Systems, GPS denied navigation, Trajectory and Pose Estimation and various other aerospace software problems. Interested in Research and Development role for developing applications for satellite systems.

International schooling in the UK and USA with exposure to various languages and nationalities.

EDUCATION

Pimpri Chinchwad College of Engineering (PCCOE), Akurdi, Pune

Bachelor of Technology (B.Tech), Computer Science Engineering, Aug 2022 to Jul 2026

APJ College of Science and Commerce, Wakad, Pune

12th

Coppell High School, Dallas, Texas, USA

10th

INDUSTRY EXPERIENCE

Research Intern (Flight Software and Autonomy), FLIGEN SYSTEMS PVT LTD

Jan 2026 to Jun 2026

NVIDIA Jetson | Raspberry Pi | Pixhawk | PX4 | ROS | PyTorch | ONNX | Lidar | Optical Flow

- GPS-Denied Indoor Navigation (Intern): Developed semi-autonomous guidance software for indoor drones by fusing **LIDAR-SLAM, Optical Flow and Visual Inertial Odometry** which provided collision avoidance capability indoors.
- Vision Positioning System: Researched and prototyped a deep-learning visual positioning algorithm using **SuperPoint** and **LightGlue** in PyTorch, exported to **ONNX** and deployed on NVIDIA **Jetson Orin Nano** edge hardware for real-time onboard inference.
- Companion Computer Stack: Built flight software stacks capable of edge-compute AI processing on indigenous Indian hardware (**Vicharak Axon**), supporting the Make-in-India hardware ecosystem.
- Flight Software Architecture: Contributed to a complete top-down architecture spanning low-level device drivers through to high-level autonomy suites, with emphasis on modularity, reliability and real-time performance.
- Fleet Management Systems: Initiated research into multi-drone fleet operations, swarm coordination and remote operations.

KEY ENGINEERING PROJECTS

Satellite Imagery Change Detection System, Collegiate Project

- Developed Siamese ViT and GAN pipelines for multi-temporal satellite change detection on roads and buildings.
- Integrated SuperPoint and LightGlue feature matching to align image pairs and eliminate alignment errors.
- Applied radiometric and histogram normalization to remove false positives from lighting and seasonal changes.
- Processed high-resolution GeoTIFF imagery using Rasterio and TorchGeo while preserving spatial CRS metadata.
- Engineered sliding-window tile inference to process multi-gigabyte satellite imagery within memory constraints.
- Fine-tuned GAN discriminators to sharpen coarse ViT segmentation masks and refine complex structural edges.
- Optimized model deployment using ONNX Runtime quantization to accelerate inference processing speed. Evaluated model performance using mIoU and Precision/Recall benchmarks on remote sensing change datasets.

Active Fin-Controlled Rocket with GPS Guidance, Team Anantam

Researched on **control system** for a small scale model rocket to maintain heading using Inertial sensors and GPS telemetry while under flight. Fused **INS** and **GPS** systems to create a **dead reckoning** based flight path logic.

Autonomous Drone Obstacle Avoidance & Target Detection

Developed perception and navigation algorithms enabling a drone to avoid obstacles and identify targets autonomously during mission execution.

Altitude & Orientation Estimator (6-DoF Suite)

Implemented state estimation software for ballistic trajectory tracking using MATLAB and Simulink.

State-Driven Flight Software

Built a state-machine flight controller using real-time sensor feedback for dynamic in-flight control; flight-validated to a peak altitude of 300 m.

Publications

- **ML Student Dropout and Detection**
 - Designed a predictive machine-learning model on educational data to flag at-risk cases for early intervention.
- **DDoS Mitigation via ML Analysis**
 - Designed an active response system to detect and mitigate DDoS attacks, improving network resilience and uptime.
- **Personalized Backup and Storage Device**
 - Developed completely private and lightweight local cloud storage model based on Vicharak Axon.

ACHIEVEMENTS, CERTIFICATIONS & OUTREACH

FIRST LEGO League Judge Training and COMET FIRST Alumni Volunteering - Certified by FIRST, USA

Organised and judged FIRST LEGO League robotics events and mentored young participants in robotics and teamwork.

Certified coursework

Python, C++, Java, Artificial Intelligence, Machine Learning, Deep Learning, ROS, ADAS.

Conducted introductory robotics classes for school students and mentored rocketry workshops and community STEM programmes

Research Conference Award, Abhinav 2K26 Young Professional Conference

Best Paper Award in the Computer Networks and Security track for Personalized Backup and Data Storage Device.

Extracurricular Activities

Operations Director, Team Anantam, PCCOE, Akurdi

- Developed entire plans from SOPs, checklists, MSDS sheets, Launch Procedures, Engineering workflows and others to streamline development and research in my collegiate team.
- Created systems for hierarchy, conflict resolution, data flow and responsibilities within the team.
- Generated templates for PDR, CDR Post Flight reviews, Testing Data, Testing Plans and Timelines and other technical documents

Head of Automation, Team Anantam, PCCOE, Akurdi

- Developed State Based flight software for unguided experimental rockets up to 500- 1000m using fusion of inertial (accelerometers, barometers, Magnetometers) and GPS measurements.
- Developed AI/ML based prototypes for satellite and camera imagery for problem statements such as image segmentation and feature recognition.
- Developed supporting software such as Flight Trajectory Simulators, Launch Control Software, Internal Database, Ground Station softwares, Telemetry Parsers etc.

Technical Exposure

- **Autonomous Systems:** UAV / Drone Autonomy, PX4 & Pixhawk Flight Stacks, Lidar-SLAM, Visual Inertial Odometry, Optical Flow, Sensor Fusion, GPS Denied Navigation, Obstacle Avoidance, Waypoint & Mission Planning, Drone Swarms & Fleet Management, Control Systems, ROS
- **AI / Machine Learning:** Computer Vision, Deep Learning (PyTorch), SuperPoint & LightGlue Feature Matching, Object & Target Detection, Change Detection, Predictive Modelling, Edge AI Deployment (ONNX, TensorRT-ready), Model Optimisation Geospatial / Remote Sensing: Satellite Imagery Analysis, Feature Recognition & Change Detection, Aerial Image Processing, Vision-Based Positioning, Ground Station & Telemetry Visualisation
- **Programming:** Python, C, C++, Java, Data Structures & Algorithms, OOP, Operating Systems, Real-Time & Embedded Software
- **Hardware & Platforms:** NVIDIA Jetson Orin Nano, Raspberry Pi, Vicharak Axon, Pixhawk Flight Computers, Lidar, Cameras, Optical Flow & GPS Sensors, ESCs, IsaacSim, Git/GitHub, Linux, VS Code

Languages

English, German (A1), Hindi, Marathi