Atman Kikani

B.Tech in Computer Science and Engineering, Final Year

Pune, India | in LinkedIn | GitHub | ✉ kikaniatman@gmail.com | ☎ +91-9923480053

EDUCATION

Vellore Institute of Technology, Chennai   **Tamil Nadu, India**
Bachelor of Technology: Computer Science and Engineering with Spl in Artificial Intelligence and Robotics (CGPA: 8.4/10)
2022 - 2026

PUBLICATIONS AND RESEARCH WORK

MARVO: Marine-Adaptive Radiance-aware Visual Odometry   *November 2025*
Paper Submitted to The IEEE/CVF Conference on Computer Vision and Pattern Recognition 2026
Advisor - *Dr. A Nayeemulla Khan*

- Developed MARVO, a novel, physics-aware SLAM framework that integrates deep learning and probabilistic fusion for robust visual-inertial navigation in challenging underwater environments.
- We extend transformer-based feature matcher with a physics-informed visual front-end featuring a transformer-based matcher with a Physics-Aware Radiance Adapter to correct color-channel attenuation and enhance feature matching in turbid water.
- Implemented a real-time, multi-sensor backend using the GTSAM library, fusing semi-dense visual-odometry factors with pre-integrated IMU motion data and barometric depth measurements for full-state estimation.
- Finally a Reinforcement Learning-based Pose-Graph Optimizer that learns optimal retraction actions on SE(2) to refine global trajectories and overcome local minima common in traditional least-squares methods.

HADVel: Hydrodynamics Aware Deep Velocity Estimation for AUVs &   *July 2025 - present*
HADVel-E: Real Time Embedded Deployment of Hydrodynamics Aware Deep Velocity Estimation
Manuscripts in Preparation for submissions to IEEE Robotics and Automation Letters & IEEE Sensors
Advisors - *Dr. Harini S* & *Dr K KARUNAMURTHY*

- Led the development of HADVel, a sensor fusion system that uses deep learning to combine pressure differences measured at specific geometric points of interest along the hull of an AUV moving underwater with 9-DOF IMU data for robust, real-time velocity estimation on AUVs.
- Designed and validated a physics-informed LSTM neural network to smooth and denoise nonlinear, noisy underwater velocity priors, and implicitly fuse with IMU acceleration readings achieving sub-centimeter-per-second accuracy.
- Orchestrated and supervised development of bespoke hardware (Custom PCB and Embedded platform design along with precise Data collection Setups) to work seamlessly in tandem with our algorithms, delivering a 50hz velocity estimate, with a 42% reduction in velocity noise RMS. Delivering a Complete sensor solution.

A Smart Elevator System and Method Thereof Patent   *July 2023 - February 2024*
Patent Application Number at Indian Patent Office - 202441007367
Advisor - *Dr. Sahaya Beni Prathiba B*

- Proposed a novel architecture to reduce energy consumed in elevator systems in large commercial and residential apartments implementing affordable and common IOT devices and sensors.
- Developed prototype using cameras, IR sensors, sonar, and YOLOv8-based person detection.

SELECTED COMPETITIONS AND PROJECTS

MIRA - Autonomous Underwater Vehicle (AUV)
IEEE OES Singapore Autonomous Underwater Vehicle Challenge 2025.

- Performed System Identification and Model parameter Estimation for 6-dof dynamic model of an AUV for Project Mira, validating hydrodynamic parameters obtained from simulation via experimental setups (combination of LSE and MLE).
- Implemented asynchronous sensor data acquisition between Flight controller and main compute over MAVLINK, combining various sampling methods, gaining 35% increase in overall sampling rates.
- Implementing and tuning Fuzzy planner for competition tasks, a significant move towards more robust control in uncertain competition flows over the previous decision tree.

- Implemented Model Predictive Control for Model Derived above and tuning for good performance in non-linear states (found LQR to be highly unreliable due to insufficient compute to run linearization fast enough, researching usage of Matlab Coder for Jetson to optmise compute from platform like Jetson Xavier).

2nd Position at Tau Autonomy Center (TAC) Challenge 2024, Norway

- Led PID control system stack development for 6 DOF underwater autonomous vehicle, tuning a 2-layer cascaded PID across 6 axis simultaneously
- Tested Adaptive Gradient Descent for partial tuning of PID parameters, observed redundancy of method, due to underwater dynamics being highly naturally damped.
- Coded ROS stack and integrated with MAVLINK protocol to interface Embedded Flight Controlled (Pixhawk 2.4.8) with Jetson Xavier Computer. reducing control loop period by 60% consequently having much snappier control.

Esp32 Cubli (3-DOF Inverted Pendulum utilising 3- Reaction wheels)

- Based of off the original Cubli and heavily inspired from the work of Youtuber Rem-rc we aim to create a platform that can be used to evaluate control algorithms of the classic inverted pendulum setup with reaction wheels, the 3 reaction wheels give the bot an additional degree of freedom to rotate in the yaw axis
- We validated function of basic PID control as well as the Backstepping Controller derived in the most recent Cubli paper, and extend work towards bench marking further algorithms such as MPC and LQR
- We aim at opensourcing a matlab toolbox/project for novice's in controls to be able to design and evaluate the performance of their controllers on a the 3 DOF Coupled Inverted Pendulum.

Monocopter: Single Rotor Vectored Thrust Drone

- Designed, built and tested a thrust-vectored monocopter platform on Pixhawk flight controller with custom firmware tuning for autonomous hovering and maneuvering.
- Conducted static and dynamic stability tuning leveraging the thrust vectoring vanes, achieving 8 min flight time at 0.3 kg total weight with stable attitude hold.
- Validated control algorithms including cascaded attitude and position control loops; integrated IMU feedback for real-time thrust vector adjustment.

EXPERIENCE

AUV Head/ Technical head - Dreadnought Robotics *September 23 - September 25*
Best Special Team 2023-24, VIT-C
- Served as AUV Head, Leading Development for MIRA 2.0 competing in IEEE OES Singapore AUV Challenge 2025.
- Initially Led Controls Department and performed duties of Junior Head during my First year securing Second Place along with my team at TAC Challenge, Norway 2024

R&D Summer Intern - Tata Communications Ltd, Dighi *June 2024 – July 2024*
Research Intern at Tata Communications Ltd, under *Mr. Manish Tiwari*
- Utilised 5G solutions to create communication link between a COBOT and an online server running custom Facial Recognition and finger tracking models, proving usability of 5G technologies in Real time robotics Scenarios.

TECHNICAL SKILLS

Languages and Frameworks: C, C++, Python, ROS, ROS2, OpenCV, PyTorch, TensorFlow

Software Tools: MATLAB Simulink, ISAAC Sim, Gazebo, Coppeliasim, EasyEDA.

Embedded Platforms: CircuitPython, MicroPython, Arduino, Vivado.

Hardware Platforms: NVIDIA Jetson series (Xavier NX, Nano), AMD KRIA, Raspberry Pi series, STM32/ESP32/SAMD21 microcontrollers.

Coursework: ML for Robotics Robot Programing Robotic Perception Autonomous Drones Kinematics, Dynamics & Motion Control

Detailed project documentation, research drafts, competition videos and certificates, posters, internship certificates and a hyperlink-clickable version of the CV available at:
https://drive.google.com/drive/folders/1Z7cZ33MQWKNpR7_jLtLB-WLDpsCHP19S?usp=sharing