Ritesh Gole

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Education

Indian Institute of Technology Guwahati, India — Nov. 2020 - May 2024
Bachelor of Technology in Mechanical Engineering — GPA: 8.56/10.0

Publications

- **Trajectory tracking control of Unmanned Surface Vehicles with optimal trajectory generation**
  - **Ritesh Gole**, Antara Sarkar and Sandeep Reddy Basireddy
  - Under review at the **14th International Conference on Systems and Control (ICSC)**, as of October 2026

Experience

Jaguar Land Rover — Sept. 2026 - Present
Systems Architect - Motion Software and Control — Bengaluru, India

- **Ego Motion Architecture - Vehicle Behavior and Motion**
  - Define architecture integrating ADAS solutions across battery-electric and hybrid platforms.
  - Support L2 production releases and develop architecture options for L2++/L3 features.
  - Define ADAS planner-powertrain integration architecture to prevent conflicting control behavior.

Jaguar Land Rover — Jul. 2024 - Sept. 2026
Graduate Engineering Trainee - Mechatronics and Controls SW — Bengaluru, India

- **Fully Active Suspension (FAS) Actuation Controls**
  - Designed real-time adaptive filters for MPU pressure sensor signals used in suspension actuation control loops.
  - Attenuated high-frequency noise (>20 Hz) by ∼40–60% using RLS, Kalman and Wavelet Denoising Filters.
  - Achieved <10 ms filtering latency while improving signal-to-noise ratio by ∼6–10 dB for control-oriented signals.
  - Built ARMA-based sensor noise models with statistical validation via ADF, KPSS, and Ljung–Box tests.
- **Standstill Management (SSM) – SDV Motion Control**
  - Developed a Simulink state machine for vehicle Standstill Management in the SDV motion control stack.
  - Implemented control logic coordinating Electronic Park Brake (EPB) actuation and Park Button requests.
  - Performed MIL and SIL verification to validate state transitions, edge cases, and requirement coverage.

Robert Bosch Centre for Cyber-Physical Systems, IISc Bangalore — Apr. 2023 - Jul. 2023
Research Intern - Stochastic Robotics Lab

- Developed a dynamic model and LQR controller for balancing a wheeled biped, validated via Mujoco simulation.
- Supported reinforcement learning policy tuning for disturbance rejection in bipedal locomotion.

Projects

USV Trajectory Tracking with Optimal Trajectory Generation — Jan. - Apr. 2024, Jun. 2026 - Present
Research project under Prof. Sandeep Reddy Basireddy, CICPS, IIT Guwahati

- Implemented a Frenet-frame planner generating jerk-optimal trajectories with collision and curvature checks.
- Derived Frenet-to-Cartesian and body-frame mappings to give controllers pose, velocity, and acceleration references.
- Established feasible tuning limits for planner parameters under closed-loop replanning.
- Designed P, PFL, CTC, and SMC tracking controllers on a 3-DOF Cybership-II USV model.
- Proved exponential stability for CTC, and finite-time reachability plus exponential convergence for SMC.
- Benchmarked all controllers with and without obstacles on tracking error, completion time, and actuator effort.

Cosmo Logistic Bot — Sept. 2023 - Mar. 2024
e-Yantra Robotics Competition (eYRC) 2023-24, IIT Bombay — Website

- Developed a framework to estimate the pose of ArUco-tagged boxes in the UR5 base frame using Intel RealSense.
- Programmed UR5 pick-and-place operation, driving the gripper to estimated box poses using MoveIt Servo.
- Configured and tuned slam_toolbox mapping, AMCL localization and Nav2 navigation on a live AMR.
- Fused wheel odometry with IMU using an EKF and added an IMU+ultrasonic docking controller for alignment.

Vision-Based Autonomous Navigation of Underwater ROV for Pipeline Tracking — Aug. 2022 - May 2024
Bachelor's Thesis Project under Dr. Satish Kumar Panda and Dr. Biranchi Panda, IIT Guwahati — Website

- Set up a Gazebo simulation with pipelines in DAVE Aquatic Virtual Environment for synthetic data generation.
- Annotated simulated pipeline images, trained and compared U-Net, YOLOv5 and YOLOv8 for segmentation.
- Applied Principal Component Analysis (PCA) on the segmentation mask to estimate pipeline orientation.
- Devised a PID-based alignment framework for a simulated ROV using the pipeline's orientation as feedback.
- Wrote a Python script using QGroundControl's API to extract live frames from a BlueROV2 in a water tank.
- Trained YOLOv8 on real underwater pipe images and tested segmentation and pose estimation on the live feed.

Yuvaan IITG Mars Rover Jul. 2021 - Apr. 2024
Robotics Club, IIT Guwahati Website

- Designed and manufactured a 5-DOF robotic manipulator with a bevel-gear differential-based end-effector.
- Performed structural analysis in ANSYS, achieving 30% weight reduction and optimizing workspace for constraints.
- Architected a Jetson Nano ROS hub for per-subsystem Arduinos running PID for robot arm and rover traversal.
- Developed a YOLOv8 arrow detector and RRT-based path planner for the autonomous navigation task.

Achievements

E-Yantra Robotics Challenge, 2023-24: Ranked 8th among 100+ teams all over India in the "Cosmo Logistics" theme.
International Rover Challenge, 2022 and 2023: Among top 20 onsite finalist teams.
International Rover Design Challenge, 2022 and 2023: Ranked 11th and 7th respectively worldwide.
Techevince 8.0, 2022, IITG: Secured Best Project Award in Jury and Overall Categories for Yuvaan Rover project.
Pi-EV, 2022: Secured 3rd Place in Overall and Engineering Design categories as Supervisory Control Systems Head.
JEE Advanced 2020: Secured an All India Rank of 3925 among more than 200K candidates.

Technical Skills

Programming / Frameworks: Python, C/C++, MATLAB & Simulink, ROS/ROS2, PyTorch, OpenCV.
Modeling and Simulation: SolidWorks, Fusion 360, ANSYS, URDF Modeling, Gazebo, MuJoCo, MIL/SIL Testing.
Electronics & Embedded Hardware: Arduino, Raspberry Pi, NVIDIA Jetson, RealSense, IMU, GPS, Encoders.
OS & Tools: Windows, Linux, MS Office (PowerPoint, Word, Excel), Git, Lucidchart.

Relevant Coursework

Controls: Control Systems, Applied Non-linear Control, Underactuated Systems, Optimization Methods in Engineering.
Robotics: Robotics & Robot Application, Robotic Vision and Control (Audit), Mechatronics (Audit).
Mechanical and Design: Kinematics of Machinery, Dynamics of Machinery, Machine Design, Mechanical Measurements.
Electronics and Signals: Basic Electronics (with Lab), Electrical Machines, Computing with Signals.
Computing and AI: Introduction to Computing, Fundamentals of AI (Audit).
Mathematics: Mathematics I-III (Multivariable Calculus, Linear Algebra, ODEs, Fourier & Laplace Transforms).

Certifications

University of Toronto: State Estimation and Localization (Mar. 2025), Introduction to Self-Driving Cars (Jan. 2025).
University of Alberta: Fundamentals of Reinforcement Learning (Nov. 2024).
University of Pennsylvania: Robotics: Computational Motion Planning (Sept. 2022).
Stanford & DeepLearning.AI: Neural Networks and Deep Learning (Dec. 2021), Machine Learning (Oct. 2021).

Positions of Responsibility

Team Lead - Yuvaan Mars Rover Team Apr. 2023 - Apr. 2024
Robotics Club, IIT Guwahati

- Led a 40+ member team (mechanical, software, bio-assembly, navigation) improving IRDC rank from 11th to 7th.
- Raised INR 150K from the institute and industry partners to fund rover development and competition travel.

Contingent Manager Oct. 2023 - Dec. 2023
Inter-IIT Tech Meet 12.0, IIT Guwahati

- Directed on-campus talent identification and recruitment for 10+ problem statements and managed 30+ members.
- Arranged resources and faculty supervision for each team as needed, leading IITG to 4th place among 20 IITs.

Robotic Manipulator Lead - Yuvaan Mars Rover Team Jun. 2022 - Apr. 2023
Robotics Club, IIT Guwahati

- Built IITG's first robot arm for student rover competitions, contributing to IRDC 2022 and IRC 2023 finals.
- Led a 10-member team through design, fabrication, testing, and prototype iterations to meet task requirements.

Project Manager Apr. 2022 - Apr. 2023
Robotics Club, IIT Guwahati

- Managed 10+ robotics projects, mentoring 200+ students from ideation to working prototypes.
- Built a pipeline to take student projects to institute and industrial stakeholders, securing INR 50K+ in support.

Extracurricular Activities

CSR, JLR: Taught English and Math to underprivileged students.
Missing Maps, JLR CSR: Mapped at-risk areas on OpenStreetMap to support British Red Cross relief.
Sports: Silver medal in Water Polo at Spardha 2023; completed NSO Certification in Football.
Robotics Club, IITG: Designed and conducted the Summer Course 2022-23 to teach robotics basics to first-year students.
Inter-IIT Tech Meet 10.0 & 11.0: Represented IIT Guwahati in robotics-based problem statements as part of the contingent.
Automobile Club, IITG: Core team member, Engine and Data Acquisition Subsystem.
Techniche 2021: Organized events including chess and case study competitions under the Competitions module.