Suryansh Aryan

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Education

Kevin T. Crofton Department of Aerospace Engineering, Virginia Tech — Blacksburg, VA, USA
M.S Thesis in Aerospace Engineering, Specialization in Dynamics & Control, CGPA: 3.85/4.00 — *Aug 2023 – May 2026*

Manipal University — Manipal, KN, India
Bachelors of Technology in Aerospace Engineering, CGPA: 9.09/10.00 — *July 2019 – July 2023*

Experience

Graduate Research Assistant — May 2024 – Present
Center for Space Science and Engineering, Virginia Tech — *Blacksburg, VA, USA*

- Spearheaded NSF-funded project development as part of space engineering team, with 2 other teams from NC State University & University of Surrey, driving research solutions in near-Earth communication resiliency.
- Engineered a real-time mega constellation emulation, establishing 200+ global terrestrial and satellite connections with optimized log-normal traffic modeling over G/G/1 Queuing model.
- Upgraded the satellite node communication resiliency upto 20% through innovative ISL grid scheme and congestion routing, leading to a robust SDR based MiniNet network for the codebase validation.

UAV Research Intern — Jan. 2023 – July 2023
Computational Intelligence Lab, Indian Institute of Science (IISc) — *Bengaluru, India*

- Evaluated 4 key challenges to sustainable precision agriculture via drone technology & constructed a costeffective architecture improving efficiency & affordability for Indian farmers upto $3000.
- Achieved over $2,000 cost savings on high-end electronics & reduced maintenance expenses by up to two years.
- Built GNC modules with SPI & CAN-based radars & depth camera drivers for PX4 & K++ flight controllers.
- Improved canopy coverage efficiency by 40%, optimizing variable spraying for crops and trees through ROS/Gazebo simulations.

Guidance-Navigation-Control Intern — May 2022 – Aug 2022
General Aeronautics Pvt Ltd — *Bengaluru, India*

- Spearheaded the development of scalable SITL & HITL package enhancing trajectory planning for the company's autonomy project, saving $1000+ on expensive flight controllers & high-resolution sensors.
- Developed 3 innovative algorithms enabling decision-making to detect and navigate obstacles and targets, achieving precision agriculture objectives, saving 3+ months of the control division's efforts.
- Implemented a robust metaheuristic GNC algorithm with APF collision avoidance in SITL, enhancing efficiency by 20%, saving 100+ hours of ground testing.

Projects

Distributed Fault-tolerant Asteroid Inspection | *MATLAB, Simulink, Spice* — Aug 2024 – Present

- Constructed an integrated Adhoc SMC controller with stochastic MPC controller to incorporate unmatched uncertainties in asteroid dynamics under frozen orbit conditions for distributed asteroid inspection problem.
- Built a swarm reconfiguration strategy that generates optimal satellite-target pairs and compute desired reference trajectories for the adaptive controller using collocation-based BVP formulation.

Level-Four Autonomous UAV SITL & HITL Design | *Python, Ardupilot, PX4* — Aug 2020 – May 2022

- Designed noval Guidance-Control architecture to mitigate realistic unobservable actuator uncertainties existing in low-quality motor and speed controllers.
- Implemented fixed wing/multirotor autonomy by integrating CNN-based Yolov6 object detection and RGBD depth estimation/sensor fusion based localization for Indoor SLAM and outdoor APF-based obstacle avoidance.

Technical Skills

Languages: Python, C/C++, C#, Julia, Markdown, HTML/CSS
Software Tools: MATLAB/Simulink, LabView, Mathematica, Robot Operating System (ROS), Ansys STK, GMAT, KSP, FlightGear, QGC, MissionPlanner
Developer Tools: Github/GitLab actions, DockerHub, DigitalOcean, Pytest, VS Code, Visual Studio, PyCharm, Jupyter notebook, Google colab
Libraries: Spice Toolkit, NumPy, Astropy, Poliastro, Pandas, Scikit, Matplotlib, SkyField, Tensorflow/Keras, OpenCV
Firmware/Hardware: Ardupilot, PX4, Betaflight, Navio2, Raspberry Pi 4, Jetson Nano, Intel NUC, CompactRIO