Jaskirat Singh

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Education

University of Virginia — Charlottesville, USA
Doctor of Philosophy, Computer Science; Advisor: Prof. Rohan Chandra — *Jun 2025 - Present*

University of Petroleum and Energy Studies — Dehradun, India
*Bachelor of Technology in Computer Science and Engineering; GPA: **7.65/10.0*** — *Aug 2020 - Apr 2024*

- Received a **fully-funded 4-year scholarship** covering tuition, accommodation, food, and miscellaneous expenses, becoming the first student in the institution's history to achieve this award.

Publications

- **DenseUAV: A LLM-Powered Framework for Dynamic Priority Coordination in Heterogeneous UAV Navigation in Constrained Environments**:
  Jaskirat Singh, and Rohan Chandra
  IEEE International Conference on Robotics and Automation (ICRA), 2026 [Under Submission]

- **PANDA: Priority-Based Collision Avoidance Framework for Heterogeneous UAVs Navigating in Dense Airspace**:**[Project Page]**
  Agamdeep Singh*, **Jaskirat Singh***, and P.B. Sujit
  International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2025

- **RHFSafeUAV: Real-Time Heuristic Framework for Safe Landing of UAVs in Dynamic Scenarios**:**[Project Page]**
  Jaskirat Singh*, Neel Adwani*, Harikumar Kandath, and K. Madhava Krishna
  IEEE International Conference on Unmanned Aircraft Systems (ICUAS), 2023

- **UAV-based Visual Remote Sensing for Automated Building Inspection**: **[Project Page]**
  Kushagra Srivastava, Dhruv Patel, Aditya Kumar Jha, Mohhit Kumar Jha, **Jaskirat Singh**, Ravi Kiran Sarvadevabhatla, Pradeep Kumar Ramancharla, Harikumar Kandath, and K. Madhava Krishna
  European Conference on Computer Vision (ECCV) - CVCIE Workshop, 2022

* *indicates equal contribution* | Full publication list at Google Scholar | Project details at jaskiratsingh2000.github.io

Internships and Work Experience

University of Virginia — Charlottesville, USA
Graduate Research Assistant - Working in the areas of multi-agent systems, motion planning, and perception — *Jun 2025 - Present*

- **Chandra Robot Autonomy Lab**: *Advised by Professor Rohan Chandra*
  - Developing an LLM-based decision-making framework for multi-UAV collision avoidance and dynamic priority negotiation. The system enables UAVs to communicate mission contexts and collaboratively resolve conflicts through natural language dialogue. It integrates physics-inspired control with priority-driven velocity adjustments for safe and efficient navigation in congested airspace.*[Under Submission - ICRA 2026]*
  - Developing a detailed 2D simulation framework for autonomous robot navigation within a multi-floor elevator environment populated by dynamic human agents. The project integrates motion planning, collision avoidance, and smooth passenger-robot interactions using physics-based force models. It includes timed elevator operations, door mechanics, and passenger behaviors, visualized through real-time animated plots for thorough scenario analysis and testing.

Indian Institute of Science Education and Research Bhopal (IISER-Bhopal) — Remote
Research Fellow - Worked in the areas of aerial robotics, multi-agent systems, and motion planning — *Jan 2024 - Jul 2024*

- **Multi-Robot Autonomy Lab**: *Supervised by Professor P.B. Sujit*
  - Proposed and developed a dynamic priority-based collision avoidance framework for different UAVs (quadrotors, fixed wings and hybrid UAVs) navigating congested airspace, where UAV priorities adjust to evolving conditions. This calculates optimal flight paths around no-fly zones, dynamically rerouting UAVs to avoid conflicts. Additionally, developed a wind disturbance model to improve flight performance in windy environments. *[RA-L 2024]*

* Developed a priority-based collision avoidance framework for heterogeneous UAVs in dense airspace. Introduced a novel potential-field-based approach that addresses constraints through augmented tangential potential fields. Evaluated the framework through simulations, achieving a 54% improvement in average completion time over existing algorithms in dense airspace, 21% faster completion time for the highest priority UAVs compared to a no-priority baseline, and 60% faster completion time over the lowest priority UAVs. *[AAMAS 2025]*

University of New Brunswick Fredericton, Canada

Research Assistant and Visiting Researcher - Worked in the areas of robot teleoperation, and human-robotics interaction *Oct 2022 - July 2023*

- **Human-Computer Interaction Lab**: *Supervised by Professor Daniel J. Rea*
  * Worked on enhancing methods for human-robot interaction during the teleoperation of robot navigation. Developed a novel approach to assist teleoperated mobile robots and devised methods for detecting disruptions (user-state, collisions, and errors) in navigation flow.
  * Developed an end-to-end module to identify signs of boredom through the analysis of joystick inputs during teleoperation.

International Institute of Information Technology Hyderabad (IIIT-Hyderabad) Hyderabad, India

Research Assistant - Worked in the broad areas of aerial robotics, motion planning, and computer vision *May 2022 - Mar 2023*

- **Robotics Research Center**: *Supervised by Professors Harikumar Kandath, Madhava K. Krishna, and Ravi Kiran Sarvadevabhatla*
  * Proposed a real-time, heuristic-based novel architecture for the safe landing of UAVs in dynamic environments. This was achieved by estimating various parameters such as potential landing zones, distance-area calculations, and navigation state through innovative techniques. It outperformed SOTA models by achieving a 50% reduction in computation time compared to deep learning counterparts. *[ICUAS 2023]*.
  * Worked on UAV-based visual remote sensing automated building inspection, a post-processing framework and developed an architecture to estimate the distances between adjacent buildings and structures, along with rooftop plan-shape area using comprehensive dataset compiled and curated from UAV imagery using nearest neighboring contours, structure-from-motion (SfM), point-cloud, and other computer vision based techniques. Outperformed existing SOTA networks that tends to identify seismic structural parameters. *[ECCV Workshop 2022]*

Mattermost Inc. Remote

Community Manager (Contract) - Worked in the areas of management, and research *May 2022 - Feb 2023*

- **Research Product Documentation Team**:
  * Formulated and implemented insightful research-driven strategies for the enhancement of Mattermost product offerings, coupled with the meticulous maintenance of detailed documentation to empower and guide end-users.

University of Petroleum and Energy Studies Dehradun, India

Undergraduate Researcher - Worked in the areas of terrestrial robot localization, and mapping *Feb 2022 - May 2022*

- **Robotics Research Lab**: *Supervised by Professor Ashish Karn*
  * Developed an optimized, cost-effective algorithmic solution for multisensor fusion, aimed at enhancing the localization and mapping of very small-scale terrestrial robots.

Indraprastha Institute of Information Technology Delhi (IIIT-Delhi) Remote

Research Intern - Worked in the areas of computer vision, and EdgeML *May 2021 - Aug 2021*

- **Network Research Lab**: *Supervised by Professor Arani Bhattacharya*
  * Worked on scalable vehicle detection on edge devices by Developing different techniques to test and measure the latency of computer vision based different variants (like, YOLO) on Jetson Nano, Raspberry Pi 4, and Raspberry Pi Pico. Also, devised methods to decrease the latency of network layers, exploring both GPU and CPU-based machines for cost-effective solutions.

Additional Experience and Leadership

- **DokkuAI**: Founded and built an innovative startup focused on revolutionizing research document management through cutting-edge AI and collaborative tools. Collaborated with industry experts from Google DeepMind, Amazon, and Mattermost to refine the product and drive market fit. *[Currently not continued due to less bandwidth]*
- **The Linux Foundation Mentorship Program**: Worked as a community liason and mentored three students under codeuino project in Aug 2020 - Jan 2021 cycle.
- **Google Summer of Code**: Served as an organisation administrator and mentor for Sugarlabs (in 2018, 2019, and 2020), Jboss Community (in 2019), Terasology Foundation (in 2020), and CHAOSS Comunity (in 2021).

- **Google Season of Docs**: Worked as a research technical writer with CHAOSS Community (in 2020) and served as an organisation administrator for Open Collective Foundation (in 2029) while mentored one student.
- **Google Code-In**: Served as an organization administrator, mentoring young students (aged 13-18) in coding, research, documentation, and design tasks, while also ensuring the thorough evaluation of both mentors and students as a part of community liason.

Achievements and Awards

- Awarded ***full travel grant of $2500*** to attend in Open Source Summit Europe, Vienna, Austria, 2024.
- Received a ***fully-funded 4-year scholarship*** covering tuition, accommodation, food, and miscellaneous expenses, becoming the first student in the institution's history to achieve this award.
- Awarded ***full travel grant of $4000*** to attend as a speaker in Open Source Summit + Embedded Linux Conference + OSPOCon, Seattle, USA 2021.
- Awarded ***Google Open Source Peer Bonus Award*** for contributing to open source and making an impact, 2021; Google honors external contributors for their outstanding contributions to Google-utilized open source projects with awards.
- Awarded ***full travel grant of $2500*** to attend Open Source Summit Europe Conference, Lyon, France 2020.
- Awarded ***Google Open Source Travel Grant*** to attend Google Summer of Code Mentor Summit, California, USA, 2018.

Technical Skills

- **Languages**: Python, C++
- **Tools & Technologies**: ROS/ROS 2, NumPy, Pandas, MatplotLib, Sci-kit Learn, Git, MySQL
- **Platforms**: Linux, Web, MacOS, Windows, Raspberry Pi, Raspberry Pi Pico, Jetson Nano, PixHawk

  * *quick learner, adaptable, and open to acquiring new skill sets or technologies as needed.*