

SUBHADEEP KOLEY

Contact : svk324@lehigh.edu Homepage : subhadeepk.github.io
Google Scholar: <https://scholar.google.com/citations?user=b0J6xoAAAAJ&hl=en>
LinkedIn: www.linkedin.com/in/subhadeep-koley-70251b1bb/ Github : github.com/subhadeepk

SUMMARY

- Has 2.5+ years of experience of research in the fields of robotics and UAVs.
- Developed a ROS framework for a decentralized drone swarm that supports leader-follower mode and independent missions, which was used to **deploy a swarm of 5 drones** at IIT Kanpur
- Developed network monitoring and ROS based congestion control tools for moving mesh networks
- Co-authored a paper on thermal runaway of Lithium-ion batteries that won the **best paper award** at a conference and a paper on multi-robot pursuit evasion at Conference of Robot Learning (**CORL '24**)

EDUCATION

Lehigh University, Bethlehem, PA
PhD • COMPUTER SCIENCE AND ENGINEERING
Advisor: Dr. David Saldana

2024-Present

IIST(Indian Institute of Engineering Science and Technology), Shibpur
BACHELOR OF TECHNOLOGY • MECHANICAL ENGINEERING
CGPA : 8.56/10

2020-2024

PUBLICATIONS

1. Yizhuo Wang, Yuhong Cao, Jimmy Chiun, **Subhadeep Koley**, Mandy Pham, Guillaume Adrien Sartoretti "ViPER: Visibility-based Pursuit-Evasion via Reinforcement Learning". **Conference on Robot Learning 2024** [Link](#)
2. Ajit Das, Saumendra Nath Mishra, **Subhadeep Koley**, Sourav Sarkar, Achintya Mukhopadhyay, Swarnendu Sen: "Early detection of thermal runaway of lithium-ion battery- an experimental study". IEEE 3rd International Conference on "Sustainable Energy and Future Electric Transportation" [Link](#) [Best paper award](#)

RELATED EXPERIENCE

PhD student, [Swarms Lab](#), Lehigh University

Bethlehem, PA

Advisor: *Dr. David Saldana*

November 2024- Present

- Working on learning based control and adaptation for quadrotors. Also working on RL for rope manipulation using quadrotors.
- TA for CSE 340(Design and analysis of algorithms)
- **Winner** of [Defend the Republic '24](#), against 7 other universities including ASU, UMich, Georgia Tech.
- Developed wall avoidance for the robots by integrating an ultrasonic sensor to the existing software and hardware stack
- Built and maintained over **16 robots** before and during the competition.

Research intern, [MARMoT Lab](#), National University of Singapore

Remote

Mentor: *Dr. Guillaume Sartoretti*

January 2024 – May 2024

- Reinforcement learning based autonomous exploration in multi-agent systems: working on an adversarial search problem where agents try to maintain a zone to prevent enemies from going in. Results were published in CORL' 24.

SURGE research intern, [SPIN Lab](#), Indian Institute of Technology, Kanpur

Kanpur, Uttar Pradesh

Mentor: [Dr. Ketan Rajawat](#)

May 2023 – August 2023

- Worked in a team of 10 people on decentralized drone swarms [Project report](#)
- Developed inter-drone **collision avoidance algorithms** and tested them in Motion Capture [Video](#)
- Developed a network monitoring and **congestion control tool for mesh networks** in drone swarms
- Surveyed and developed **ROS based decentralized leader election** framework and algorithms
- Developed a **ROS framework for swarm missions** with leader follower mode and private mission modes [Video](#)

Flight software intern, [EndureAir Systems](#)

Noida, Uttar Pradesh

Mentor : [Dr. Kuldeep Kumar Dhiman](#)

December 2022 – February 2023

- Worked on and explored the **PX4 stack**

- Developed a **range extension kit on Matlab** for a drop tank with delayed wing deployment [Github repo](#)

Undergraduate researcher, IEST Shibpur

Mentor : [Dr. Joydeep Bhowmik](#)

Howrah, West Bengal
May 2022 – February 2024

- Attempted to build a **swashplate-less helicopter** from scratch.
- Built a wireless data acquisition system for the wind tunnel using **ESP8266 and MQTT**
- Built a cheap **tachometer** using line sensor and Arduino [Github repo](#)

Research intern, Jadavpur University

Mentor : [Dr. Sourav Sarkar](#)

Kolkata, West Bengal
July 2022 – December 2022

- Built a system to simultaneously record temperatures at multiple points on a turntable as a part of a Tata steel funded research project to find cooling rates in rolling mill cooling beds in steel mills. [Github repo](#)
- Built a setup for the detection of thermal runaway of lithium-ion batteries using heat and gas sensors that led to a paper that won the best paper award at a conference.
- Reviewed literature on efficient fire detection algorithms and early detection of lean blowout in a combustor and implemented them using **Python and OpenCV**

PROJECTS

Sample efficient Learning based Model Predictive control for quadrotors

May 2025 - Present

Ongoing PhD work

- I optimize existing cross-entropy method based planning algorithms for real robots (specifically quadrotors and other aerial vehicles).

Swashplate-less helicopter

Pitch control of helicopter using lag and lead hinges

July 2022 – March 2024

- Attempted to build the helicopter from scratch. Inspired from [Tim Station's video](#) and [Research paper](#)
- Used AS5040 magnetic rotary encoder to read the BLDC motor's shaft angle and send throttle inputs accordingly.
- Designed a base for the motor and a hub on solidworks and got them 3D printed. [Photo](#)
- Couldn't get the main controller loop to work fast enough to accurately send cyclic throttle inputs to the motor to get prominent pitch. [Project report](#)

ROS based decentralized leader election framework and algorithm [Repository](#)

Built for the decentralized drone swarm at SPiN Lab, IIT Kanpur

June 2023 – August 2023

- A decentralized leader election algorithm has been developed that will allow the swarm to elect a new leader in the event of leader failure or unavailability. Page 15 of [Project report](#)

High performance multi-point wireless temperature acquisition system

Tata steel sponsored project at Jadavpur University

July 2022 – September 2022

- Used Python and Arduino IDE to program the system. [System overview](#) [Repository](#)
- The system is being used to monitor temperature changes in a turntable that simulates a rolling mill cooling bed in a steel plant.

TECHNICAL SKILLS

- **Programming Languages:** Python
- **Operating Systems:** Linux, Windows
- **Stacks and libraries:** PX4, OpenCV, Rospy, MoveIt, Pytorch
- **Software:** ROS, Gazebo, CoppeliaSim, Matlab, Arduino IDE, Solidworks
- **Microcontrollers and microprocessors:** ESP32, ATmega328, RaspberryPi 4B

RELEVANT COURSES

Robotics and mechanics: Modeling and control of Mechanical Systems, Kinematics of Mechanisms and Robots, Elements of helicopter aerodynamics, Dynamics of Machines and Vibrations, Numerical Methods in Engineering, CAD Modelling and Simulation Laboratory, Design of Power Transmission Elements, Design of Frictional Machine Elements, CNC Machining

Machine Learning and Computer Science: Advanced Algorithms (CSE440), Design and analysis of algorithms (CSE 340), Advanced programming Techniques (CSE 411), Supervised Machine Learning: Regression and Classification, Introduction to Reinforcement Learning, Andrej Karpathy's Neural Networks: Zero to Hero