

ANANYA GANDHI

Pune, India

+91 9405639871

ananya.gandhi.183@gmail.com

[ananya183.github.io](https://github.com/ananya183)

[ananya183](https://www.linkedin.com/in/ananya183)

[ananya183](https://www.github.com/ananya183)

EDUCATION

Indian Institute of Science Education and Research (IISER) - Bhopal

2020 – 2025 (Expected)

BS-MS in Electrical Engineering and Computer Science

CGPA: 7.26/10

- Major: Electrical Engineering and Computer Science (EECS)
- Minor: Data Science and Engineering (DSE)

BS Thesis: **Moving Depot (MOD): An Efficient Depot Motion Strategy for Multi-Robot Foraging**

Advisor: Prof. Sujit P. B.

Developed a novel moving depot strategy (MOD) for enhancing resource collection efficiency in multi-robot foraging systems. The strategy dynamically relocates the depot based on foraging patch quality and avoids obstacles using a potential field-based method. Conducted agent-based simulations comparing MOD with stationary depot strategies (SDS) and multiple-place foraging algorithms (MPFA), demonstrating up to 50% performance improvements in dynamic environments.

Jan 2024 – Apr 2024

This work led to the acceptance of an *Extended Abstract* and a *Poster Presentation* at the *ANTS 2024 International Conference on Swarm Intelligence, Konstanz, Germany*.

MS Thesis: **Multi Drone RL Strategy for Swarm Formation, Survival and Narrow-Alley Navigation**

Advisor: Prof. Sujit P. B.

(Ongoing)

Aug 2024 – Apr 2025

Relevant Coursework: Computer Vision, Artificial Intelligence, Multi-Agent Reinforcement Learning, Network Science: Theory and Applications, Data Science and Machine Learning, Introduction to Quantum Computer Science, Process Mining, Applied Optimization

HONOURS AND AWARDS

Kanako Miura Travel Award | *IEEE-RAS International Conference on Humanoid Robots 2024*

Nov 2024

Awarded by the *IEEE Robotics and Automation Society (RAS) Technical Committee on Humanoid Robotics*.

Nancy, France

PUBLICATIONS & PRESENTATIONS

P Ingle, A Gandhi, PB Sujit "*Moving Depot (MOD): An Efficient Depot Motion Strategy for Multi-Robot Foraging*". *ANTS 2024 International Conference on Swarm Intelligence, Konstanz, Germany*. (Poster Presentation, Extended Abstract)

Manuscript in preparation: "*Multi-Drone Reinforcement Learning Strategies for Swarm Formation and Navigation in Constrained Environments*." (Targeted for —)

RESEARCH EXPERIENCE

Lab Research Member, **Multi-Robot**

Prof. Sujit P. B.

Multi-rObot autONomy (MOON) Lab, IISER Bhopal

Aug 2022 – Present

Moving Depot (MOD): Multi-Robot Foraging Strategy

- Developed and published a novel depot motion strategy for multi-robot foraging, accepted at ANTS 2024 International Conference on Swarm Intelligence in Konstanz, Germany
- Presented research findings as an Extended Abstract, focusing on swarm robotics and swarm optimization techniques

Multi-Drone Reinforcement Learning for Swarm Navigation with HRI

- Developing advanced RL strategies for drone swarm formation and narrow-alley navigation with VR interface integration

Summer School Student, **Dynamic Resource Allocation in Networks**

Prof. Alexandre Reiffers-Masson

Centre for Networked Intelligence (CNI), Indian Institute of Science (IISc Bangalore)

July 2023

- Explored mathematical and ML techniques for *NP-Hard Dynamic Resource Allocation Problems in Communication Networks*
- Implemented heuristics including LP-based and Whittle index policies for real-world network issues
- Applied the theory of Weakly-Coupled MDP and Restless Multi-Armed Bandit Problems to solve finite horizon optimization challenges

Summer Research Intern, **Multi-Robot Foraging and Danger Communication Algorithm**

Prof. Sujit P. B.

Multi-rObot autONomy (MOON) Lab, IISER Bhopal

Aug 2022 – Present

- Designed an innovative Swarm Algorithm for Danger-based Signal communication system, validated through comprehensive Monte-Carlo Simulations

PROJECTS

Multi-Agent Reinforcement Learning for Swarm Robotics <i>Python, TensorFlow, Unity</i>	2023 – Present
<ul style="list-style-type: none">Developing advanced RL strategies for drone swarm formation, survival, and navigation in constrained environments.Implementing and evaluating various MARL algorithms to optimize swarm behavior and decision-making processes.Integrating VR interfaces to enhance human-swarm interaction and visualization of complex swarm dynamics.	
Feature Selection for Few-Shot Mixed-Type Building Classification <i>Python, PyTorch, Genetic Algorithms</i>	2022
<ul style="list-style-type: none">Applied genetic algorithms and contrastive learning techniques to classify mixed-type buildings from Street-View images.Achieved superior accuracy compared to ResNet-50 with DINOv2, demonstrating the effectiveness of the proposed approach.Explored the potential of few-shot learning in reducing the need for large labeled datasets in urban scene understanding.	
Network Analysis of the Indian Stock Market <i>Python, NetworkX, Pandas</i>	2022
<ul style="list-style-type: none">Conducted comprehensive analysis of stock market networks using various centrality measures.Identified Federal Bank and ITC as highly influential stocks based on daily closing prices and network topology.Developed visualizations and metrics to represent complex financial relationships and market dynamics.	
Chicago Crime Identification and Analysis <i>Python, Scikit-learn, Matplotlib</i>	2021
<ul style="list-style-type: none">Utilized unsupervised machine learning techniques for crime pattern recognition and analysis.Implemented clustering algorithms to identify crime hotspots and temporal patterns in urban environments.Created interactive visualizations to communicate findings to non-technical stakeholders effectively.	

COMPETITIONS

INSEF Regional Fair, IISER Pune <i>Chemistry Research Project</i>	Nov 2017
<ul style="list-style-type: none">Received the Special Mentions Award for the project “Element Flame Colours: A Trend in the Periodic Table?”.Conducted experiments, presented findings on flame colors of elements and periodic trends, recognized among top projects at the regional fair organized by IISER Pune, CSIR-NCL, and SSI.	
Infosys Spark: Catch Them Young (CTY) Program <i>Summer Workshop, IT Concepts and Applications</i>	July 2016
<ul style="list-style-type: none">Selected as one of 40 students from over 300+ top-performing students of the state.Completed a two-week summer workshop at Infosys Pune, focused on Information Technology fundamentals, programming, and software development.	

TECHNICAL SKILLS

Programming Languages: Python, C++, MATLAB, C# (Unity)
Frameworks & Libraries: TensorFlow, PyTorch, Scikit-learn, Pandas, NumPy
Tools & Technologies: Git, LaTeX, Shapr3D, Linux, Xanadu-PennyLane, VR Systems

LEADERSHIP AND EXTRACURRICULAR ACTIVITIES

‘Arbitrage’: the Quantitative Finance Club of IISER Bhopal	Founding Date – Present
<i>Founder and Coordinator (2024-Present)</i>	<i>IISER Bhopal</i>
<ul style="list-style-type: none">Established the first quantitative finance-focused club across all IISERs.Developed and implemented educational programs to foster financial literacy and quantitative skills among peers.Organized workshops, seminars, and competitions to engage students in practical applications of finance and data science.	
IISERB Book Club	Aug 2022 – Present
<i>Coordinator (2022-2023), Advisor (2023-Present)</i>	<i>IISER Bhopal</i>
<ul style="list-style-type: none">Revitalized the club post-pandemic, leading recruitment and management of the core committee.Expanded the club’s reach and impact, gaining recognition from the Education Minister of Madhya Pradesh State.Organized regular literary events, author talks, and reading sessions to foster a vibrant intellectual community.	

ACHIEVEMENTS

Maharashtra State Board Junior College Topper <i>Computer Sciences</i>	2019
<ul style="list-style-type: none">Achieved 97.5% in Computer Science in Kalmadi Shamrao Junior College, Pune.Maintained consistent academic excellence with 92% in 10th grade boards and 87% in 12th grade boards.	
Foundation Level Course <i>BSc in Programming and Data Science, IIT Madras</i>	2021

ADDITIONAL INFORMATION

Research Interests: Swarm Intelligence, Multi-Agent Reinforcement Learning, Human-Robot Interaction, Autonomous Systems
Languages: English (Fluent), Hindi (Fluent), Marathi (Native)
Hobbies: Literature, Travel, Hiking, Letter Writing & Philately, Basketball