

Sarthak Mishra

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EDUCATION

- **Universidad Polytechnica de Madrid, Madrid, Spain** 2023 - 2026 (Expected)
Center for Automation and Robotics (CAR), a joint center for research by UPM and CSIC.
Current **Ph.D. Student**
- **Indian Institute of Science Education and Research Bhopal** 2018 - 2023
Integrated Bachelors of Science - Masters of Science CPI: 8.32/10 (8.92/10 normalised)
Major in **Physics**, Minor in **Data Science and Engineering**
- **Senior Secondary Education** 2015 - 2017
Class 12th (CBSE board) Percentage: 93%
Major subjects: *Physics, Chemistry, Maths, Biology*

RESEARCH EXPERIENCE

- **Project Seawings (Funded by EU Horizon Europe)** Nov 2023 - present
Computer Vision and Aerial Robotics lab (CVAR lab) Universidad Politecnica de Madrid, Spain
 - Wing-in-ground effect vehicles (WIG vehicles) to improve the strategic preparedness and defence-related operations in the sea/air interface.
Leading the project for the development of a new and advanced class of military surveillance drones as WIG vehicles for sea/air operations, introducing Unmanned WIG Vehicles (UWV) to carry out maritime surveillance missions in critical situations. Primary contribution in designing learning-based control strategies to enhance vehicle capability by seamlessly integrating ground, naval, and aerial assets.
- **Project Airship (Funded by EU Horizon Europe)** Nov 2023 - present
Computer Vision and Aerial Robotics lab (CVAR lab) Universidad Politecnica de Madrid, Spain
 - Autonomous Flying Ships For Inter-island And Inland Waters Transport.
Part of lead technical team for the research and development of autonomous UWV technology for aviation business models with fully electric, energy-efficient, and versatile unmanned aircraft systems. Study classical control algorithms and incorporate AI-based control techniques to employ complex transition manoeuvres by the WIG Vehicle.
- **Master's Thesis Research** Aug 2022 - Apr 2023
Underwater Systems and Technology Laboratory (LSTS Porto) University of Porto, Portugal
 - Model Predictive Control (MPC) based approach to trajectory optimization of Autonomous Underwater Vehicles (AUV).
Performed a thorough literature review concluding in design and implementation of a mathematical model for MPC for real-time optimal trajectory optimization of a six-degree-of-freedom underwater vehicle. The approach minimises the tracking error of the desired trajectory while ensuring that operational constraints are met, demonstrating effectiveness in the presence of disturbances and uncertainties. [\[Final Report\]](#)
- **Project iFADO (Funded by JUNO - Robotic exploration of Atlantic waters)** Jan 2022 - Apr 2023
Multi-Robot Autonomy Lab (Moon Lab) in collaboration with LSTS Porto IISER Bhopal
 - Speed Modelling for Path Planning of a Wave-Propelled USV using metocean forecasts.
This study validates and improves a speed-over-ground (SOG) model and estimator for a wave-propelled Unmanned Surface Vehicle (USV) using an independent dataset collected in the Irish-Atlantic Ocean. The estimator employs a non-linear Gaussian Process Regression (GPR) model trained with SOG measurements from a GNSS unit and metocean data from Copernicus Marine Services.




TECHNICAL SKILLS

- **Programming/scripting languages:** Python*, C/C++*, \LaTeX , HTML, CSS, JS, PHP, SQL.
- **Libraries/Frameworks/Simulators:** ROS*/ROS2, Gazebo, [UUV Simulator*](#), MATLAB, Nvidia Isaac Sim, Pandas*, Numpy, Matplotlib*, Keras, Tensorflow, Pytorch, Git, Github, Wolfram Mathematica, Qutip.
- **Operating Systems:** Windows, Linux*.
- **Soft Skills:** English*, Hindi, Odia (Native), Sanskrit, Spanish A2. *Proficient

CONFERENCES, SUMMER SCHOOLS, WORKSHOPS

- **Computational Neuroscience Summer school**, Among 20 selected students worldwide to attend funded in-person summer school focused on physics and machine-learning based approaches to neuroscience organised by **Jagiellonian University**, Krakow, Poland. *July 2023*
- **IITB CSE Research Symposium**, Selected to participate in fully-funded symposium in the cutting-edge research in the field of **AI/ML**, computer systems, and theoretical CS. *Mar 2023*
- **OCEANS 2023 Limerick conference**, Selected to present our conference paper titled- **Speed Modelling for Path Planning of a Wave-Propelled USV**: An independent validation in the Atlantic Ocean by Sarthak Mishra, Renato Mendes, Joao Sousa, Alberto Dallolio and P.B. Sujit. Regrettably, it was necessary to withdraw due to a significant discrepancy in the final round of result validation. *June 2023*
- **WSDM 2023**, Recieved the **ACM SIGWEB Fair Access Student Participation Award** for participation in the **16th ACM International Conference on Web Search and Data Mining** organised by National University of Singapore. *Feb 2023*
- **17th Academic Research and Careers for Students Symposium** [↗](#), co-located with **ACM India Annual Event** organised by ACM India at OIST Bhopal. *Feb 2023*
- **Soft skills and Career Development workshop** [↗](#), a 2.5 day intensive workshop on behavioral skills and personality development organised by ICDPC, IISER Bhopal. *Mar 2023*

PROJECTS

- **Testing Obstacle avoidance algorithm using Turtlebot** 
 - Acquiring proficiency in using the Robot Operating System (ROS) framework and applying obstacle avoidance algorithms on Turtlebot to navigate through closed environments.
- **Synthetic Satellite Image generation using Generative Adversarial Networks (GANs)** 
 - Carrying out Image style transfer using GANs on multi-spectral images to generate high-quality synthetic images by translating a masked layer.
- **Monte carlo localization of Mobile Robots** 
 - Learning about the Monte Carlo Localization algorithm and simulating it based on the paper "Monte Carlo localization of Mobile Robots" by Frank Dellaert et. al.

KEY COURSES TAKEN

- **Credited courses**: Linear Algebra, Multi variable Calculus, Probability & Statistics, Mathematical Methods, Computational Physics, **Numerical Methods and Programming**, Physics through Computational Thinking, **Deep Learning**, **Data science and Machine Learning**, **Artificial Intelligence**, Advanced Programming in Python, AI and it's scientific application.
- **e-Certificate courses**: Satellite Photogrammetry and its Application [↗](#), Basics of Machine Learning [↗](#), Computer Vision Basics using MATLAB [↗](#), MATLAB onramp [↗](#).

POSITIONS OF RESPONSIBILITY/ACHIEVEMENTS

- **Team Leader**, Challenge Fundación Repsol [↗](#) qualifying as **top 5 finalists** from a total of 386 proposal submissions across 83 universities all over Spain. Invited to participate for a 2 day intensive elevator pitch presentation workshop. *Mar 2024*
 - **Teaching Assistant**, for the course **Data Science in Practices**, Dept. of Data Science and Engineering. Examination conduction, assignment preparation, answer sheet evaluation for a class of 120 students. *Aug - Nov 2022*
 - **Volunteer at NGO**, Swadhin Educational and Charitable Trust, Sambalpur, Odisha. Organised multiple food and clothing distribution campaigns for daily wage workers, Sanitizers and masks distribution for needy ones during COVID-19. *2019 - 2021*
 - **Organiser**, Conference for **National Assembly of Researchers in Physics** (NARIPHY), IISER Bhopal. *Aug 2022*
 - **Winner Gold Medal**, Inter University Sports Meet - Chess, Football. *2018, 2022*
 - **National player**, National Junior Chess Championship, Lucknow, India. *2013*
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