Sarthak Mishra

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EDUCATION

- **Indian Institute of Science Education and Research Bhopal** *2018 - 2023 (Expected)*
  Integrated Bachelors of Science - Masters of Science CGPA: 8.19/10
  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

- **Ongoing Master's Thesis** *Aug 2022 - Apr 2023*
  Underwater Systems and Technology Laboratory, University of Porto, Portugal (with Moon Lab, IISERB) U. Porto, Portugal

  – Trajectory optimization for Autonomous Underwater Vehicles using Model Predictive Control (MPC).
  Development of an optimal trajectory of a 6DOF underwater vehicle interacting with time varying ocean flow fields with the use of a pre-defined cost function in MPC and then using a deep learning model to predict the best suitable cost function for the MPC.

- **Moon Lab** *May - July 2022*
  Summer Internship (collaboration with Underwater Systems and Technology Laboratory, U. Porto, Portugal) IISER Bhopal

  – Autonaut speed prediction and trajectory optimization using wave data from forecast models.
  Development of a machine learning model to predict the speed and trajectory of an Autonaut Unmanned Surface Vehicle with the help of datasets of the missions carried out in open oceans (Irish-Atlantic Region) and Fjords (near Norway).

- **Dr. Ritam Mallik, Dept. of Physics** *May - July 2020*
  Online Summer Internship IISER Bhopal

  – Galaxy image classification using Regression and Ensemble models.
  Image Analysis on Galaxy Images (GAMA catalogue) and classification using Local Weighted Regression and Ensemble Learning.

- **Coral Lab** *Dec 2018, May - July 2019*
  Winter and Summer Internship IIIT Delhi

  – Obstacle avoidance using Turtlebot.
  Learning Robot Operating System (ROS) framework and applying obstacle avoidance algorithms on Turtlebot to navigate through a closed environment.

TECHNICAL SKILLS

- **Programming/scripting languages**: Python*, C/C++, HTML, CSS, Javascript, PHP, MySQL.
- **Tools/Frameworks/Simulators**: ROS, UUV Simulator*, Pandas*, Numpy, Matplotlib*, Keras, Tensorflow, Pytorch, Git, MATLAB, Wolfram Mathematica, Qutip.
- **Operating Systems**: Windows, Linux*.
- **Soft Skills**: English, Hindi, Odia, Sanskrit, Spanish. *Proficient*

PROJECTS

- **Monte carlo localization simulation of Mobile Robots**
  – Learning about Monte Carlo Localization algorithm through the paper- Monte Carlo localization of Mobile Robots by Frank Dellaert et. al. by creating simulations based on the paper.

- **Synthetic Satellite Image generation using Generative Adversarial Networks (GANs)**
  – Image style transfer using GANs on multi-spectral images to generate and translate a masked layer to output high quality synthetic images.

- **Drug Discovery on chEMBL dataset** ☉
  - Traditional Machine Learning based model to predict the concentration of a drug that is required for 50% inhibition (IC50) in vitro for various drugs manually curated by chEMBL database to fight SARS CoV-2.

- **Couzins Model** ☉
  - A simulation of the Couzins Model to study the collective animal behaviour.

- **Question Answering from e-manual using word embeddings in Natural Language Processing** ☉
  - Finding the most relevant question text corpus of user query from e-manual faqs and thus finding their corresponding answers.

- **Multi-class music Genre classification using Machine Learning** ☉
  - Given a raw unprocessed dataset of multiple audio files, classify each file into respective music genres such as Jazz, Hip-hop, Disco, Blues, etc with the help of tuned ML models.

- **Spin to Spring mapping of a two-level Quantum System** ☉
  - Study of the behavior of the Spin Magnetization Vector through simulation of a nucleus subjected to a constant magnetic field on the application of Radio Frequency Pulse.

- **Web development** ☉
  - Cicada '21, '20
    Creator of an online treasure hunt game inspired by the famous 'CICADA 3301 Online Treasure' that requires extensive internet browsing and the use of browser developer tools to navigate through various pages on the internet.
  - Chrysalis Science Magazine
    Owner and maintainer of e-blog for institute science magazine.

KEY COURSES TAKEN

- **Mathematics**: Linear Algebra, Multivariable Calculus, Probability & Statistics.
- **Physics**: Mathematical Methods, Computational Physics, Numerical Methods and Programming, Physics through Computational Thinking.
- **Computer Science**: 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 (Indian Institute of Remote Sensing, IIRS Dehradun) 🔗, Basics of Machine Learning (IISERB) 🔗, Computer Vision Basics using MATLAB (Coursera) 🔗, MATLAB onramp (Mathworks) 🔗.

POSITIONS OF RESPONSIBILITY

- **Teaching Assistant**, Data Science in Practices, Dept. of Data Science and Engineering.
  Conducted examinations, assignment preparation, answer sheet evaluation.
  Managed over 120 students. *Aug - Nov 2022*

- **Volunteer at NGO**, Swadhin Educational and Charitable Trust, Sambalpur, Odisha.
  Organised multiple food and clothes distribution campaign for daily wage workers,
  Sanitizers and masks distribution for needy ones during COVID-19. *2019 - 2021*

- **Organising Committee**, Conference for National Assembly of Researchers in Physics
  (NARIPHY), IISER Bhopal. *Aug 2022*

- **Technical Head cum Core Commitee**, Annual cultural fest, Enthuzia, IISER Bhopal. *2020 - 2021*

- **Club Coordinator**, Chess Club, IISER Bhopal. *2020 - 2021*

- **Editorial Board**, Chrysalis Science Magazine, IISER Bhopal. *2019 - 2020*

ACHIEVEMENTS

- **Gold Medal**, Inter-IISER Sports Meet (IISM) - Football. *2022*
- **Gold Medal**, International Genetically Engineered Machine competition (iGEM). *2020*
- **Gold Medal**, Inter-IISER Sports Meet (IISM) - Chess. *2018*
- **Gold, Silver, Bronze Medals**, All India Kendriya Vidyalaya National Sports (Chess) Meet. *2010 - 2016*
- **Participant**, National Junior Chess Championship, Lucknow. *2013*