# Agniva Banerjee

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| Degree/Certificate | Institute | Year | GPA/% |
|---|---|---|---|
| PhD - EECS | Indian Institute of Science Education and Research Bhopal | 2024-present | 9.67 |
| M.Sc - Applied Mathematics | Indian Institute of Engineering Science and Technology, Shibpur | 2022-24 | 9.64 |
| B.Sc - Mathematics | Ramakrishna Mission Vivekananda Centenary College, Rahara | 2019-22 | 8.94 |
| Intermediate/+2 | Ramakrishna Mission Vidyapith, Purulia | 2019 | 88 |
| High School | Ukhra Kunja Bihari Institution | 2017 | 90.28 |

## WORK EXPERIENCE

- **Project Intern - IIT Ropar (Department Mathematics)** *(May'22-July'22)*
  *Project:* Riemann Zeta Function and the Prime Number Theorem: A Critical Link in Number Theory
  - This project explores the deep connection between the distribution of prime numbers and the analytic properties of the Riemann zeta function. It highlights how the non-vanishing of the zeta function on the line $Re(s) = 1$ leads to the proof of the Prime Number Theorem. The study emphasizes the role of complex analysis in understanding prime number behavior.

- **Project Intern - ISI Kolkata (WSDL 2023)** *(Jan'23-March'23)*
  *Project:* Build Diffusion Model
  - This project focuses on constructing a diffusion model used in generative AI to create realistic images. It explores the mathematical foundation of diffusion processes and how neural networks learn to reverse noise over iterative steps.

## INTERNSHIPS

- **Intern | IISER, Bhopal** [May'23-July'23]
  - Summer Internship on Machine Learning
  - Worked on Label Free Identification of Cancer Cells

- **Intern | Harish Chandra Research Institute, Allahabad** [Jun'23-July'23]
  - Summer School Program on Mathematics
  - Pure Mathematics

## CURRENT PROJECTS

- **Heterogeneous Event-Triggered Min-Consensus Strategy under Unifromly Strongly Connected Networks**
  - The work proposes a scalable event-triggered min-consensus protocol for heterogeneous agents that reduces communication and avoids Zeno behavior.

- **Heterogeneous Geometric Mean Consensus for Finite-Time Switching Undirected Graph**
  - This work presents a distributed GM-consensus algorithm that drives heterogeneous agents to the geometric mean of their initial states using a scalable observer-controller structure.

## COMPLETED PROJECTS

- **SHIELD: Safe Hybrid Integration of PPO and MPC for Reliable Trajectory Tracking of Autonomous Ground Vehicles** *(Submitted at CORL 2025)*
  - This paper proposes a PPO-MPC hybrid algorithm for autonomous ground vehicle path tracking, achieving high safety and reliability with a 99.8% success rate and 98% collision avoidance in dynamic environments.
- **Impact of Feature Attributions on Different Types of Fake Face Detection** *(Submitted at IJCB 2025)*
  - This paper uses explainable AI methods like SHAP, LIME, and IG to enhance deepfake image detection by highlighting manipulated features, showing that models trained on Photoshop forgeries generalize better than those trained on deepfake datasets.

- **RestAware: Non-Invasive Sleep Monitoring Using FMCW Radar and AI-Generated Summaries** *(Submitted at UBICOMP-ISWC 2025)*
  - This paper proposes a non-invasive, FMCW radar-based sleep monitoring system that uses machine learning for posture and behavior recognition, achieving 92% accuracy and enabling real-time, privacy-preserving sleep tracking with human-readable summaries via instruction-tuned language models.
- **Efficient Deep Learning Approach for Early Detection and Classification of Renal Disorders** *(Submitted at PReMI 2025)*
  - This study proposes a deep learning framework using transfer learning for the detection of early renal disease using EfficientNetV2 and ResNet-50, highlighting its strong potential for clinical diagnostics.

## PUBLICATIONS

- **Quantum-Enhanced Machine Learning for Precision Breast Cancer Diagnosis** (COMSNETS WQT 2025)
  - This study explores classical and quantum machine learning for breast cancer image classification, showing that while classical models currently outperform quantum ones, QML holds promise for improving early cancer detection and diagnosis in the future.

## SKILLS & INTERESTS

- **Programming Languages**: Python, Matlab, C
- **Tools & Libraries**: Numpy, Pandas, Matplotlib, Scikit, Tensorflow, Pytorch, Qiskit
- **Interests**: Computer Vision, Machine Learning, Deep Learning, Quantum Machine Learning, Reinforcement Learning, Multi Agent Systems

## POSITIONS OF RESPONSIBILITY & ACHIEVEMENTS

- Selected for Dr. A.P.J. Abdul Kalam Young Research Fellowship 2024-25.
- Cleared TCS NQT 2024 with Digital Profile.
- Secured All India Rank 498 in GATE MA 2023.
- Teaching Assistant for the courses, ECS311 : Applied Optimization, ECS201 : Discrete Mathematics. Conducted tutorials/lab sessions, evaluated assignments, quizzes and examination papers.
- **NCC Cadet** [Jan'15-Jan'16]
  - Responsible for National Cadet Crops
  - WBNCC/ARMY-CERT/16/166