Subhransu S. Bhattacharjee | Résumé

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Education

Doctor of Philosophy in Artificial Intelligence **Ongoing**
Research School of Computing, Australian National University, Australia *April 2023-Present*

- **Supervisors:** Dr. Rahul Shome, Dr. Dylan Campbell & Prof. Stephen Gould
- **Specializations:** Vision Language Models, Non-Convex Optimization, Diffusion Models & 3D Computer Vision
- **Attended:** Robotic Vision Summer School, 2024; Optiver PhD Quant Lab Program, 2024
- **Invitation:** Participated by invitation to the all-paid PhD summit by Citadel & Citadel Securities, London, 2025
- **Thesis Topic:** *A Probabilistic 3D Spatio-Semantic Reasoning Framework using Generative Models*
- **Courses Audited:** *Task & Motion Planning in Robotics, Convex Optimization, Differential Geometry & Probability Theory*

Bachelor of Engineering **First Class, Honours**
College of Systems & Society, Australian National University, Australia *July 2018 - Dec 2022*

- **Major:** Mechatronic Systems Engineering (Graduated cum laude in Honors' cohort)
- **Minors:** Mathematics & Electronic Communication Systems
- **Summer School:** London School of Economics, 2019: Practical Machine Learning (Grade-A)
- **Certifications:** Online Certification in Game Theory, Stanford University; Machine Learning Production; Project Management, Google
- **Thesis Project:** Whiplash Gradient Descent Dynamics (Supervisor: Professor Ian Petersen)
- **Transfer:** Transferred to ANU from VIT, India in 2020 (Top 1% of branch)
- **Courses Audited:** *Non-linear Control Theory, Network Optimization & Control, Information Theory, Mathematical Analysis*

Scholarships & Awards

1. **2025:** Winner of the highly competitive VC Travel Grant, ANU
2. **2023:** ANU International University Research Scholarship with HDR Merit Stipend (Acceptance Rate: 2.18%)
3. **2022:** Highly recommended paper in the Asian Control Conference
4. **2021:** High commendation award in the Australia and New Zealand Control Conference
5. **2020:** ANU Undergraduate International Scholarship and Partner Institute scholarship – 50% tuition scholarship.

Publications

Subhransu S. Bhattacharjee*, Dylan Campbell & Rahul Shome: Believing is Seeing: Unobserved Object Detection using Generative Models, IEEE/CVF Computer Vision and Pattern Recognition, 2025

Subhransu S. Bhattacharjee* & Ian Petersen: Analysis of the Whiplash Gradient Descent Dynamics, DOI: 10.1002/asjc.3153, Asian Journal of Control, Special Edition, 2023

Subhransu S. Bhattacharjee* & Ian Petersen: Analysis of closed-loop inertial gradient dynamics, DOI:10.23919/ASCC56756.2022.9828104, Asian Control Conference, 2022

Subhransu Bhattacharjee* & Ian Petersen: A closed loop gradient descent algorithm applied to Rosenbrock's function, DOI:10.1109/ANZCC53563.2021.9628258, Australia and New Zealand Control Conference, 2021

Experience

School of Computing, Australian National University
Senior Tutor Advanced Machine Learning, Supervisor: Dr. Rahul Shome *June 2025 – Present*

- Conducting hands-on laboratory sessions for undergraduate and postgraduate students.
- Teaching major AI frameworks and addressing common machine learning challenges.
- Introducing core deep learning systems, including CNNs and Transformer-based architectures.

School of Cybernetics, Australian National University
Head Tutor Cybernetics, Supervisor: Dr. Safiya Okai-Ugbaje *March 2025 – Present*

- Leading hands-on laboratory sessions for postgraduate coursework students.
- Assisting in the design and delivery of projects involving microprocessors, robotics, and machine learning.
- Teaching foundational programming concepts using Python.

Optiver APAC, Sydney

Quantitative Research Intern *Nov 2024 – Feb 2025*

- Developed, implemented & back-tested a statistical arbitration model on the Hong Kong exchange.
- Performed statistical analyses on large-scale financial data to uncover market patterns and operational inefficiencies in Korean market.
- Collaborated with traders and developers to build a proprietary, real-time Machine Learning decision-making system.

Research School of Management, Australian National University
Graduate Research Assistant — Fintech & AI, Principal Investigator: Dr. Priya Muthukannan *Sep 2023 – Sep 2024*

- Conducted qualitative analyses of open banking regimes using dynamic capabilities frameworks.
- Delivered introductory courses in data analysis for Business Information Systems.
- Developed innovative frameworks to assess the impact of AI on banking responses to technological shifts.

School of Engineering, Australian National University
Casual Sessional Academic — Engineering, Employers: Prof. Ian Petersen & Prof. Iman Shames *Jul 2022 – Sep 2023*

- Tutored laboratory sessions for Advanced Control Systems (ENGN8824) for a cohort of 12 masters students.
- Facilitated interactive problem-solving sessions for 34 students in Network Optimization and Control (ENGN4628).
- Led focused tutoring sessions for 16 students in Power Systems and Electronics (ENGN4625).

School of Computing, Australian National University
Undergraduate Researcher — Foundational Deep Learning, Supervisor: Prof. Richard Hartley, FAA *Mar 2022 – Jun 2022*

- Applied neural networks to assess the invertibility of differentiable functions in non-linear processes, achieving a 72% RMSE hit rate using positional encoding.
- Demonstrated the limitations of normalizing flow networks for global invertibility, underscoring neural networks limitations as local approximators for smooth functions.
- Developed an FPGA-based TIMER algorithm to quantify the computational effort required for minimum convergence, accounting for floating-point precision constraints.

Research School of Engineering, Australian National University
Undergraduate Researcher — Control & Optimisation, Supervisor: Prof. Ian Petersen, FAA *Dec 2021 – Mar 2022*

- Developed a deterministic algorithm that outperformed classical Nesterov-like methods for convex functions.
- Applied control theory to design universal Lyapunov-based methods for predicting convergence rates in high-resolution ODE models.

Calcutta Electric Supply Corporation, India
Head Automation Intern — Power Systems Automation, Supervisor: Mr. Arindam Sanyal, Director *Mar – Aug 2021*

- Led a cross-functional team of 17 (including 5 interns and 12 field workers) to design and implement a self-healing mechanism for the Ring Main Unit-based power system at Chitpur Hospital Substation during the second COVID-19 wave in India.

Decimal Point Analytics, India
ML Research Intern — Financial NLP, Supervisor: Mr. Paresh Sharma, MD *Dec 2020 – Mar 2021*

- Engineered and optimized a financial metadata database for a RoBERTa-based question-answering system, enhancing both accuracy and efficiency.
- Conducted client meetings for product reassessment and quality assurance, collaborating with diverse stakeholders to implement performance enhancements.

Armament Research and Development Establishment, DRDO, India
Summer Research Trainee — Passive Radar Signal Processing *May – Aug 2020*

- Developed a Kalman filterbased technique to rapidly select optimal matched filters for incoming radar signals via ambiguity functions, enabling fine-tuning of radar bursts to reduce signal uncertainty.
- Implemented an FPGA-based multi-processor interface for real-time analysis of long-range, noise-affected radar signals.

Skills

- **Programming & Scripting Languages:** Python, C, R, MATLAB, Embedded C, Bash, HTML/CSS, JavaScript, LaTeX
- **Core AI/ML & Scientific Libraries:** PyTorch, Scikit-learn, NumPy, SciPy, Pandas, Matplotlib, Seaborn, Jupyter, Numba, CuPy, XGBoost, LightGBM, Optuna, Dask
- **Deep Learning Systems:** PyTorch Lightning, Hugging Face Transformers, Torchvision, OpenCV, W&B, TensorBoard
- **MLOps & Infrastructure:** Docker, Kubernetes (K8s), GitHub Actions, CI/CD pipelines, MLflow, Weights & Biases (W&B), SLURM, PySpark, SQL, AWS, GCP, RESTAPI, Flask
- **Other Tools:** Git/GitHub, Blender, Vivado, Simulink, STM32Cube, SCADA, Gradio, Tableau, OpenGL, OpenML

Services

- **Paper Reviewer:** IROS, 2025; ICRA, 2025; Asian Journal of Control, 2023; Asian Control Conference, 2022; ANZCC, 2021
- **Volunteering:** ANU Techlauncher Manager (2024); Set4ANU Mentoring (2023–24); Course Representative, ANU (2021)