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
- Specialisations: Vision Language Models, Non-Convex Optimization, Diffusion Models & 3D Computer Vision
- Attended: Robotic Vision Summer School, 2024; Optiver PhD Quant Lab Program, 2024 (Acceptance rate 6%)
- Participated by invitation to the all-paid PhD summit by Citadel & Citadel Securities, London (Acceptance rate 4.8%)
- 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 in Mechatronic Systems Engineering (Graduated cum laude in Honors' cohort)
- Minors in Mathematics & Electronic Communication Systems

Courses Audited: *Non-linear Control Theory, Network Optimization & Control, Information Theory, Mathematical Analysis*
- Summer School at the **London School of Economics**, 2019: Practical Machine Learning: Grade-A
- Online Certification in Game Theory, **Stanford University**
- Thesis Project: Whiplash Gradient Descent Dynamics (Supervisor: Professor Ian Petersen).
- Transferred to ANU from VIT, India in 2020 (Top 1% of branch).

Scholarships & Awards

1. **2023:** ANU International University Research Scholarship with HDR Merit Stipend (Acceptance Rate: 2.18%)
2. **2022:** Course Highest in Robotics (ENGN4627)
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 CECS 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 Cybernetics, Australian National University

Casual Sessional Academic — Cybernetics, Employers: Dr. Safiya Okai-Ugbaje　　　*March 2025 – Present*
- Tutoring hands-on laboratory sessions for Masters students.
- Developing projects on Microprocessors, Robotics and Machine Learning.
- Teaching introductory programming using Python.

Optiver APAC, Sydney

Quantitative Research Intern　　　　　　　　　　　　　　　　　　　　　*Nov 2024 – Feb 2025*
- Developed, implemented & back-tested a statistical arbitrage 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.

Laxmi Vilas Bank, India

Research Intern, Supervisor: Mr. Parthasarathi Mukherjee, Ex-CEO   Sep – Nov 2020

○ Devised a portfolio optimization method using competitive neural networks to analyze multiple time series datasets.

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 Languages & Scripting:** Python, C, CUDA-Python, R, Embedded C, MATLAB, HTML-CSS-JavaScript

○ **ML libraries:** PyTorch, Scikit-learn, Pandas, NumPy, Numba, SciPy, Seaborn, Matplotlib, Jupyter, OpenCV, OpenGL, Transformers, CuPy, XGBoost, LightGBM, Dask, W&B, Optuna, NLTK

○ **Additional Tools & Frameworks:** Git/GitHub, PySpark, SQL, STM32Cube, Vivado, Simulink, LTSpice, SCADA, DigiSim, SLURM, Blender, SAS, Tableau, LaTeX, Shell Script

Certifications & Services

○ **Certifications:** ANU Tutor (Teaching) Program; ANU Lab Training for Researchers; ANU AI in Research & Teaching; Machine Learning Production, Deeplearning.AI; Project Management, Google; Financial Markets, Yale; SCADA, Udemy

○ **Paper Reviewer:** IROS, 2025; ICRA, 2025; Asian Journal of Control, 2023; Asian Control Conference, 2022; ANZCC, 2021

○ **Volunteering Experience:** Thread Together, Sydney (2025), ANU Techlauncher Program (2024); Set4ANU Mentoring (2023–24); Course Representative, ANU (2021); AIESEC VIT (2018–19); Friends of Tribal Society, India (2017–18)