Subhransu S. Bhattacharjee | Résumé

School of Computing, The Australian National University, Australia
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GitHub ▪ LinkedIn ▪ Google Scholar

Research Interests: Efficient Generative Modelling; Uncertainty Estimation; 3D Spatial Computing; Optimization Theory

Education

Doctor of Philosophy — **Resident Scholar**
Research School of Computing, Australian National University, Australia — *Apr 2023 – Expected Apr 2027*

- **Supervisors:** Dr. Rahul Shome, Dr. Dylan Campbell, and Prof. Stephen Gould
- **Specialisation in spatial computing and inverse graphics:** visionlanguage models, generative models, and 3D robotic vision
- **Thesis** *The Shape of Truth: A Probabilistic 3D Spatio-Semantic Reasoning Framework using Generative Models*
- **Attended:** Robotic Vision Summer School (2024); Optiver PhD Quant Lab Program (2024)
- **Talks:** invited to the fully funded PhD Summit by Citadel and Citadel Securities (London, 2025); AIMLF talk at ANU (2023)
- **Courses audited:** *Advanced Artificial Intelligence; Convex Optimisation; Differential Geometry; Probability Theory and Applications*
- **Reviewer:** CVPR 2026; AAAI 2025; IROS 2025; ICRA 2025–2026

Bachelor of Engineering — **First Class Honours**
College of Systems & Society, Australian National University, Australia — *Jul 2018 – Dec 2022*

- **Major:** Mechatronic Systems Engineering (graduated *cum laude* in the Honours cohort)
- **Minors:** Mathematics and Electronic Communication Systems
- **Summer schools:** London School of Economics (2019): Practical Machine Learning; IIT Madras: Data Science for Engineers
- **Certifications:** Game Theory, Stanford; Machine Learning Production; Project Management, Google; Financial Markets, Yale
- **Thesis project:** Whiplash Gradient Descent Dynamics (supervisor: Prof. Ian Petersen)
- Transferred to ANU from Vellore Institute of Technology, India (2020); Chancellor's Special Achiever Award, VIT (2019)
- **Courses audited:** *Nonlinear Control Theory; Statistical Machine Learning; Information Theory; Mathematical Analysis I & II*
- **Reviewer:** Asian Journal of Control, 2023; American Control Conference, 2022; Australia & New Zealand Control Conference, 2021-22

Scholarships & Awards

2025: VC Travel Grant (Winner), ANU.

2023: ANU International University Research Scholarship; Higher Degree by Research Merit Stipend.

2022: Highly Recommended Paper, Asian Control Conference; Highest in ENGN4627: Robotics.

2021: High Commendation, Australia and New Zealand Control Conference; ANU Chancellor's International Scholarship.

Publications: Conferences, Journals, Repositories & Preprints

Subhransu S. Bhattacharjee*, Dylan Campbell & Rahul Shome: Into the Unknown: Towards using Generative Models for Sampling Priors of Environment Uncertainty for Planning in Configuration Spaces, arXiv (Under Review)

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: TorchKAN: Simplified KAN Model with Variations, Software Publication, GitHub, 2024

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
Tutor, Introduction to Machine Learning, Supervisors: Dr Rahul Shome and Dr Yun Keun Chen — *Jun 2025 – Nov 2025*

- Taught mathematical tools for machine learning and optimisation; marked exams for a cohort of **250** students.
- Introduced classical ML methods and deep-learning systems; assessed hands-on projects.

School of Cybernetics, Australian National University
Head Tutor, Cybernetics, Supervisor: Dr Safiya Okai-Ugbaje *Mar 2025 – Nov 2025*

- Co-designed and delivered projects spanning microprocessors, robotics, and machine learning.
- Led programming for the NAO robot and coordinated student project delivery.

Optiver APAC, Sydney
Quantitative Research Intern (Machine Learning) *Nov 2024 – Feb 2025*

- Performed statistical analyses on large-scale financial data to uncover market patterns and operational inefficiencies in the **Korean** market.
- Collaborated with traders and engineers to build a proprietary real-time machine-learning decision system achieving **94%** accuracy in historical validation.

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 data-analysis courses for Business Information Systems.
- Developed frameworks to assess how AI adoption shapes banks responses to technological shifts.

School of Engineering, Australian National University
Casual Sessional Academic Engineering, Supervisors: Prof Ian Petersen and Prof Iman Shames *Jul 2022 – Sep 2023*

- Ran laboratory sessions for Advanced Control Systems (ENGN8824) for a cohort of **12** Masters students.
- Facilitated problem-solving sessions for **34** students in Network Optimisation and Control (ENGN4628).
- Led focused tutoring 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*

- Studied invertibility of differentiable mappings with neural networks, achieving a **72%** hit rate (RMSE criterion) using dense positional encodings.
- Demonstrated limitations of normalising flows for global invertibility, highlighting neural networks locality as function approximators.

School of Engineering, Australian National University
Undergraduate Researcher Control & Optimisation, Supervisor: Prof Ian Petersen, FAA *Dec 2021 – Mar 2022*
Applied linear and nonlinear control-theoretic methods to design Lyapunov-based approaches for predicting convergence rates in high-resolution ODE models and developed a novel complexity model for studying feedback systems without explicit solutions.

Calcutta Electric Supply Corporation, India
Head Automation Intern Power Systems Automation, Supervisor: Mr Arindam Sanyal, Director *Mar 2021 – Aug 2021*
Led a team of **17** to implement an emergency 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 – Jan 2021*

- Engineered and optimised a financial metadata database for a RoBERTa-based question-answering system.
- Coordinated client reviews for product reassessment and quality assurance with cross-functional stakeholders.

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

- Developed a Kalman-filter-based technique to select optimal matched filters for incoming radar signals.
- Implemented an *FPGA-based multiprocessor* interface for real-time analysis of long-range, noise-affected radar signals.

Skills

- **Programming & Scripting:** Python, CUDA C/C++, C, Embedded C, Bash, MATLAB, LaTeX, HTML/CSS, JavaScript
- **ML/AI Frameworks:** PyTorch, PyTorch Lightning, Hugging Face (Transformers, Diffusers, Accelerate, Tokenizers), scikit-learn, NumPy, SciPy, pandas, Jupyter
- **Generative AI & Computer Vision:** Diffusion, VLM/LLM/MLLM, Vision Transformers, segmentation/detection, 3D reconstruction; TorchVision, OpenCV, Open3D, PyTorch3D, trimesh
- **Performance, Distributed & Profiling:** Mixed Precision training, `torch.compile`, TorchDynamo/Inductor, custom CUDA kernels, Numba, CuPy, ONNX Runtime, TensorRT, Triton (GPU DSL), Nsight Systems/Compute
- **Containers & HPC:** Apptainer (Singularity), Docker, Podman, NVIDIA Container Toolkit, Conda/Mamba, Lmod/Environment Modules, SLURM
- **Data, Cloud & Services & Tools:** PySpark, SQL, AWS, GCP, Airflow, REST APIs, FastAPI, Weights & Biases, Prometheus, Grafana; Git/GitHub, CI/CD & Actions, Matplotlib, Seaborn, Gradio, Blender

— Transcripts and References are available on request —