

Subhransu S. Bhattacharjee | Résumé

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Education

Doctor of Philosophy (Artificial Intelligence)

Intelligent Systems Cluster, School of Computing, ANU, Australia

Ongoing
April 2023-Present

- Supervisors: Rahul Shome, Dylan Campbell & 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
 - Thesis Topic: *Spatio-Semantic Hedging: A Probabilistic Spatial-Semantic Reasoning Framework using Generative Models*
- Courses Audited: Task & Motion Planning in Robotics, Convex Optimization, Differential Geometry & Probability Theory

Bachelor of Engineering (Honours)

College of Engineering, Computing & Cybernetics, ANU, Australia

First Class Honours
July 2018 - Dec 2022

- Major in Mechatronic Systems Engineering (CGPA: 6.48/7.0, Graduated 3rd 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). Find it [here](#).
 - Transferred to ANU from VIT, India, with CGPA: 9.34 (top 10% in ECE branch) & IELTS: 8.5 band.

Scholarships & Awards

- 2023:** ANU International University Research Scholarship with HDR Merit Stipend
- 2022:** Highly Recommended in the Asian Control Conference
- 2021:** High Commendation Award in the Australia and New Zealand Control Conference
- 2020:** CECS Undergraduate International Scholarship and Partner Institute scholarship – 50% tuition scholarship.
- 2019:** VIT Chancellors' Special Achiever Award for Best Project in VIT Expo

Publications

Subhransu S. Bhattacharjee*, Dylan Campbell & Rahul Shome: Believing is Seeing: Unobserved Object Detection using Generative Models, Preprint

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

Experiences

Quantitative Research Intern

Mentor: Cameron Chandler, Performance Engineer

Optiver APAC
November 2024 - February 2025

- Designed and implemented high-performance mathematical models to optimize trading strategies.
- Conducted statistical analyses on large-scale financial data to identify market patterns and inefficiencies.
- Collaborated with traders and developers to build proprietary real-time Machine Learning decision-making systems.

Graduate Research Assistant: Fintech & AI

Employer: Dr. Priya Muthukannan, Principal Investigator

Research School of Management, ANU
September 2023 - September 2024

- Conducting Qualitative Analysis on Open Banking Regime using Dynamic Capabilities Lens
- Taught Introduction to Data Analysis in Business Information Systems
- Developed novel frameworks to study effects of AI and banking sector response to technological shifts

Casual Sessional Academic: Engineering

Employers: Dr. Ian Petersen, FAA & Dr. Iman Shames, Professors

School of Engineering, ANU

July 2022 - September 2023

- ENGN8824: Advanced Control Systems (Masters) at ANU, 2023: Tutored the laboratory class of 12 students.
- ENGN4628: Network Optimization and Control at ANU, 2023: Tutored Problem-Solving sessions in a class of 34 students.
- ENGN4625: Power Systems and Electronics at ANU, 2022: Tutored problem-solving sessions for 16 students.

Undergraduate Researcher: Foundational Deep Learning

Supervisor: Dr. Richard Hartley, FAA, Distinguished Professor Emeritus

School of Computing, ANU

March 2022 - June 2022

- Employed Neural Networks to assess the invertibility of differentiable functions in closed sample ranges for non-linear processes. Achieved a RMSE hit rate of 72% with computationally intensive positional encoding and transfer decoding.
- Demonstrated that normalizing flow networks struggle with global invertibility, serving as strong evidence for Neural Networks as local approximators for smooth functions.
- Formulated an FPGA TIMER algorithm to measure the total computational effort required for minimum convergence, dictated by the floating-point accuracy of the oracle.

Undergraduate Researcher: Control & Optimisation

Supervisor: Dr. Ian Petersen, FAA, Professor

School of Engineering, ANU

December 2021 - March, 2022

- Established a novel algorithm which was deterministic and exponentially faster than classical Nesterov-like methods for convex functions.
- Utilized control theory to formulate universal Lyapunov-based methods for predicting convergence rates in high-resolution ODE approaches.

Head Automation Intern: Power Systems Automation

Employer: Mr. Arindam Sanyal, Deputy Director (Automation)

Calcutta Electric Supply Corporation, India

March - August, 2021

- Orchestrated a 17-member team, comprising 5 junior interns and 12 field workers, to engineer and implement a self-healing mechanism in the Ring Main Unit-based Power System at Chitpur hospital substation amid India's second COVID-19 wave.
- Managed a real-time installation of high-voltage DC circuit breakers, linking the substation to multiple power grids.

ML Research Intern: Financial NLP

Employer: Mr. Paresh Sharma, MD

Decimal Point Analytics, India

December 2020 - March 2021

- Engineered and optimized a financial metadata database tailored for RoBERTa-based question-answering systems. Utilized cutting-edge NLP methodologies to augment both system accuracy and operational efficiency.
- Facilitated and chaired client meetings for product reassessment and quality assurance, liaising with diverse stakeholders to collect feedback and enact performance enhancements.
- Successfully renegotiated contract durations during discussions with the banking tribunal, with a focus on stock option roll-over mechanisms in policy management deliberations.

Research Intern

Employer: Mr. Parthasarathi Mukherjee, Ex-CEO, Laxmi Vilas Bank, India

Laxmi Vilas Bank, India

September - November, 2020

Developed a Markonikov portfolio optimization method using a Competitive Neural Network to analyze multiple time series data.

Summer Research Intern: Passive Radar Signal Processing

Supervised by V. Venkateshwara Rao, Ex-Director, ARDE

DRDO, India

May-August, 2020

- Formulated a Kalman filter-centric technique for swift selection of the best-matched filter for incoming radar signals, utilizing its ambiguity function. This methodology facilitated the fine-tuning of subsequent radar bursts to reduce signal uncertainty.
- Implemented an FPGA-based multi-processor interface for the analysis of long-range, noise-affected radar signals.

Services

- IEEE Xplore — ICRA, 2025: Paper Review on the Application of Diffusion models in Robotics.
- Wiley: Asian Journal of Control, 2023: Paper Review on Game-theoretic Control.
- Asian Control Conference, 2022: Paper Review on Feedback Linearisation for UAV controllers.
- IEEE Xplore — ANZCC, 2021: Paper Review on Non-Smooth Feedback Controllers.

Skills

- **Programming Languages:** Python, C, C++, CUDA, R, Embedded C, Verilog, SQL, CSS, Javascript
- **Libraries & Frameworks:** PyTorch, TensorFlow, Pandas, NumPy, SciPy, Scikit-learn, Seaborn, Matplotlib
- **Scripting & Documentation Tools:** \LaTeX , MATLAB, Shell Script, HTML, Nano
- **Software & Tools:** Git/GitHub, STM32Cube, Vivado, Simulink, LTSpice, SCADA, DigiSim, SLURM, Blender, SAS, Jupyter