Subhransu S. Bhattacharjee | Résumé

115 North Rd, Brian Anderson Building, The Australian National University, Acton, ACT 2601
+61474224742 • Subhransu.Bhattacharjee@anu.edu.au • 1ssb.github.io
1ssb.rudra@gmail.com GitHub LinkedIn Google Scholar

Education

Doctor of Philosophy in Artificial Intelligence **Ongoing**
Intelligent Systems Cluster, School of Computing, ANU, Australia *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: *Probabilistic Spatial-Semantic Reasoning in 3D using Generative Models*

Courses Audited: *Task & Motion Planning in Robotics, Convex Optimization, Differential Geometry & Probability Theory*

Bachelor of Engineering (Honours) **First Class Honours**
College of Engineering, Computing & Cybernetics, ANU, Canberra *July 2018 - Dec 2022*
- Major in Mechatronic Systems Engineering (CGPA: 6.48/7.0, Graduated 3^{rd} 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

1. **2023:** ANU International University Research Scholarship with HDR Merit Stipend
2. **2022:** ANU Course Highest in Robotics
3. **2022:** Highly Recommended in the Asian Control Conference
4. **2021:** High Commendation Award in the Australia and New Zealand Control Conference
5. **2020:** CECS Undergraduate International Scholarship and Partner Institute scholarship – 50% tuition scholarship.
6. **2019:** VIT Chancellor's Achiever Award for highest marks in Digital Signal Processing
7. **2019:** VIT Chancellors' Special Achiever Award for Best Project in VIT Expo
8. **2019:** Best Project Award, HUL & Google, AI for Agriculture Hackathon – Markov Chain Modelling of Supply Chain Uncertainty for FMCG products in India.

Publications

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

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 **Sydney, Australia**
Employer: 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.
- Developed and backtested algorithms leveraging tools using proprietary software systems.
- Collaborated with traders and developers to enhance real-time decision-making systems.

Graduate Research Assistant: Fintech & AI **Research School of Management, ANU**
Employer: Dr. Priya Muthukannan, Principal Investigator *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 **School of Engineering, ANU**
Employers: Dr. Ian Petersen, FAA & Dr. Iman Shames, Professors *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 **School of Computing, ANU**
Supervisor: Dr. Richard Hartley, FAA, Distinguished Professor Emeritus *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 **School of Engineering, ANU**
Supervisor: Dr. Ian Petersen, FAA, Professor *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 **Calcutta Electric Supply Corporation, India**
Employer: Mr. Arindam Sanyal, Deputy Director (Automation) *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 **Decimal Point Analytics, India**
Employer: Mr. Paresh Sharma, MD *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 **Laxmi Vilas Bank, India**

Employer: Mr. Parthasarathi Mukherjee, Ex-CEO, Laxmi Vilas Bank, India *September - November, 2020*

- Developed a Markonikov portfolio optimization method using a Competitive Neural Network to analyze multiple time series data.
- Optimized asset allocation strategies to balance risk and return using AI-driven models.
- Conducted quantitative analyses on financial data to identify trends and enhance portfolio performance.

Summer Research Intern: Passive Radar Signal Processing **DRDO, India**

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

VIT Undergraduate Researcher: Optical Excitation Study in Graphene Sheets **VIT, Vellore**

Supervisors: Prof. Gargi Chakraborty, Dr. Sumathi S, Prof. Shweta B. Thomas *August-December, 2019*

- Developed a model to estimate parametric states for the optical response of viscoelastic graphene sheets under stress, challenging the reproducibility of the Bubnov-Galerkin treatment.
- Verified the bifurcations and empirically validated the model for larger gains.

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, SPSS

Certifications

- Machine Learning Production, Deeplearning.AI
- SCADA: Process Control Engineering, Udemy
- Game Theory, Stanford University
- Foundations of Project Management, Google
- Introduction to Git and GitHub, Google
- Financial Markets, Yale University

References

- Rahul Shome
  Lecturer
  School of Computing
  Australian National University
  Email: rahul.shome@anu.edu.au
- Dylan Campbell
  Lecturer
  School of Computing
  Australian National University
  Email: dylan.campbell@anu.edu.au
- Stephen Gould
  Professor
  School of Computing
  Australian National University
  Email: stephen.gould@anu.edu.au