Teo Yu Jie

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Research Interests —

- PhD candidate pursuing research at the intersection of machine learning, computational mechanics, and aerospace engineering.
- Interested in developing novel computational methods for engineering applications, with focus on ML-driven optimization and uncertainty quantification.
- Committed to advancing scientific understanding through interdisciplinary research combining physics-based modeling with data-driven approaches.

Technical Skills

Research Methods	Statistical analysis, computational modeling, experimental design, data validation
Programming	Python, MATLAB, Mathematica, C, C#, statistical computing, scientific computing
Machine Learning	PyTorch, tinygrad, NumPy, SciPy, pandas, GANs, decision trees, neural networks
Mathematical Tools	Linear algebra, representation theory, probability theory, information theory, optimization
Computational Software	PyANSYS, ABAQUS, Ansys APDL, Patran/NASTRAN, simulation analysis
Academic Tools	LaTeX, mathematical modeling, experimental validation, reproducible research
Systems	Linux, Gentoo, OpenBSD, Fedora
Soft Skills	Academic writing, cross-disciplinary collaboration, research presentation

Research Experience

ST Engineering **Jan 2024 – Present**

Research Engineer (Computational Mechanics, Optimization)

- Conducted research on machine learning applications in computational mechanics, developing novel approaches for parameter sensitivity analysis in engineering systems.
- Investigated decision tree learning methods for understanding complex engineering design relationships, contributing to optimization strategies.
- Researched automated analysis workflows to accelerate engineering research processes, developing scalable computational frameworks.
- Collaborated with cross-functional teams to translate research findings into practical engineering applications and solutions.

Advanced Micro Devices ("AMD") **Jan 2023 – May 2023**

Research Intern (Computational Materials Science)

- Investigated generative adversarial networks (GANs) for materials modeling, developing novel surrogate modeling approaches that achieved significant computational improvements.
- Researched automated ML pipelines for engineering simulations, contributing to open-source computational frameworks for the research community.
- Studied experimental validation methodologies for machine learning models in engineering contexts, developing reproducible research protocols.

Education

Nanyang Technological University, Singapore

Bachelor of Engineering (Aerospace)

Specialisation in Mechanical Engineering, Honours (Highest Distinction), Accelerated Bachelor's

Relevant Coursework: Applied Mathematics, Statistics, Computational Methods, Materials Science

Research Projects

Computational Mathematics Research **Jan 2024 – Present**

- Independent research on Monte Carlo methods, Markov chains, and advanced probability theory with applications to engineering uncertainty quantification.
- Developing mathematical frameworks for probabilistic modeling in complex engineering systems and contributing to theoretical foundations.

Computational Materials Science Research **Jan 2023 – Dec 2023**

- Researched parametric modeling approaches for advanced materials using computational intelligence and mathematical optimization.

- Investigated fracture mechanics through computational simulation, developing novel methodologies for predicting material behavior under complex loading conditions.
- Developed modified phase field methodologies enhanced with computational optimization for materials property prediction and analysis.

Research Competencies

- **Computational Research:** Numerical methods, finite element analysis, simulation validation, computational optimization
- **Statistical Analysis:** Hypothesis testing, experimental design, uncertainty quantification, statistical modeling
- **Interdisciplinary Research:** Physics-based modeling, data-driven approaches, engineering applications, mathematical foundations
- **Research Methodology:** Literature review, experimental validation, reproducible research, academic writing, presentation skills

Academic Achievements

- **Academic Excellence:** Honours (Highest Distinction) in accelerated Bachelor's program
- **Research Contributions:** Open-source ML pipelines and computational frameworks contributing to scientific community
- **Interdisciplinary Training:** Combination of engineering, mathematics, and computer science expertise
- **Collaborative Research:** Experience working across engineering disciplines with strong communication skills