Jack Shi Wei Lun

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Education

National University of Singapore
Doctor of Philosophy — *Aug. 2024 – Aug. 2028*
Research Topics: Large Language Models

Georgia Institute of Technology
Master of Science (Computer Science); Current GPA: 4.0/4.0 — *Aug. 2024 – Dec. 2027*
Specialization in Machine Learning

National University of Singapore
Bachelor of Engineering (Civil Engineering); GPA: 4.81/5 — *Aug. 2020 – May 2024*
Specialization in Digitalization of Urban Infrastructure

Research Publications

- Phan, L., Gatti, A., Han, Z., Li, N., Hu, J., Zhang, H., ... **Shi, J. W. L.**, ... & Wykowski, J. (2025). Humanity's last exam. arXiv preprint arXiv:2501.14249, https://doi.org/10.48550/arXiv.2501.14249
- **Shi, J. W. L.**, Solihin, W., & Yeoh, J. K. (2025). Fine-tuning a large language model for automated code compliance of building regulations. *Advanced Engineering Informatics*, 68, 103676, https://doi.org/10.1016/j.aei.2025.103676
- **Shi, J. W. L.**, Dang, M., Solihin, W., Poh, L. H., & Yeoh, J. K. W. (2026). Hallucination mitigation in large language models for code compliance logic via reinforcement learning. *Automation in Construction*. (Under Review)
- Dang, M., **Shi, J. W. L.**, Guo, Y., Li, S., & Yeoh, J. K. W. (2026). Bridge inspection visual question answering via multi-modal large language modeling. *Automation in Construction*. (Under Review)
- Dang, M., **Shi, J. W. L.**, Guo, Y., Li, S., & Yeoh, J. K. W. (2026). Group relative policy optimization-based bridge damage degree assessment. *Automation in Construction*. (In Progress)
- **Shi, J. W. L.**, Zhao, X., & Dao, M. H. (2023). Component-based reduced order modeling for heat transfer in thermal fin and data server. Poster presented at the *International Workshop on Reduced Order Methods*, NUS-IMS Singapore.

Work Experience

novaCITYNETS
Machine Learning Research Intern — *Sep. 2023 – April 2024*

- Engineered a natural language processing framework using retrieval augmented generation and semantic search techniques that led to 97% accuracy for information retrieval of building regulations.
- Spearheaded a novel research project regarding automated rule checking of Singapore's building regulations via fine-tuning of large language model.
- Authored a research paper as part of my dissertation and received the College of Design and Engineering Innovation & Research Award (Merit) 2024.
- Enhanced design workflow by order of magnitudes compared to manual process of the rule interpretation sessions.

LeapThought
Algorithm Intern — *Jun. 2023 – Aug. 2023*

- Established and maintained documentation pertaining to user journeys, workflows and computational logic for Singapore's architectural codes.
- Designed algorithms and spatial/computational prototypes for BCA's automated model checker as part of CORENET X, in collaboration with in-house software developers and government agencies (e.g., URA, PUB, NEA, etc).

- Facilitated discussions with engineering and development teams to optimize collaborative platform, model-checking, UI and BIM-related features in LeapThought's deep technology products.

A*STAR Institute of High Performance Computing

Research Intern (Supervisors: Dr. Dao My Ha, Dr. Zhao Xiang) *Jan. 2023 – May 2023*

- Recipient of the A*STAR Research Internship Award, and researched on physics-based AI modeling of heat transfer in data center using component-based reduced order methods.
- Successfully and independently replicated past research work by other renown researchers to validate their experimental results and adapt them to our own case studies.
- Decreased computational runtime for heat transfer modeling by up to 26 times, while still maintaining similar accuracy. Findings were presented by me at an international IMS-NUS workshop.

Academic Projects

PREP-NexT Lab

Research Assistant *Oct. 2023 – May 2024*

- Contributed to enhanced functionality and maintainability through modifications to the existing large Python code base, and reducing computational runtime of custom Python packages.
- Assisted in editing and reviewing technical manuscripts, setting up websites, and creating scientific illustrations to showcase our lab research. Research work can be found here: github.com/PREP-NexT
- Performed extreme value analysis on historical hydrological simulations and in situ streamflow measurement, and conducted literature reviews on nature-based solutions (aquifer recharge), global drought and flood risks.

Detection of Counterfeit Carplates Project

Computer Vision and Machine Learning Project *Mar. 2022 – May 2022*

- Directed a 4-member team on computer vision project on detection of counterfeit carplates using several computer vision methods.
- Devised and presented a deep learning architecture for predicting car plate checksums, achieving the highest accuracy and utilizing the lowest computational resources among all groups in both synthetic and real-world test datasets.

Undergraduate Research Opportunities Programme

Undergraduate Researcher (Supervisor: A/Prof. He Xiaogang) *Dec. 2021 – Nov. 2022*

- Assimilated and cleaned heavy reforecast and reanalysis datasets (e.g., ERA5 and GEFSv12) as ground truth simulations from numerical weather forecast models and ground measurements.
- Accelerated Python codes by harnessing modern technologies from NUS High Performance Computing and National Supercomputing Center.
- Established a regional climate model with a research fellow and two PhD students to downscale historical and future climate variables.
- Experimented state-of-the-art machine learning algorithms (e.g., SRGAN with multi-task) to obtain high-resolution and spatially coherent precipitation forecasts in Singapore. Future work can be found here: sgcale.github.io