Duy Le

Location: Mulgrave, Melbourne, Australia
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Machine learning researcher with a PhD in computational modelling and strong experience developing deep learning surrogates for physics-based simulations. Skilled in neural network architecture design, high-performance computing (HPC), scientific programming, and large-scale data processing. Demonstrated ability to deliver publishable research, build complex ML pipelines, and collaborate within multidisciplinary research teams (CSIRO Data61, academia). Seeking research roles in AI/ML, data science, or computational modelling.

RESEARCH INTERESTS

Machine learning for physical systems • Scientific computing • AI for engineering • Computational modelling • Surrogate modelling for simulations • 3D computer vision • Physics-informed ML

CORE SKILLS

- ***Programming languages***: Python, C, Java, MATLAB
- ***ML/AI***: PyTorch, Tensorflow, Scikit-learn, Open3D
- ***Data & Scientific Computing***: Pandas, Numpy, Scipy, data pipelines
- ***Simulation & Modelling***: Computational modelling, Discrete Element Method (DEM), numerical methods, optimisation
- ***Tools***: Git, Slurm, Linux, High Performance Computing (HPC) clusters
- ***Visualisation***: Matplotlib, ParaView, seaborn
- ***Other***: CUDA (basic), scientific writing, LaTeX

EXPERIENCE

❖ **PhD Researcher – Computational Modelling & Deep Learning**

Federation University / CSIRO Data61 (2022-2025)

- Developed deep-learning surrogate models replacing high-cost DEM simulations, achieving **70–120× faster runtimes** while maintaining physical accuracy.
- Designed and trained 3D convolutional neural network-based architectures to predict particle interactions, collisions, motion corrections, and rotational dynamics in 3D space.
- Constructed high-performance data pipelines processing **1,000+ simulations** using Python, Pandas, msgpack-zstd, and Slurm-based automation.
- Built full ML workflow: data preprocessing, augmentation, batching, multi-GPU training, logging, evaluation, and inference pipelines.
- Conducted physical validation using coefficients of restitution, kinetic energy analysis, rotational metrics, mixing entropy, and boundary-condition generalisation.
- Collaborated with CSIRO researchers on model design, optimisation, and domain-specific evaluation strategies.
- Published as first author in peer-reviewed journals and international ML/engineering conferences.

SELECTED PROJECTS

- **Neural Surrogate for 3D Granular Flow**
  Developed a deep-learning model using continuous convolution operators and time-resolved boundary-motion features to generalise across multiple industrial geometries (rotating drum, hopper, blade mixer). Integrated temporal rollout and multi-stage training to ensure long-horizon stability.
- **HPC-Automated Simulation Pipeline**
  Built a Slurm-based workflow for generating DEM datasets at scale. Automated job submission, simulation management, output extraction, and data compression into ML-ready formats.
- **Large-Scale Physical Metrics & Analysis Toolkit**
  Developed Python scripts for computing granular flow statistics (mixing entropy, alignment metrics, angular velocity fields, kinetic energy, collision metrics) for evaluating surrogate and DEM outputs.

PUBLICATIONS

- Duy Le, Gary W. Delaney, Linh Nguyen, Truong Phung, David Howard, Gayan Kahandawa, Manzur Murshed, "A Neural Network Surrogate for Modelling Granular Flow Dynamics in Industrial Applications with Dynamic Boundary Conditions", *Powder Technology, 2025* **(Under review)**

- Duy Le, Linh Nguyen, Truong Phung, David Howard, Gayan Kahandawa, Manzur Murshed, Gary W. Delaney, "Machine Learning Accelerated Prediction of 3D Granular Flows in Hoppers", *The 33rd International Conference on Artificial Neural Networks*, *2024*
- Duy Le and Linh Nguyen, "Simple linear iterative clustering based low-cost pseudo-LiDAR for 3D object detection in autonomous driving", *Multimedia Tools and Applications, 2023*
- Duy Le and Linh Nguyen, "An Efficient Force-Feedback Hand Exoskeleton for Haptic Applications", *International Journal of Intelligent Robotics and Applications, 2021*
- Duy Le, Ying Men, Yunkang Luo, Yixuan Zhou and Linh Nguyen, "An Efficient Multi-Vehicle Routing Strategy for Goods Delivery Services", *IEEE International Conference on Advanced Robotics and its Social Impacts, 2021*
- Duy Le and Linh Nguyen, "A Design of Haptic Hand Exoskeleton for Virtual Reality Applications", *2021 Innovations in Intelligent Systems and Applications Conference (ASYU), IEEE, 2021*

EDUCATION

❖ **Federation University, Australia** (2025)
Doctor of Philosophy (Computational Modelling & Deep Learning)
Thesis: Accelerated Surrogate Modelling of Granular Materials using Artificial Neural Networks
Scholarship: CSIRO Data61 PhD Scholarship, Federation University Tuition Fee Scholarship

❖ **Australian National University (ANU), Australia** (2021)
Master of Engineering (Mechatronics)
<u>**Academic achievements**</u>:
GPA: 6.2/7.0 – High Distinction in Capstone Project and core engineering units

❖ **Ho Chi Minh city University of Technology (HCMUT), Vietnam** (2018)
Bachelor of Engineering (Honours degree – PFIEV) in Mechatronics
<u>**Academic achievements:**</u>
GPA: 3.5/4.0 – Top 3 GPA in the PFIEV program

ADDITIONAL INFORMATION

- Eligible to work in Australia (full work rights)
- Experience collaborating with multidisciplinary researchers across academia and industry
- Strong scientific communication skills (papers, reports, presentations)

Referees available upon request