Po-Han (Kozak) HOU

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Python, C++, MATLAB, Julia
Scientific Machine Learning, PDEs, Scientific Computing, Parallel Computing, Plasma Physics, Docker, Nvidia-Modulus,
TensorFlow, PyTorch, SciPy, NumPy, SymPy, Simulink, Slurm, PBS, OpenMP
HuggingFace, Git/Github,

INDUSTRY & RESEARCH EXPERIENCE

MOLDEX3D – CORETECH SYSTEM CO., LTD. HEADQUARTERS   Hsinchu, Taiwan
Software R&D Intern   Sep 2023 ~ Jan 2024

- Integrating Neural Operator into Moldex3D API, allowing clients to simulate thermal analysis with pre-trained PINN and FNO models under various boundary/initial conditions and materials for molding. (speed x2000, error < 3%)

SPACE ENVIRONMENT LABORATORY – NATIONAL CENTRAL UNIVERSITY   Taoyuan, Taiwan
Undergraduate Research Assistant (Supervisor: Prof. Jih-Hong Shue)   Sep 2021 ~ Jun 2023

- Focused on physics models in space, machine learning, and their combination
- *Project: Regression-based Physics Informed Neural Networks for Magnetopause Tracking*
- *Project: Comparing Kalman Filter with Recurrent-based machine learning on CubeSat ADCS*
- *Project: Automatic Emergency Dust-Free solution on-board International Space Station with Bi-GRU*

NATIONAL CENTER FOR HIGH-PERFORMANCE COMPUTING, NCHC   Hsinchu, Taiwan
Deep Learning Research Intern (AI/Modulus [NVIDIA – SimNet]) (Supervisor: Dr. Chun-Yu Lin)   Jul 2022 ~ Aug 2022

- Focused on Physics Informed Neural Networks including DeepONet and Fourier Neural Operator with their applications for Computational Fluid Dynamics.
- Examining zero-shot generalization on 1D Advection Equation via PINNs
- *Project: Implementing Fourier Neural Operator (FNO) for Image Classification via TensorFlow*

EDUCATION

IMPERIAL COLLEGE LONDON   London, UK
Master of Science in Applied Computational Science and Engineering   Sep 2024 ~ Sep 2025

- Graduate with Merit (Supervisor: Prof Adriana Paluszny and Prof. Naoto Tsujii)
- Research Interests: Modelling and Numerical Methods, Scientific Machine Learning (SciML)
- Dissertation: *Physics-based Machine Learning Scheme for Accelerating Simulation of 2D Lower-Hybrid Wave on TST-2 Spherical Tokamak*

NATIONAL CENTRAL UNIVERSITY   Taoyuan, Taiwan
Bachelor of Science in Space Science and Engineering   Sep 2020 ~ Jan 2024

- Credit Program: Artificial Intelligence
- Relevant Coursework: Applied Mathematics, Plasma Physics, Electromagnetism, Solar Physics
- Cumulative GPA: 4.01 / 4.3 (Top 5% in the class) [Department Student Representative - Valedictorian]

STANFORD UNIVERSITY   California, USA
Undergrad Summer Session   Jun 2023 ~ Aug 2023

- Relevant Coursework: Stochastic Process, High Performance Computing, Data Mining & Analysis
- Cumulative GPA: 3.70 / 4.3

PUBLICATIONS

- (Accepted for Oral Presenataion) **Hou, P.-H** and Hsieh, S.-C. (2025) *Regression-based Physics Informed Neural Networks (Reg-PINNs) for Magnetopause Tracking, International Conference on Scientific Computing and Machine Learning.* Manuscript is available at: https://arxiv.org/abs/2306.09621

- **Hou, P.-H.**, Lin, W.-C., Hou, H.-C., Huang, Y.-H., Shue, J.-H. (2022*) Automatic Emergency Dust-Free solution on-board International Space Station with Bi-GRU (AED-ISS), arXiv:2210.08549.* Available at: https://arxiv.org/abs/2210.08549

- Chou, H.-H, Chiang, W.-J, Kuo, C.-W, Lung. C, **Hou, P.-H,** Wang, E.-J, Chen, Y.-T, Zhao, Y.-X, Kuo, J.-S (2021) *Utilizing Pop-Up Platform on the CubeSat to Achieve Commercial Activities in the Universe (UCCU), International Conference on Astronautics and Space Exploration (iCASE).*

AWARDS & RECOGNITION

Dean's Award of College of Earth Science (Valedictorian) – National Central University

2024
- Academic performance in the top 5%, recommended for selection by the department's curriculum committee.

ICTP-IAEA College on Plasma Physics and Fusion Application – ICTP

2024
- Completed all tests from IAEA-LMS, including MHD Plasma, Relativistic Plasmas, Vlasov Simulations, Turbulence and Dissipation, Magnetic Reconnection, Gyrokinetic, Magnetic Confinement and Tokamak

Level 2 of the Asia AI Odyssey Challenge – Microsoft

2024
- The competition requires the top 1000 challengers to complete tasks in deploying cloud services for intelligent document processing (OCR) and language model deployment using Microsoft Azure.

Honor for Academic Excellence – National Central University

2023
- Placed in the top 1% of the department for the semester. (2023 Spring Term)

Future Star Awards – The Space Science Society of the Republic of China

2023
- Introduced the Regression-based Physics Informed Neural Network architecture, which ranked among the top five out of 54 posters presented at The Space Science Society of the Republic of China poster showcase.

TensorFlow Developer Certificate – Google TensorFlow

2023
- This certification requires candidates to complete tasks in Computer Vision, Natural Language Processing, and Data Augmentation using TensorFlow during a five-hour examination. (Obtained by 50 individuals in Taiwan and approximately 4900 individuals worldwide)

Disaster Risk Monitoring Using Satellite Imagery Certification – United Nations Satellite Centre

2023
- This certification requires completing tasks within 8 hours, including data retrieval from the UNOSAT satellite image database, performing digital image pre-processing and pipelining, and training a high accuracy, near real-time flood prediction model with TensorRT.

Best Technical Awards – AI Space Challenge, ASEAN

2022
- Proposed a particulate matter sensor integrating atmospheric physics parameters and geomagnetic sensing on the International Space Station with Bi-GRU, which was specially awarded by Geo-Insight, for demonstrating the best design and technology among all participating teams (a total of 34 teams) from ASEAN countries.

EXTRACURRICULARS & LEADERSHIP EXPERIENCE

Student Representative - Department of Space Science and Engineering

Sep 2022 ~ Jun 2023
- Held a Learning Effectiveness Committee meeting to collect student feedback and engage in discussions with relevant faculty and staff members, further strengthening the bond between learners and instructors.
- Organized various events as the designated events holder for the department, including the Learning Effectiveness Committee, Yuri's Night, and parties, among others.

Team Leader – AI Space Challenge, The Association of Southeast Asian Nations (ASEAN)

Dec 2021 ~ Jun 2022
- As representatives of Taiwan, we proposed an integrated particle warning system that combines a multivariate physics model with an edge computing system on the International Space Station.
- Made scheduling decisions and acted as a bridge between the supervising professor and the organizing committee.
- Collaborated with Taipei-Tech to jointly develop an end-to-end particle warning system.

SIDE PROJECTS

Numerical Methods and Physics Informed Neural Networks in Advection Function
- Demonstrated that Physics-Informed Neural Networks (PINNs) have a relatively lower likelihood of dissipation occurrence during long-term evolution compared to traditional numerical solution methods such as the Finite Difference Method and Finite Volume Method. (Source: https://github.com/KozakHou/Python-Tensorflow-DeepXDE/tree/main)

High Performance Computing with NVIDIA-RAPIDS
- Conducted benchmarks on data manipulation from the geostationary satellite, HIMAWARI-8, using CPU nodes (Intel - Xeon W-2123) and multi-GPUs (NVIDIA - A100 * 2 / NVIDIA - RTX5000).
- Employed RAPIDS to replace Scikit-Learn and trained the MNIST dataset using SVM on a GPU (NVIDIA - RTX5000), resulting in a significantly reduced training time of only 17 seconds.(Source: https://github.com/KozakHou/cuDF-and-cuML)

Benchmarks on ImageNet and MNIST with self-constructed Neural Networks
- Investigated the mechanism of the Fourier Neural Operator and implemented it independently using TensorFlow.
- Benchmarks on the standard MNIST image classification problem showed that it outperformed FCN, CNN, and ResNet in terms of accuracy, albeit at the cost of longer training and inferencing times. (Source: https://github.com/KozakHou/Image-Classification)