Da Long

837 University Village, Salt Lake City, UT 84108

385-418-7953, u1368737@umail.utah.edu, long-da.github.io

EDUCATION

The University of Utah, Salt Lake City, Utah
Ph.D. student in Computer Science, GPA: 3.89, 2021 - Present
- Advisor: Shandian Zhe
- Expected: May 2026

The University of Arizona, Tucson, Arizona
B.S. in Computer Science, GPA: 4.0, 2020
B.S. in Mathematics, GPA: 4.0, 2020

WORK EXPERIENCE

Meta, Menlo Park, CA
Research Scientist Intern, May 2024 - Aug. 2024
- Integrated reinforcement learning algorithms, including Deep Q-Network (DQN) and Advantage Actor-Critic (A2C), into Meta's recommendation foundation model.

Lawrence Berkeley National Laboratory, Berkeley, CA
Student Researcher, Aug. 2024 - Dec. 2024
- Designed a hierarchical spatio-temporal Fourier transformer (StFT) for long-term forecasting, improving prediction stability and accuracy with meaningful uncertainty quantification.

SKILLS

Technical: Python, PyTorch, JAX, MATLAB, LaTeX

RESEARCH EXPERIENCE

Spatio-temporal Fourier Transformer for Long-term Dynamics Prediction
- Designed a hierarchical Fourier transformer for multi-scale and multi-physics long-term spatio-temporal forecasting, with a generative residual refiner for further improvement and uncertainty quantification.

Arbitrarily-Conditioned Multi-Functional Diffusion for Multi-Physics Emulation
- Proposed a flexible diffusion model framework for multi-physics systems to simulate diverse physical processes, addressing arbitrary conditional tasks using a single, unified model.

Solving Forward and Inverse Problems via an Invertible Fourier Neural Operator
- Invented an invertible Fourier neural operator to solve both PDE forward and inverse problems.

Toward Efficient Kernel-Based Solvers for Nonlinear PDEs
- Developed a kernel learning framework that efficiently and effectively solves nonlinear, high-dimensional PDEs.

Learning High-frequent and Multi-scale Solutions via Gaussian Process
- Solving high-frequent and multi-scale PDEs by selecting and learning high-frequent components through a spectral mixture kernel.

Gaussian Process for Solving ODE/PDEs
- Developed a Gaussian process framework to solve ODE/PDEs while quantifying uncertainties in solutions through variational inference.

RESEARCH INTERESTS

Spatio-temporal Forecasting, Diffusion Model for Operator Learning, Foundation Model for Physics, Scientific Large Language Model, Surrogate Modeling, Gaussian Process, Reinforcement Learning

PUBLICATIONS

$*$ indicates equal contribution.

- **Long D.**, Xu Z., Yang G., Narayan A., & Zhe S., Arbitrarily-Conditioned Multi-Functional Diffusion for Multi-Physics Emulation. In *International Conference on Machine Learning (ICML 2025)*.

- Xu Z.*, **Long D.***, Xu Y., Yang G., Zhe S., & Owhadi H., Toward Efficient Kernel-Based Solvers for Nonlinear PDEs. In *International Conference on Machine Learning (ICML 2025)*.
- **Long D.**, Xu Z., Yuan Q., Yang Y., & Zhe S., Invertible Fourier Neural Operators for Tackling Both Forward and Inverse Problems. In *International Conference on Artificial Intelligence and Statistics (AISTATS 2025)*.
- **Long D.**, Xing W., Krishnapriyan A., Kirby R., Zhe S., & Mahoney M., Equation Discovery with Bayesian Spike-and-Slab Priors and Efficient Kernels. In *International Conference on Artificial Intelligence and Statistics (AISTATS 2024)*.
- Fang S.*, Cooley M.*, **Long D.***, Li S., Kirby R., & Zhe S., Solving High Frequency and Multi-Scale PDEs with Gaussian Processes. In *International Conference on Learning Representations (ICLR 2024)*.
- **Long D.**, Mrvaljevic N., Zhe S., & Hosseini B., A Kernel Approach for PDE Discovery and Operator Learning. In *Physica D: Nonlinear Phenomena*.
- **Long D.**, Wang Z., Krishnapriyan A., Kirby R., Zhe S., & Mahoney M. (2022). AutoIP: A United Framework to Integrate Physics into Gaussian Processes. In *International Conference on Machine Learning (ICML 2022)*.

PAPERS IN SUBMISSION

- **Long D.**, Zhe S., Williams S., Oliker L., & Bai Z., Spatio-temporal Fourier Transformer (StFT) for Long-term Dynamics Prediction.
- Li Y., Chen K., **Long D.**, Xu Z., Xing W., Hochhalter J., & Zhe S., Pseudo Physics-Informed Neural Operators.