Jinhong Wu | Curriculum Vitae

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SUMMARY

Research Interests: My research primarily lies in **deep learning** and **data-driven science and engineering** (e.g., deep learning-based physical simulation), Currently, I'm working on fluid field generation with **diffusion models**. My ultimate objective is to integrate deep learning algorithms with traditional scientific methodologies to create intelligent agents bridging the virtual and physical worlds.

Highlight: 5 years of programming experience; 4 years of research experience with solid mathematical and theoretical background; attended the Oriel College Summer School at the University of Oxford (2019);

Relevant Courses: Matrix Theory (96), Mathematical Statistics (93), Introduction to Robotics (93), Linear Algebra (95), System Dynamic & control (99), Calculus (99), Complex function and Integral Transform (93), Dynamics and Bifurcations (99), Engineering Graphics (96), Dynamics (94), Mission Planning for Unmanned Aerial (92), Aerodynamics (98), Computational Fluid Dynamics (98).

EDUCATION

Technical University of Munich (TUM) — **Munich, Germany**
Ph.D. in Computer Science — *October 2024 (Expected)*

Huazhong University of Science and Technology (HUST) — **Wuhan, CHN**
M.E. in Mechanical Engineering — *September 2021 - June 2024*
– GPA: 3.87/4.0 (89.09/100)
– Rank: 5/51

Huazhong University of Science and Technology (HUST) — **Wuhan, CHN**
B.E. in Flight Vehicle Design and Engineering — *September 2017 - June 2021*
– GPA: 3.97/4.0 (92.50/100)
– Rank: 3/42

INTERNSHIP

School of Intelligence Science and Technology, Peking University — **Beijing, CHN**
Research Assistant — *August 2024 - Present*
– Research on fin-tuning diffusion models for fluid field generation

AWARDS & HONORS

- **Hong Kong PhD Fellowship Scheme**, RGC (Hong Kong), 2024
- **Merit Postgraduate**, Huazhong University of Science and Technology, **2022, 2023**
- **First-class Scholarship for Postgraduates**, HUST, **2021, 2022, 2023**, top 1% students in HUST
- **Graduate Freshman Scholarship**, HUST, 2021, top 10% students (Recommended exemption Graduate)
- **Outstanding Graduates**, Huazhong University of Science and Technology, 2021
- **Excellent Graduation Thesis**, HUST, 2021, top 5% students in HUST
- **Outstanding Undergraduate Students**, HUST, 2018, top 1% students in HUST
- **Scholarship for National Encouragement**, HUST, **2018, 2019, 2020**, top 5% students in HUST
- **Merit Student**, Huazhong University of Science and Technology, 2019

RESEARCH EXPERIENCE

Deep learning-based Prediction and Optimization Method for Acoustic Field — *2021 - 2022*

- **Introduction:** Conventional optimization methods for acoustic metasurfaces typically rely on high-performance numerical simulation models, which can lead to significant computational costs and time-consuming simulations.
- Proposed a deep learning-based optimization framework for achieving acoustic uniformity, which consists of three key components: Data Preparation, Multi-Fidelity Neural Network, and Physical Parameters Optimization.
- Proposed method reaches the highest accuracy and the mean absolute error is improved by at least 20%.

Physics-informed Physical Field Reconstruction *2022 – 2023*
- **Introduction:** Data-driven models typically require a large amount of data, which can be difficult to obtain in engineering applications. Moreover, the predicted results may not be consistent with physical laws.
- Proposed a physics-informed neural network that incorporates the heat transfer equation and boundary conditions into the loss function to predict the temperature field of a fuel tank.
- Compared to unconstrained models, the MAE of the predicted temperature field was reduced from 1.1 to 0.69.

Strain Field Prediction and Uncertainty Quantification for Adapters *2023 – 2024*
- **Introduction:** Deep neural networks are powerful tools for the performance prediction and optimization of adapters, but the inevitable prediction errors will lead to sub-optimal even ineffective outcomes.
- Proposed an improved multi-scale neural operator to reduce the prediction errors at strain concentration points. A novel conditional normalizing flows auxiliary UQ model was proposed to estimate the uncertainty of predictions.
- The proposed methods show an 8.80% improvement over the SOTA and the best uncertainty metrics.

ACADEMIC ACTIVITIES

- 2021 International Conference of Mechanical Design, 2022.08, Changsha, China, (**Oral Presentation**)
- Member of Chinese Mechanical Engineering Society, Chinese Association of Automation

SKILLS

Programming	Python, C++, Matlab
Frameworks	Linux, PyTorch, Tensorflow, Numpy, JAX, OpenCV
Languages	English (**IELTS: 6.5**)

PUBLICATIONS

- **MPIPN: a multi physics-informed PointNet for solving parametric acoustic-structure systems**
  Chu Wang, **Jinhong Wu**, Yanzhi Wang, Zhijian Zha, Qi Zhou*
  Engineering with Computers, 2024. **IF: 8.083, Rank: Q1.** DOI: 10.1007/s00366-024-01998-w
- **A structurally re-parameterized convolution neural network-based method for gearbox fault diagnosis in edge computing scenarios**
  Yanzhi Wang, **Jinhong Wu**, Ziyang Yu, Jiexiang Hu, Qi Zhou*
  Engineering Applications of Artificial Intelligence, 2023. **IF: 7.4, Rank: Q1.** DOI: 10.1016/j.engappai.2023.107091
- **A deep learning-based multi-fidelity optimization method for the design of acoustic metasurface**
  Jinhong Wu, Xingxing Feng, Xuan Cai, Xufeng Huang, Qi Zhou*
  Engineering with Computers, 2022. **IF: 8.083, Rank: Q1.** DOI: 10.1007/s00366-022-01765-9
- **A two-stage adaptive multi-fidelity surrogate model-assisted multi-objective genetic algorithm for computationally expensive problems** (Highly Cited Paper)
  Qi Zhou (supervisor), **Jinhong Wu**, Tao Xue, Peng Jin*
  Engineering with Computers, 2021. **IF: 8.083, Rank: Q1.** DOI: 10.1007/s00366-019-00844-8

COMPETITIONS (selected)

- **The 19th & 20th China Postgraduate Mathematical Contest in Modeling (CPMCM) - Huawei Cup**, National Second Prize, 2022, 2023 (twice)
- **Huawei Software Elite Challenge (Wuhan-Changsha Division)**, Second Prize, 2022
- **Alibaba Cloud Tianchi AAAI 2022 Security AI Challenger Program Phase 8**, Top 1% (30/3169), 2021
- **Jiangsu Big Data Development and Application Competition**, Top 2% (13/653), 2020