Haoyang Zheng

PH.D. STUDENT & APPLICANT

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Education

Purdue University, College of Engineering — *West Lafayette, IN*
Ph.D. in Mechanical Engineering (supervised by Prof. Guang Lin, GPA 4.0/4.0) — *Jun. 2021 - May. 2025 (expected)*

Purdue University, College of Engineering — *West Lafayette, IN*
M.S. in Mechanical Engineering (GPA 3.8/4.0) — *Sep. 2019 - May. 2021*

Southwest University, School of Computer and Information Science — *Chongqing, China*
B.Eng. in Automation (supervised by Prof. Yong Deng, Rank 1/92) — *Sep. 2014 - Jun. 2018*

Conference

[1] **Haoyang Zheng**, Wei Deng*, Christian Moya, Guang Lin*, "Accelerating Approximate Thompson Sampling with Underdamped Langevin Monte Carlo", *AISTATS 2024*.

Journal

[1] **Haoyang Zheng**, Yao Huang, Ziyang Huang, Wenrui Hao, Guang Lin*, "HomPINNs: homotopy physics-informed neural networks for solving the inverse problems of nonlinear differential equations with multiple solutions", *Journal of Computational Physics* (2024);

[2] **Haoyang Zheng**, Jeffrey R. Petrella, P. Murali Doraiswamy, Guang Lin*, Wenrui Hao, "Data-driven causal model discovery and personalized prediction in Alzheimer's disease", *NPJ digital medicine* (2022);

[3] **Haoyang Zheng**, Ziyang Huang, Guang Lin*, "A physics-constrained neural network for multiphase flows", *Physics of Fluids* (2022);

[4] **Haoyang Zheng**, Yong Deng*, Yong Hu, "Fuzzy evidential influence diagram and its evaluation algorithm", *Knowledge-Based Systems* (2017);

[5] **Haoyang Zheng**, Yong Deng*, "Evaluation method based on fuzzy relations between Dempster-Shafer belief structure", *International Journal of Intelligent Systems* (2018);

[6] Tian Bian, **Haoyang Zheng**, Yong Deng*, "Failure Mode and Effect Analysis based on D numbers and TOPSIS", *Quality and Reliability Engineering International* (2018);

[7] Likang Yin, **Haoyang Zheng**, Tian Bian, Yong Deng*, "An Evidential Link Prediction Method and Link Predictability Based On Shannon Entropy", *Physica A* (2017).

Research Experience

Argonne National Laboratory, Mathematics and Computer Science Division — *Lemont, IL*
Givens Associate — *May. 2023 - Jul. 2023*

- Developed an automated approach for optimizing **reinforcement learning** algorithms;
- Integrated the DeepHyper framework with the **MPI Programs** to enable parallel computing;
- Used the integrated setup to boost the performance of reinforcement learning optimization.

Purdue University, School of Mechanical Engineering — *West Lafayette, IN*
Research Assistant — *Jul. 2021 - Now*

- Proposed a **data-driven causal model** described by ODEs to reveal **Alzheimer's disease** progression in different stages and provide accurate personalized disease progression predictions for patients.
- Proposed a **physics-constrained neural network** to predict sequential patterns and motions of multiphase flows with implicit and explicit physical constraints.

Purdue University, Department of Mathematics *West Lafayette, IN*

Visiting Student *Jul. 2018 - Apr. 2019*

- Proposed a method to propagate uncertainties between aleatory uncertainty and epistemic uncertainty by **multi-fidelity Gaussian process** and **fuzzy set theory**;
- Applied **Gaussian process**, **Fourier transform** and **State-space model** to analyze time series with uncertainties;

Southwest University, School of Computer and Information Science *Chongqing, China*

Undergraduate Research Assistant *Oct. 2014 - Jun. 2018*

- Proposed **fuzzy evidential influence diagram** to allow multiple experts to evaluate risks among complex systems;
- Proposed a method to estimate the membership degree function and basic probability assignment among top event and basic events;
- Proposed a failure mode and effects analysis model based on fault tree, D numbers and TOPSIS;

Teaching Experience

Purdue University *West Lafayette, IN*

Teaching Assistant *Aug. 2019 - Now*

- **ME 270: Basic Mechanics I** (2022 Fall)
- **ME 375: System Modeling and Analysis** (2021 Spring, 2021 Fall)
- **ME 475: Automatic Control Systems** (2020 Fall, 2020 Spring)
- **ME 352: Machine Design I** (2020 Summer)
- **EAPS 507: Introduction to Analysis and Computing with Geoscience Data** (2019 Fall)

Skills

Programming Python (TensorFlow, PyTorch), MATLAB, R, C, Java

Research skills LaTeX, Origin Lab, EndNote, Visio, Notion

Achievements

Selected Honors

2017 **Finalist (0.5%)**, Interdisciplinary Contest in Modeling *COMAP*

2016 **Special prize (2/3568)**, International Mathematical Contest in Modeling *GMMCA*

Selected Awards

2018 **Pacemaker to Technological Innovation in Chongqing**, Awarded 10 college students every two years *Chongqing, China*

2018 **Outstanding undergraduates in Chongqing**, Awarded 1% of all college undergraduate students every year *Chongqing, China*

2015 **China National Scholarship**, Awarded 1% of all undergraduates in China *China*