# Shijiang Li（李仕江）

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I am currently a direct doctoral student at Xiamen University, focusing on artificial intelligence and the automation of construction machinery. My research aims to contribute to the development of intelligent systems and automation in the field of engineering machinery. I have had the opportunity to publish five papers in SCI journals related to these areas, and I continue to explore ways to improve both theoretical understanding and practical applications in this field.

## EDUCATION

◆ **Xiamen University, Xiamen, China** **2021.09 - present**

- PhD Student; Cumulative Grade Point Average: (3.8/4)
- PhD Dissertation: Research and Application of Data-Driven Modeling of the Coupling Relationship Between Excavation Robot Buckets and Materials

◆ **Xiamen University, Xiamen, China** **2017.09 - 2021.06**

- Bachelor of Engineering in Mechanical Design & Manufacturing and Automation
- Cumulative Grade Point Average: (3.6/4); Integrated Ranking: 3/61

## RESEARCH EXPERIENCE

◆ **Operating data-driven inverse design** **2021.09 - 2022.09**

Operating data-driven inverse design (DID) provides updated knowledge for the forward design process. It forms a closed loop of design enhancements in which uncertainties from different sources, such as the model and environment, have a significant impact on the design and optimization results.

- Proposed a method for analyzing data-driven inverse design (DID) uncertainty based on Bayesian theorem.
- A clustering method is proposed to extract information on different working conditions from the operating data to provide a basis for mass personalized design.

◆ **Development of mini electric excavator** **2022.09 - 2023.07**

To facilitate the progression of subsequent research, we have developed a miniature electric excavator. I am mainly responsible for the following parts:

- Designed the mechanical structure.
- Designed the hydraulic system.
- Drew the electrical schematic diagram.

◆ **Research on soft measurement of working resistance of excavator** **2023.03 - 2023.09**

Accurate measurement of the working resistance encountered during excavation plays a vital role in improving production efficiency, reducing energy consumption, and enabling intelligent capabilities in excavators. To address the challenges of the inaccurate measurement of working resistance, we present a novel method for measuring excavator working resistance based on physics-informed machine learning (PIML).

- We construct a mechanism model, which incorporates the kinematic and dynamic models of the

excavator working device.

- By integrating the mechanism models with machine learning algorithms, a soft sensing model for excavator working resistance based on the PIML method is developed.

# PUBLICATION

**Papers:**

- [1] **S. Li**, G. Zhou, S. Wang, X. Jia, L. Hou, Multi-sensor data fusion and deep learning-based prediction of excavator bucket fill rates, Automation in Construction 171 (2025), https://doi.org/10.1016/j.autcon.2025.106008. (IF 11.5)
- [2] **S. Li**, S. Wang, X. Chen, G. Zhou, B. Wu, L. Hou, Application of physics-informed machine learning for excavator working resistance modeling, Mechanical Systems and Signal Processing 209 (2024) 111117, https://doi.org/10.1016/j.ymssp.2024.111117. (IF 8.9)
- [3] **S. Li**, S. Wang, X. Chen, G. Zhou, L. Hou, Identification of material excavation difficulty and uncertainty analysis based on Bayesian deep learning, Journal of Industrial Information Integration 42 (2024) 100728, https://doi.org/10.1016/j.jii.2024.100728. (IF 11.6)
- [4] **S. Li**, L. Hou, Z. Chen, S. Wang, X. Bu, Uncertainty modeling and applications for operating data-driven inverse design, Journal of Engineering Design 34 (2) (2023) 81-110, https://doi.org/10.1080/09544828.2023.2180846. (IF 3.4)
- [5] **S. Li**, X. Zhou, Y. Liu, J. Chen, T. Guo, W. Yang, L. Hou, Agile Conceptual Design and Validation Based on Multi-source Product Data and Large Language Models: A Review, Framework, and Outlook, Journal of Engineering Design (2025), https://doi.org/10.1080/09544828.2025.2476879. (IF 3.4)
- [6] B. Wu, S. Wang, H. Lin, **S. Li**, L. Hou (2023) Fast Estimation of Loader’s Shovel Load Volume by 3D Reconstruction of Material Piles. Chinese Journal of Mechanical Engineering, 36 (1), DOI: 10.1186/S10033-023-00945-Y. (IF 4.5)
- [7] **S. Li**, G. Zhou, Y. Dang, X. Jia, S. Wang, L. Hou, Modeling of Excavator Bucket-Material Interaction Based on Multi-Task Learning. (Submitted)
- [8] **李仕江**, 王少杰, 侯亮, 基于机电液联合仿真的装载机工作装置电气化设计研究, 机械设计 (S02) (2021) 038.

◆ **Patents:**

- Liang Hou, **Shijiang Li**, Shaojie Wang, Xiangjian Bu, Xiu Chen & Gongxi Zhou. A method for measuring the excavation resistance of an excavator [P]. CN116878575A, 2023-10-13.
- Shaojie Wang, **Shijiang Li**, Liang Hou, Binyun Wu, Xiaozhen Lian. Electrostatic Discharge Testing System and Method for Liquid Crystal Display Panels [P]. CN113570988A,2021-10-29.
- Liang Hou, **Shijiang Li**, Shuai Lv, Shaojie Wang, Xiangjian Bu. Excavator[P]. CN308020913S,2023-05-05.
- Liang Hou, Binyun Wu, Shaojie Wang, **Shijiang Li**, Xiaozhen Lian. Automatic Electrostatic Discharge Testing Device and Method for Liquid Crystal Display Panel [P]. CN113899961A, 2022-01-07.

# SKILLS

- Python, MATLAB, SOLIDWORKS, AutoCAD, Cero, ADAMS, Unity3D.