

Jifeng Song

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RESEARCH INTERESTS

Multimodal Learning, AI for Science, Computational Biology, Explainable AI, Efficient AI

EDUCATION

- **University of Pittsburgh** Sep. 2023 – Present
Ph.D. in Electrical and Computer Engineering
◦ Advisors: [Prof. Yufei Huang](#), [Prof. Zhi-Hong Mao](#) Pittsburgh, PA, USA
- **University of Pittsburgh** Sep. 2023 – August. 2025
M.S. Research in Electrical and Computer Engineering; GPA: 3.83/4 Pittsburgh, PA, USA
- **Huazhong University of Science and Technology** Sep. 2019 – Jun. 2023
B.E. in Electrical Engineering and Automation; GPA: 3.77/4 Wuhan, China

PUBLICATIONS

CONFERENCE

1. [\[EMNLP'26\]](#) **Jifeng Song**, Arun Das, Pan Wang, Hui Ji, Kun Zhao, Yufei Huang. "[FigEx2: Visual-Conditioned Panel Detection and Captioning for Scientific Compound Figures](#)." *Proceedings of the 2026 Conference on Empirical Methods in Natural Language Processing*.
2. [\[MLSys'26\]](#) **Jifeng Song**[†], Xiangyu Yin[†], Boyuan Yang, Kai Huang, Weichen Liu, Wei Gao. "[Attribution-based Sparse Activation in Large Language Models](#)." *Proceedings of Machine Learning and Systems 2026*.
3. [\[EMNLP'25\]](#) **Jifeng Song**, Arun Das, Ge Cui, Yufei Huang. "[FigEx: Aligned Extraction of Scientific Figures and Captions](#)." *Findings of the Association for Computational Linguistics: EMNLP 2025*.
4. **Jifeng Song**, Xiaosheng Peng, Zimin Yang, Peijie Wei, Bo Wang, Zheng Wang. "[A Novel Wind Power Prediction Approach for Extreme Wind Conditions Based on TCN-LSTM and Transfer Learning](#)." *IEEE/IAS I&CPS Asia'22*.
5. Zimin Yang, Xiaosheng Peng, Peijie Wei, **Jifeng Song**. "[Short-term Wind Power Prediction Based on CEEMDAN and Parallel CNN-LSTM](#)." *IEEE/IAS I&CPS Asia'22*.

JOURNAL

1. **Jifeng Song**, Xiaosheng Peng, Jiajiong Song, Zimin Yang, Bo Wang, Jianfeng Che. "[MTTLA-DLW: Multi-task TCN-Bi-LSTM Transfer Learning Approach with Dynamic Loss Weights based on Feature Correlations of the Training Samples for Short-term Wind Power Prediction](#)." *Wind Energy*, 2024.

PREPRINTS

1. Arun Das, Kexun Zhang, **Jifeng Song**, Meiru Han, Angela Chen, Wen Meng, Hugh Galloway, Po-Yuan Chen, Sumin Jo, Zhentao Liu, Md Musaddaql Hasib, Adam Officer, Harsh Sinha, Yu-Chiao Chiu, Shou-Jiang Gao, Lei Li, Yufei Huang. "[spatiAlytica: Viewer-Grounded Multimodal Agentic System for Interactive Spatial Omics Analysis](#)." *bioRxiv*, 2026.
2. Kun Zhao, Siyuan Dai, Pan Wang, **Jifeng Song**, Hui Ji, Chenghua Lin, Liang Zhan, Haoteng Tang. "[Aligning Findings with Diagnosis: A Self-Consistent Reinforcement Learning Framework for Trustworthy Radiology Reporting](#)." *arXiv:2601.03321*, 2026.
3. Md Musaddaql Hasib, Sumin Jo, Harsh Sinha, **Jifeng Song**, Arun Das, Zhentao Liu, Hugh Galloway, Huey Huang, Kexun Zhang, Shou-Jiang Gao, Yu-Chiao Chiu, Lei Li, Yufei Huang. "[A Process-Centric Survey of AI for Scientific Discovery Through the EXHYTE Framework](#)." *Research Square*, 2025.

RESEARCH EXPERIENCE

- **Research Assistant** Oct. 2024 – Present
Dept. of Electrical and Computer Engineering, University of Pittsburgh
Cancer Virology Program, UPMC Hillman Cancer Center Pittsburgh, PA, USA
FigMind: A Vision-Language Foundation Model for Scientific Figure Understanding in Spatial Biology.
 - Developing FigMind, a VLM-based embedding model for spatial and single-cell biology, leveraging >1M scientific figure-caption pairs for aligned image-text embeddings and retrieval.
 - Building the data pipeline and contrastive training and evaluation stack for domain adaptation, targeting zero-shot transfer and retrieval on spatial and single-cell biology figures.
 - Designing an entity-level retrieval benchmark for scientific figures, pairing a curated test set with entity-aware metrics to measure scientific-entity alignment beyond coarse image-text similarity.

FigEx2: Visual-Conditioned Panel Detection and Captioning for Scientific Compound Figures.

- Proposed FigEx2, a visual-conditioned framework that detects labeled panels and generates panel-wise captions from a compound figure alone (linked via a [DET] trigger), achieving 0.751 mAP@0.5:0.95 for detection and a +6.80 Entity-F1 gain over Qwen3-VL-8B on MedICaT, with zero-shot transfer to out-of-distribution domains.
- Introduced an Entity-Attention KL regularizer that aligns the detector's query-to-text cross-attention with scientific entity tokens, and applied a four-stage SFT+RL recipe with GRPO under a panel-level Entity-F1 reward to optimize scientific faithfulness.
- Curated BioSci-Fig-Cap for in-domain supervision and contributed physics and chemistry test suites for cross-disciplinary transfer.

FigEx: Aligned Extraction of Scientific Figures and Captions.

- Developed FigEx-7B, a vision-language model that separates compound figures and their captions into subfigures and subcaptions.
- Curated the BioSci-Fig dataset of 7,174 compound biomedical figures with 43,183 annotated subfigure bounding boxes and aligned subcaptions.
- Demonstrated that FigEx-7B outperforms YOLO-based detectors and LLaMA-based caption models in subfigure detection AP and caption separation ROUGE.

• Research Assistant

Dept. of Electrical and Computer Engineering, University of Pittsburgh

Sep. 2023 – Sep. 2024

Pittsburgh, PA, USA

Attribution-based Sparse Activation in Large Language Models.

- Proposed a new technique of attribution-based sparse activation, which is a lossy sparse activation technique that deactivates neurons with low attribution scores and aims to achieve the best tradeoff between model accuracy and computing costs.
- Quantified the large errors of existing attribution metrics when used for sparse activation, due to the interdependency among attribution scores of different neurons, and further proposed a new attribution metric that can provably correct such errors.
- Demonstrated that the technique achieves up to 70% model sparsity on difficult generative tasks such as question answering and text summarization, with <5% accuracy loss.

• Research Assistant

School of Electrical and Electronic Engineering, Huazhong University of Science and Technology

Sep. 2021 – Jun. 2023

Wuhan, China

Transfer Learning for Short-Term Wind Power Prediction.

- Designed a multi-task TCN-LSTM transfer learning model for newly built wind farms in a wind cluster.
- Introduced dynamic loss weights based on feature correlations between source and target farms, reducing prediction error by about 25%.

PRESENTATIONS & POSTERS

1. "FigEx2: Visual-Conditioned Panel Detection and Captioning for Scientific Compound Figures." Workshop on Emerging Directions in Data for Multimodal Foundation Models (DataMFM), CVPR 2026, June 2026.
2. "FigEx: Aligned Extraction of Scientific Figures and Captions." EMNLP 2025, Suzhou, China, November 2025.
3. "FigEx: Aligned Extraction of Scientific Figures and Captions." CMU AI for Science Workshop, Carnegie Mellon University, Pittsburgh, PA, September 2025.
4. "Demand Paging towards Sparse Activation in Small Language Models." Elijah Group Meeting, Dept. of Computer Science, Carnegie Mellon University, March 2024.

HONORS AND AWARDS

• Outstanding Undergraduate Thesis (Top 3%)

2023

Huazhong University of Science and Technology

- Recognized for outstanding undergraduate thesis in Electrical Engineering and Automation.

• Scholarship for Academic

2022

Huazhong University of Science and Technology

- Awarded for academic excellence during undergraduate studies.

• Scholarship for Scientific and Technological Innovation

2022

Huazhong University of Science and Technology

- Awarded for contributions to scientific and technological innovation projects.

TECHNICAL SKILLS

- **Programming:** Python, MATLAB/Simulink, C/C++, LaTeX
- **ML Frameworks:** PyTorch, TensorFlow, Keras