SIYANG LI （李思扬）

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Education

Huazhong University of Science and Technology, China **2022 – present**
Ph.D. in Artificial Intelligence, School of Artificial Intelligence and Automation

Boston University, USA **2020 – 2021**
Master in Artificial Intelligence, College of Arts and Sciences

New York University, USA **2014 – 2018**
Bachelor in Mathematics and Computer Science, Courant Institute

Research Experience

Transfer Learning Algorithms for Calibration-Efficient Brain-Computer Interfaces **2021 – present**
Advisor: **Prof. Dongrui Wu (IEEE Fellow; EiC, IEEE Trans. on Fuzzy Systems)**
Huazhong University of Science and Technology, China
Brain-computer interface (BCI) is an interdisciplinary field covering biomedical engineering, computer science, etc. **EEG**-based non-invasive BCIs face challenges of individual variability and signal non-stationarity, making per-use calibration necessary yet inconvenient. My research develops **transfer learning** methods that align auxiliary data from other subjects, devices, or modalities with the target user, thereby reducing reliance on target-specific data. This enables fast and accurate **BCI decoding** with improved robustness and stronger privacy protection.

Language Modeling for Low-Resource Machine Translation **2020 – 2021**
Advisor: **Prof. Derry Wijaya**
Boston University, USA
Large language models (LLMs) have transformed natural language processing, but internet text corpora is dominated by high-resource languages such as English and Mandarin. My research developed **transfer learning** approaches to adapt pre-trained LLMs on mainstream languages to low-resource languages, enabling efficient transfer with minimal aligned corpora. This enables improved **machine translation** quality for data-scarce language and scenarios with limited data.

Research Interest

My research interests include **machine learning** and its applications. Technically, I study **transfer learning**, **ensemble learning**, and **multimodal learning** methods and theories. I am also familiar with signal processing techniques, modern **large language models and vision-language models (LLMs/VLMs)**. For applications, I am particularly interested in brain decoding for **brain-computer interfaces (BCIs)**. For the long-term goal, I aim at **multimodal human-computer interaction** systems for future generations.

Publications

Published

1. **S. Li**, Z. Wang, H. Luo, L. Ding*, and D. Wu*, "T-TIME: Test-Time Information Maximization Ensemble for Plug-and-Play BCIs," IEEE Transactions on Biomedical Engineering, vol. 71, no. 2, pp. 423-432, 2024. GitHub.

2. **S. Li**, Z. Wang, C. Liu, and D. Wu*, "Black-Box Test-Time Ensemble," IEEE Computational Intelligence Magazine, accepted, 2025. GitHub.

3. **S. Li**, H. Wu, L. Ding, and D. Wu*, "Meta-Learning for Fast and Privacy-Preserving Source Knowledge Transfer of EEG-Based BCIs," IEEE Computational Intelligence Magazine, vol. 17, no. 4, pp. 16–26, 2022.

4. **S. Li**, Y. Xu, H. Wu, D. Wu*, Y. Yin, J. Cao, and J. Ding, "Facial Expression Recognition In-the-Wild with Deep Pre-trained Models," in Proc. European Conf. on Computer Vision Workshop, Tel Aviv, Israel, Oct. 2022.

5. Z. Wang†, **S. Li†**, J. Luo, J. Liu, D. Wu*, "Channel Reflection: Knowledge-Driven Data Augmentation for EEG-based Brain–Computer Interfaces," Neural Networks, vol. 176, pp. 106351, 2024. [co-first author]

6. Z. Wang, **S. Li**, D. Wu, "Canine EEG Helps Human: Cross-Species and Cross-Modality Epileptic Seizure Detection via Multi-Space Alignment," National Science Review, vol. 12, no. 6, nwaf086, 2025.

7. Z. Wang, **S. Li**, X. Chen, and D. Wu*, "Time-Frequency Transform based EEG Data Augmentation for Brain-Computer Interfaces," Knowledge-Based Systems, vol. 311, pp. 113074, 2025.

8. Z. Wang, **S. Li**, X. Chen, and D. Wu*, "MVCNet: Multi-View Contrastive Network for Motor Imagery Classification," Knowledge-Based Systems, vol. 328, pp. 114205, 2025.

9. H. Wu, **S. Li**, and D. Wu*, "Motor Imagery Classification for Asynchronous EEG-Based Brain-Computer Interfaces," IEEE Transactions on Neural Systems and Rehabilitation Engineering, vol. 32, pp. 527-536, 2024.

10. X. Chen, **S. Li**, Y. Tu, Z. Wang, D. Wu*, "User-wise Perturbations for User Identity Protection in EEG-Based BCIs," Journal of Neural Engineering, vol. 22, no. 1, pp. 016040, 2024.

11. H. Wu, **S. Li**, and D. Wu*, "TMMM: Transformer in Multimodal Sentiment Analysis under Missing Modalities," Proc. International Joint Conference on Neural Networks, Yokohama, Japan, Jun. 2024.

12. T. Jia, L. Meng, **S. Li**, D. Wu*, "Federated Motor Imagery Classification for Privacy-Preserving Brain-Computer Interfaces," IEEE Transactions on Neural Systems and Rehabilitation Engineering, vol. 32, pp. 3442-3451, 2024.

13. Z. Wang, W. Zhang, **S. Li**, X. Chen, and D. Wu*, "Unsupervised Domain Adaptation for Cross-Patient Seizure Classification," Journal of Neural Engineering, vol. 20, no. 6, pp. 066002, 2023.

14. X. Jiang, L. Meng, **S. Li**, and D. Wu*, "Active Poisoning: Efficient Backdoor Attacks on Transfer Learning-based Brain-Computer Interfaces," Science China Information Sciences, vol. 66, no. 8, pp. 1–22, 2023.

15. H. Wang, H. Zhang, **S. Li**, D. Wu*, "Gated Parametric Neuron for Spike-based Audio Recognition," Neurocomputing, vol. 609, pp. 128477, 2024.

16. X. Chen, J. An, H. Wu, **S. Li**, B. Liu, and D. Wu*, "Front-End Replication Dynamic Window (FRDW) for Online Motor Imagery Classification," IEEE Transactions on Neural Systems and Rehabilitation Engineering, vol. 31, pp. 3906–3914, 2023.

17. G. Kuwanto†, A. F. Akyürek†, I. C. Tourni†, **S. Li†**, A. Jones, and D. Wijaya*, "Low-Resource Machine Translation Training Curriculum Fit for Low-Resource Languages," in Proc. Pacific Rim International Conference on Artificial Intelligence, Jakarta, Indonesia, Nov. 2023. [co-first author]

18. Z. Wang, H. Wang, T. Jia, X. He, **S. Li**, D. Wu*, "DBConformer: Dual-Branch Convolutional Transformer for EEG Decoding," IEEE Journal of Biomedical and Health Informatics, accepted. preprint available: arXiv.

Under Review

1. **S. Li**, Z. Wang, S. Zheng, and D. Wu*, "Heterogeneous Supervised Domain Adaptation (HSDA) for Cross-Device EEG Classification," IEEE Transactions on Pattern Analysis and Machine Intelligence, R3.

2. **S. Li**, H. Wang, X. Chen, and D. Wu*, "Multimodal Brain-Computer Interfaces: AI-powered Decoding Methodologies," in revision (adding a code benchmark beyond the survey), preprint available: arXiv.

3. **S. Li†**, J. Ouyang†, Z. Cui†, Z. Wang, T. Jia, and D. Wu*, "Backpropagation-Free Test-Time Adaptation for Lightweight Brain-Computer Interfaces," IEEE/CAA Journal of Automatica Sinica, under review.

4. **S. Li†**, C. Liu†, D. Wu*, Z. Zeng, and L. Ding, "StackingNet: Collective Inference across Independent AI Foundation Models," under review.

5. D. Liu, **S. Li**, Z. Wang, W. Li, D. Wu*, "Spatial Distillation based Distribution Alignment (SDDA) for Cross-Headset EEG Classification," IEEE Transactions on Neural Systems and Rehabilitation Engineering, R1.

6. X. Chen, **S. Li**, D. Wu*, "AFPM: Alignment-based Frame Patch Modeling for Cross-Dataset EEG Decoding," Science China Information Sciences, under review. preprint available: arXiv.

7. Y. Tu, **S. Li**, X. Chen, D. Wu*, "BrainprintNet: A Multiscale Cross-Band Fusion Network for EEG-based Brainprint Recognition," IEEE Transactions on Information Forensics and Security, under review.

8. Z. Cui, **S. Li**, S. Kan, D. Wu*, "A Fuzzy Set Based Classification-to-Regression Extension Framework for Transfer Learning and Its Application to Brain-Computer Interfaces," IEEE Transactions on Emerging Topics in Computational Intelligence, under review.

9. H. Wang, Z. Jia, Y. Shen, Z. Wang, **S. Li**, K. Shu, F. Hu, D. Wu*, "SACM: SEEG-Audio Contrastive Matching for Chinese Speech Decoding," IEEE Transactions on Biomedical Engineering, under review. preprint available: arXiv.

Awards

- Youth Paper Defense Competition Award, World Robot Contest (WRC) - BCI Track, 2023
- National Scholarship (Doctoral Students), 2024
- China Brain-Computer Interface "HuaNao" Award, 2024

Fundings

- 20,000 CNY. Grant from the Henan Key Laboratory of Brain Science and Brain–Computer Interface Technology Open Fund (HNBBL230204), *Research on Transfer Learning Algorithms for Calibration-Free Brain-Computer Interfaces*, 2023–2025. URL.

Talks

- **S. Li**, D. Wu, Tutorial: Machine Learning Pipeline for EEG-based Brain-Computer Interfaces, International Joint Conference on Neural Networks, Gold Coast, Australia, 2023.
- D. Wu, Z. Wang, **S. Li**, Tutorial: Transfer Learning for EEG-based Brain-Computer Interfaces, International Conference on Neural Information Processing, Changsha, China, 2023.

Academic Service

Reviewer for IEEE Transactions on Biomedical Engineering, IEEE Transactions on Neural Systems and Rehabilitation Engineering, IEEE Computational Intelligence Magazine, and related journals.

Patents

- D. Wu, **S. Li**, H. Wu. Meta-learning methods, EEG signal recognition methods, and devices for brain–computer interfaces. Chinese Invention Patent, CN114879838A, *granted*.
- D. Wu, **S. Li**, Z. Wang, S. Zheng. Construction method, classification method, and system for cross-device EEG classification models. Chinese Invention Patent, CN119719914A, *granted*.
- D. Wu, **S. Li**. Test-time adaptation methods and systems for calibration-free brain–computer interfaces. Chinese Invention Patent, CN117056837A, *granted*.
- D. Wu, **S. Li**, Z. Wang. Test-time ensemble method, medium, and device for black-box models. Chinese Invention Patent, CN118626848A, *published*.
- D. Wu, H. Wu, **S. Li**. Asynchronous motor imagery BCI recognition methods and systems. Chinese Invention Patent, CN117034105A, *granted*.
- D. Wu, X. Jiang, L. Meng, **S. Li**. Training methods and devices for machine learning models with backdoors, and electronic equipment. Chinese Invention Patent, CN114021626A, *published*.
- D. Wu, Z. Wang, **S. Li**, X. Chen. Supervised contrastive learning methods and devices based on spatio-temporal-spectral consistency. Chinese Invention Patent, CN118626901A, *published*.
- D. Wu, **S. Li**. Stroke rehabilitation methods based on the integration of motor imagery BCI and transcranial direct current stimulation. Chinese Invention Patent, CN120420602A, *published*.
- D. Wu, D. Liu, **S. Li**, Z. Wang. Construction methods and classification methods and systems for EEG models across different devices. Chinese Invention Patent, CN120067794A, *published*.