# M.Eng. Shuo Zhao

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**Google Scholar:** https://scholar.google.com/citations?user=NQGPCI0AAAAJ&hl=en

## EDUCATION

**2017.09 – 2020.03 Harbin Engineering University, Harbin, P. R. China M.Eng. in Computer Technology**

- **GPA:** 3.52/4.0 (88/100 Top 5%)
- **Research Field:** Computational Vision, Machine Learning, Deep Learning, Pedestrian Tracking
- **Selected coursework:** Advanced Computer NetWork, Wireless Sensor Network, Computation Intelligence, Digital Signal Processing, Acquirement and Utilization of Information about Scientific Research.

**2012.09 – 2016.06 Harbin Engineering University, Harbin, P. R. China B.Eng. in Telecommunication Engineering**

- **GPA:** 2.88/4.0 (72/100)
- Strong foundation in mathematics, signal processing, and communication systems

## RESEARCH & ACADEMIC EXPERIENCE

**2022.05 – Present Leibniz-Institut für Analytische Wissenschaften – ISAS – e.V. Research associate**

- **Research Field:** Biomedical image analysis, multimodal image registration, active learning, image segmentation.
- Experience with cell-level segmentation (Cellpose, MONAI), dataset quantization, continual learning, out-of-distribution detection, uncertainty modeling, and explainable AI for medical imaging.
- Collaborated with clinicians and computer scientists to bridge data-centric AI with biomedical research. Supervised and mentored junior researchers and students in deep learning pipelines for biomedical image analysis, including model training, and evaluation.

**2016.07 – 2016.08 BOE Technology Group Co., Ltd., P. R. China Electronic circuit researcher**

- **Project:** Optimization design of mobile phone display circuit for SAMSUNG, MI, VIVO and OPPO etc.

## TEACHING EXPERIENCE & ACADEMIC SERVICE

**2017.09 – 2019.09 Harbin Engineering University,, Harbin, P.R. China Lecturer (Part-time)**

- Sole lecturer for the undergraduate course “Intelligent Application Foundation Based on Arduino Microcontroller”.
- Designed and delivered lectures and hands-on laboratory sessions covering basic programming, sensor integration, and embedded systems. Supervised student coursework and projects and provided technical guidance and troubleshooting support.

**2017.09 – 2019.09 Harbin Engineering University,, Harbin, P.R. China Undergraduate Research Mentor**

- Counsellor for undergraduate students on scientific and technological innovation projects, including project design and presentation in College of Computer Science and Technology, HEU.

## AWARDS & LEADERSHIP

- National Second Prize, 6th NOC Technology Invention & Innovation Competition (2014), "Tidal Energy Based Jellyfish Robot", Dalian University of Technology
- Second Prize, "Challenge Cup" Innovation Competition of Heilongjiang Province (2015) "Hybrid Water Purification Vehicle Based on Solar and Wind Energy".
- Chairman, School Art Troupe Hip-Hop Dance Club (2014–2015) Harbin Engineering University. Demonstrated leadership, organization, and team coordination skills.

## Publications & Patents

[1] **Zhao, S**, Chen, J. (2025). "Data Efficiency and Transfer Robustness in Biomedical Image Segmentation: A Study of Redundancy and Forgetting with Cellpose", International Conference on Bioinformatics and Biomedicine (BIBM 2025) (Workshop Accepted).

[2] Jiajun, C, **Shuo Z**., et al. (2025). et al. "**Rethinking deep learning in bioimaging through a data centric lens.**" npj Imaging 3.1 (2025): 29.

[3] Ye, Z. Yu, Z. Jingwen, Q. Hongxiao, W. **Shuo, Z**. Yongbing, Z. and Jianxu, C. 2025. **PathMR: Multimodal Visual Reasoning for Interpretable Pathology Diagnosis.** *International Conference on Computer Vision, ICCV 2025* (Submitted).

[4] **Zhao, S**., Zhou, Y., Chen, J. (2025). Active Learning Pipeline for Biomedical Image Instance Segmentation with Minimal Human Intervention. In: Palm, C., et al. Bildverarbeitung für die Medizin 2025. BVM 2025. Informatik aktuell. Springer Vieweg, Wiesbaden. https://doi.org/10.1007/978-3-658-47422-5_48

**Github**: https://github.com/MMV-Lab/AL_BioMed_img_seg/tree/main

[5] Christ, R., Siemes, D., **Zhao, S**., Widera, L., Spangenberg, P., Lill, J., Thiebes, S., Bottek, J., Borgards, L., Pinho, A.G. and Silva, N.A., 2025. **Inhibition of tumour necrosis factor alpha by Etanercept attenuates Shiga toxin-induced brain pathology.** Journal of Neuroinflammation, 22(1), p.33.

[6] Zhou, Y., **Zhao, S**., Sonneck, J. and Chen, J., 2024. **2D Label-free Prediction of Multiple Organelles Across Different Transmitted-light Microscopy Images with Bag-of-Experts**. *bioRxiv*, pp.2024-05.

[7] Hagemann, N., Qi, Y., Mohamud Yusuf, A., Li, A., Zhang, X., Spangenberg, P., Squire, A., Doeppner, T.R., Jin, F., **Zhao, S**. and Chen, J., 2025. **Arterial specification precedes microvascular restitution in the peri-infarct cortex that is driven by small microvessels**. *Journal of Cerebral Blood Flow & Metabolism*, *45*(1), pp.171-186.

[8] Jung, M., Nagel, D., **Zhao, S**., Hasenberg, A., Chen, J., Gunzer, M.,2024**, AI powered all optical cell death pathway detection in neutrophils for high thoughput screening**. In *Proceedings of the* 2024 Neutrophil International Symposia

[9] Sonneck, J., **Zhao, S**. and Chen, J., 2023. **On the risk of manual annotations in 3D confocal microscopy image segmentation**. In *Proceedings of the IEEE/CVF International Conference on Computer Vision* (pp. 3894-3902).

[10] Sonneck, J., **Zhao, S**. and Chen, J.,2023. **Biologically plausible segmentation with deep learning: relevance and importance for downstream analysis of 3D confocal microscopy images**. In Proceedings of the Focus on Microscopy 2023.

[11] Zheng, L., **Zhao, S**., Zhang, Y. and Yu, L., 2020. **Thermal infrared pedestrian tracking using joint siamese network and exemplar prediction model**. Pattern Recognition Letters, 140, pp.66-72.

[12] Enhan, L., Rui, Z., **Shuo, Z**. and Ru, W., 2020. **An infrared pedestrian target tracking method based on video prediction**.

J. Harbin Inst. Technol, 52(10), pp.192-200.

**Patents**

[1] Zheng, L., Zhang, Y., **Zhao,** S. and Bing, X., 2020. ***An infrared pedestrian tracking method based on online template prediction***, CN Patent, CN110782480A, Feb. 11, 2020.

[2] Zheng, L., Bing, X., **Zhao, S.** Li, Z. and Zhang, Y., ***A channel weighted generative adversarial network method for super-resolution reconstruction of retinal images***, CN Patent, CN110796599A, Feb. 14, 2020.

[3] Zheng, L., Wang, Y., **Zhao, S.** and Bing, X., 2018. ***Face stick figure generation method based on convolutional neural network***, CN Patent, CN108257194A, July. 06, 2018.

## Technical Skills

**Programming & Tools**:

- Python (advanced), C/C++, Matlab
- Deep Learning: PyTorch, PyTorch Lightning, MONAI
- Data analysis: NumPy, Pandas, h5py; visualisation with matplotlib, UMAP/t-SNE

**AI & Machine Learning Expertise:**

- Multimodal learning and data fusion for biomedical and human-centred data
- Human-in-the-loop and active learning with uncertainty-based sampling
- Uncertainty quantification (epistemic/aleatoric), model calibration, OOD detection
- Continual learning and robustness analysis under domain shift
- Explainable AI for clinical decision support (feature attribution, visual explanations)

**Application Domains:**

- Biomedical image segmentation and registration (Cellpose, nnU-Net)
- Multimodal medical image analysis and reasoning (PathMR)
- Motion analysis and sensor–vision data integration for digital health

**English skill:**

- IELTS 6.5 (Listening 6.5, Reading 7.0, Writing 6.0, Speaking 6.5)
- Proficient in academic writing and oral communication for research, including manuscript preparation, presentations, and interdisciplinary collaboration.

## RESEARCH INTERESTS

- Trustworthy and data-centric AI for healthcare applications
- Multimodal sensing and data fusion for human motion analysis and digital health
- Uncertainty-aware and active learning for label-efficient clinical models
- Domain generalization and robustness in real-world medical data
- Explainable AI to support clinical interpretation and decision-making