# Lei Wang
RESEARCH FELLOW

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*I am a hardworking, passionate, and self-disciplined researcher.*

Lei Wang is a Research Fellow at the Australian National University (ANU) and also serves as a Visiting Scientist at Data61/CSIRO. He has been a Computer Scientist with Active Intelligence Australia Pty Ltd since 2021 and a Computer Vision Researcher with iCetana Pty Ltd since 2018. Previously, he worked as a Visiting Researcher at both Data61/CSIRO and UWA. During his PhD candidature, Lei authored numerous first-author papers published in esteemed venues such as CVPR, ICCV, ECCV, ACM MM, TPAMI, IJCV, and TIP. He was also honored with the Sang Uk Lee Best Student Paper Award from ACCV 2022. Lei Wang is the principal investigator at the ANU TIME Lab.

**Research Interests:** data-centric | machine learning | motion-centric | video understanding | one- and few-shot learning | spectral and tensor learning | optimal transportation | domain adaptation and incremental learning

## Education

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|---|---|
| **Doctor of Philosophy (PhD), Computer Science**, *The Australian National University (ANU)* | *2019/07-2023/12* |
| **Master of Professional Engineering, Software Engineering**, *The University of Western Australia (UWA)* | *2016/02-2018/03* |
| **Bachelor of Engineering, Software Engineering**, *Yangzhou University (YZU)* | *2011/09-2015/06* |

## Experience

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|---|---|
| *Research Fellow (Level B)* | ANU College of Engineering, Computing and Cybernetics | *2023/02-present* |
| *Visiting Scientist, Postgraduate research student, Visiting Researcher* | CSIRO's Data61, Australia | *2018/09-2024/06* |
| *Computer Scientist* | Active Intelligence Australia Pty Ltd, Perth, Australia | *2021/07-2024/03* |
| *Machine Learning Researcher* | Ebenezer Technologies, Barranquilla, Colombia | *2020/09-2021/01* |
| *Visiting Researcher* | Department of Comput. Sci. and Softw. Eng., UWA, Perth, Australia | *2018/10-2019/10* |
| *Computer Vision Researcher, Computer Vision Research Intern* | iCetana Pty Ltd, Perth, Australia | *2018/07-2020/09* |

## Research Projects & Funding

- **Chief Investigator (CI) / Delegated lead CI**, "MotionNetLite: Video Dynamics Distillation for Scalable Models", **National Computational Merit Allocation Scheme (NCMAS 2024)**, 1MSU and 10TB, 2024/01/01-2024/12/31
- **Lead Chief Investigator (Lead CI)**, "Robust anomaly detection in human-centric videos", The NCI **National AI Flagship Merit Allocation Scheme**, 100KSU and 5TB, 2024/01/01-2024/06/30
- **Co-Investigator (Co-I)**, "Review of Xailient's technical pipeline of facial recognition", **A\$ 50,815**, 2023/10/30-2023/12/22 *[CI: Associate Professor Liang Zheng, Co-I: Dr Lei Wang]*
- ***Chief Investigator (CI) / Delegated lead CI**, "Towards building general-purpose multimodal foundation models", NCI Adaptater Scheme Q4 2023 (**HPC funding scheme**), Gadi allocation 100KSU and storage allocation 25KSU (4TB), 2023/10/01-2023/12/31*
- ***Grant / Project Award** (Oracle Cloud credits award), "Automatic, large-scale screening of failure cases in autonomous driving", **A\$ 48,000**, 2023/07/26-2024/07/25*
- ***Co-Investigator (Co-I)**, "Sharing early insights for more resilient communities", **A\$ 71,089**, 2023/04/19-2023/10/31 [CI: Professor Lorrae Van Kerkhoff, Co-I: Mr Takuya Iwanaga, Dr Steven Lade, Dr Wendy Merritt, Dr Lei Wang, Associate Professor Liang Zheng]*
- ***Research sponsorship** (Active Intelligence Corp.), **Principal Investigator / Project Lead**, "Detecting anomalies in video footage (stage 3)", **A\$ 40,013**, 2023/07/01-2024/03/01*
- ***Research sponsorship** (Active Intelligence Corp.), **Principal Investigator / Project Lead**, "Detecting anomalies in video footage (stage 2)", **A\$ 108,628**, 2022/07/01-2023/06/30*
- ***Research sponsorship** (Active Intelligence Corp.), **Principal Investigator / Project Lead**, "Detecting anomalies in video footage", **A\$ 135,706**, 2021/07/01-2022/06/30*

## Teaching

*TechLauncher Examiner* | School of Computing, ANU                                              *2024/02-present*
- ANU TechLauncher, co-taught courses: COMP3500, COMP4500, COMP8715
- Course Convenors: Associate Professor Charles Gretton & Associate Professor Liang Zheng

*Teaching Assistant* | Department of Comput. Sci. and Softw. Eng., UWA                           *2018/03-2018/07*
- CITS5508 Machine Learning
- Unit Coordinator(s): Associate Professor Du Huynh & Professor Mark Reynolds

## Student Supervision

- I am the **primary supervisor** for nine ANU master's and honors students for their final year research projects:
    - Gennie Nguyen, "Physiological signals, fake news, and phishing", 2024/07/22-present
    - Arjun Raj, "Training video data optimisation", 2024/07/22-present
    - Yifan Chen, "In-depth analysis of video understanding models", 2024/07/22-present
    - Dexuan Ding, "Robust human-centric anomaly detection", 2024/02/19-present
    - Qixiang Chen, "A closer look at fine-grained motions", 2024/02/19-present
    - Huilin Chen, "Spatio-temporal video coding: an in-depth analysis and assessment", 2024/02/19-present
    - Liyun Zhu, "A comparative review of recent video-based anomaly detection algorithms", 2024/02/19-present
    - Jushang Qiu, "Dynamics distillation for scalable models", 2024/02/19-present
    - Liwen Luo, "Spatio-temporal motion prediction", 2024/02/19-present
- I am an **associate supervisor** for three ANU master's students: Junliang Ye, Haodong Yang, and Meitong Liu, working on multi-modal learning and video language models (2024/07/22–present).
- Former student:
    - Xiuyuan Yuan (1xICML'24), "Video dynamics distillation", ANU Summer Research Scholars Program, 2023/11/20-2024/02/02

## Recognition & Honors

- **iAwards 2024 ACT Merit Receipt** (ANU TechLauncher), Student & Education category, Australian Information Industry Association (AIIA), 2024/06/12
- **iAwards 2024 Finalist** (ANU TechLauncher), Business & Industry category, AIIA, 2024/05/22
- **The Sang Uk Lee Best Student Paper Award**, ACCV 2022, 2022/12/08
- **The Incentive Unit Award**, Active Intelligence Corp., 2022/09/09-2032/09/08
- **Outstanding Reviewer Award**, ECCV 2022, 2022/10/19
- **Data61 Top-up Scholarship**, Data61/CSIRO, 2019/07/01-2023/06/30
- **Data61 PhD Scholarship**, Data61/CSIRO, 2019/07/01-2023/06/30
- **ANU HDR Fee Remission Merit Scholarship**, ANU, 2019/07/01-2023/06/30
- **Outstanding Graduate Award**, YZU, 2015/06
- **Jingwen Zhu Scholarship**, YZU, 2015/03
- **Principal's Scholarship (First Division)**, YZU, 2014/12
- **The Second Prize of Lanqiao Cup Competition (C/C++ Program Design)**, National Software and Information Technology Professional Talent Competition, 2014/04
- **Principal's Scholarship (Second Division)**, YZU, 2013/12

## Professional Service

- Area Chair: ACM Multimedia 2024, ICPR 2024
- Guest Editor: MDPI open-access journal Electronics (Special Issue entitled "Motion-centric Video Processing") [Q2, h-index 83]
- Reviewer:
    - Journals: TPAMI, IJCV, ACM CSUR, TCSVT, TMM, BDMA, PR, CVIU, Neurocomputing, NCAA, JVCI, SIVP, TVCJ, Algorithms, Multimedia Systems, Machine Learning and Knowledge Extraction (MAKE), Sensors, Electronics, Journal of Imaging, Future Internet, Information, Healthcare, IET Computer Vision, Electronics Letters, AI Communications, Global Health Economics and Sustainability
    - Conferences: ICLR 2023-2024, AAAI 2022-2025, NeurIPS 2022-2024, ICML 2022-2024, CVPR 2022-2024, ICCV 2023, ECCV 2022-2024, WACV 2024-2025, BMVC 2020-2024, ACCV 2024, IEEE CAI 2023
    - Workshops: 3rd Computer Vision for Metaverse Workshop (CV4Metaverse at ECCV 2024), The AI City Challenge Workshop (CVPR 2023-2024), Vision Datasets Understanding (CVPR 2022-2024), Deep Vision Workshop (CVPR 2020)
- Thesis Examiner for Honors and Master's Theses: ANU College of Engineering, Computing & Cybernetics, S1 & S2 2023, S1 2024.

## Invited Talk

- Action Recognition: Past, Present and Future | Department of Computer Science, Harbin Institute of Technology | 2023/08/12

# Publications

- Journals

    [j4] – **Lei Wang**, Jun Liu, Liang Zheng, Tom Gedeon, and Piotr Koniusz. "Meet JEANIE: a Similarity Measure for 3D Skeleton Sequences via Temporal-Viewpoint Alignment." *International Journal of Computer Vision.* 2023. IF: 19.5

    [j3] – Zhenyue Qin, Yang Liu, Pan Ji, Dongwoo Kim, **Lei Wang**, R.I. (Bob) McKay, Saeed Anwar, and Tom Gedeon. "Fusing Higher-Order Features in Graph Neural Networks for Skeleton-Based Action Recognition." *IEEE Transactions on Neural Networks and Learning Systems* (2022): 4783-4797. IF: 14.255

    [j2] – Piotr Koniusz, **Lei Wang**, and Anoop Cherian. "Tensor Representations for Action Recognition." *IEEE Transactions on Pattern Analysis and Machine Intelligence* 44.2 (2021): 648-665. IF: 24.314

    [j1] – **Lei Wang**, Du Q. Huynh, and Piotr Koniusz. "A Comparative Review of Recent Kinect-based Action Recognition Algorithms." *IEEE Transactions on Image Processing*, 29 (2019): 15-28. IF: 11.041

- Conferences

    [c11] – Wenshuo Chen*, Hongru Xiao*, Erhang Zhang*, Lijie Hu, **Lei Wang**, Mengyuan Liu, Chen Chen. "SATO: Stable Text-to-Motion Framework." *ACM Multimedia*, 2024. A* (* denotes equal contribution.)

    [c10] – **Lei Wang**, Piotr Koniusz, Tom Gedeon, and Liang Zheng. "Adaptive Multi-head Contrastive Learning." *European Conference on Computer Vision.* 2024. A*

    [c9] – **Lei Wang**, Xiuyuan Yuan, Tom Gedeon, and Liang Zheng. "Taylor Videos for Action Recognition." *International Conference on Machine Learning (ICML).* 2024. A*

    [c8] – **Lei Wang**, Ke Sun, and Piotr Koniusz. "High-order Tensor Pooling with Attention for Action Recognition." *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP).* IEEE, 2023. B, oral

    [c7] – **Lei Wang** and Piotr Koniusz. "Flow Dynamics Correction for Action Recognition." *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP).* IEEE, 2023. B

    [c6] – **Lei Wang** and Piotr Koniusz. "3Mformer: Multi-order Multi-mode Transformer for Skeletal Action Recognition." *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition.* 2023. A*

    [c5] – **Lei Wang** and Piotr Koniusz. "Uncertainty-DTW for Time Series and Sequences." *European Conference on Computer Vision.* Cham: Springer Nature Switzerland, 2022. A*, oral

    [c4] – **Lei Wang** and Piotr Koniusz. "Temporal-Viewpoint Transportation Plan for Skeletal Few-shot Action Recognition." *Proceedings of the Asian Conference on Computer Vision.* 2022. B, oral, **Best Student Paper Award**

    [c3] – **Lei Wang** and Piotr Koniusz. "Self-supervising Action Recognition by Statistical Moment and Subspace Descriptors." *Proceedings of the 29th ACM international conference on multimedia.* 2021. A*

    [c2] – **Lei Wang**, Piotr Koniusz, and Du Q. Huynh. "Hallucinating IDT Descriptors and I3D Optical Flow Features for Action Recognition with CNNs." *2019 IEEE/CVF International Conference on Computer Vision*, IEEE Computer Society, 2019. A*

    [c1] – **Lei Wang**, Du Q. Huynh, and Moussa Reda Mansour. "Loss Switching Fusion with Similarity Search for Video Classification." *2019 IEEE International Conference on Image Processing (ICIP)*, IEEE, 2019. B, 1 AU patent

- Patents

    [p3] – **Lei Wang**. "System and Method of Detecting Anomalies from Mass Data." (US provisional, SN 63/326,525)

    [p2] – **Lei Wang** and Graeme Woods. "Method and System for Classifying Video Data." (au 2019903775, provisional patent filed 07/10/2019)

    [p1] – **Lei Wang**, Moussa Reda Mansour, and Graeme Woods. "System and Method of Video Data Retrieval." (au 2019900316, provisional patent filed 01/02/2019)

- Theses

    [t2] – **Lei Wang**. "Robust Human Action Modelling." *PhD thesis*, The Australian National University, Canberra, ACT, Australia, Nov. 2023.

    [t1] – **Lei Wang**. "Analysis and evaluation of Kinect-based action recognition algorithms." *Master's thesis*, The University of Western Australia, Perth, WA, Australia, Nov. 2017.

- arXiv preprints

    [a6] – Qixiang Chen, **Lei Wang**, Piotr Koniusz and Tom Gedeon. "Motion meets Attention: Video Motion Prompts." *arXiv*, 2024.

    [a5] – Liyun Zhu, **Lei Wang**, Arjun Raj, Tom Gedeon, and Chen Chen. "Advancing Video Anomaly Detection: A Concise Review and a New Dataset." *arXiv*, 2024.

    [a4] – Sen Fang, **Lei Wang**, Ce Zheng, Yapeng Tian, Chen Chen. "SignLLM: Sign Languages Production Large Language Models." *arXiv*, 2024.

    [a3] – Yuchi Liu, **Lei Wang**, Yuli Zou, James Zou, and Liang Zheng. "Optimizing Calibration by Gaining Aware of Prediction Correctness." *arXiv*, 2024.

    [a2] – **Lei Wang**, Jun Liu, and Piotr Koniusz. "3D Skeleton-based Few-shot Action Recognition with JEANIE is not so Naïve." *arXiv*, 2021. An extended version has been accepted by ACCV'22 [oral] and has been awarded the Sang Uk Lee Best Student Paper Award. The further extension of ACCV'22 has been accepted for publication by the IJCV special issue.

    [a1] – **Lei Wang**. "AI in Software Engineering: Case Studies and Prospects." *arXiv*, 2017, technical report.