Haiping Lu

LINKS	Email, Web, LinkedIn, Google Scholar, GitHub
CURRENT POSITIONS	○ Director, UK Open Multimodal AI Network ○ Turing Academic Lead, University of Sheffield, UK ○ Head of AI Research Engineering, Centre for Machine Intelligence, University of Sheffield, UK ○ Professor of Machine Learning, School of Computer Science, University of Sheffield, UK ○ AI Strategy Lead, School of Computer Science, University of Sheffield, UK
RESEARCH INTERESTS	○ Machine learning, multimodal AI, foundation models, generative AI, knowledge graphs ○ Healthcare, bioinformatics, protein engineering, drug/materials discovery, open-source software
EDUCATION & PROFESSIONAL QUALIFICATION	○ Fellow of the Higher Education Academy (FHEA), UK, 2018 ○ PhD in Electrical & Computer Engineering, University of Toronto, Canada, 2008 ○ MEng in Electrical & Electronic Engineering, Nanyang Technological University, Singapore, 2004 ○ BEng in Electrical & Electronic Engineering, Nanyang Technological University, Singapore, 2001
SELECTED AWARDS AND HONOURS	○ Top 100 AI Leaders in Biomarkers Technology, Aging Analytics Agency, UK, 2023 ○ Turing Network Development Award, the Alan Turing Institute, UK, 2021 ○ NIHR AI in Health and Care Award, National Institute for Health Research, UK, 2020 ○ Wellcome Trust Innovator Awards: Digital Technologies, UK, 2019 ○ Amazon Research Award (among 83 international awardees), US, 2018 ○ AAAI Outstanding Program Committee Member Award (20 awardees from 2,415 PC members of AAAI-18), Association for the Advancement of Artificial Intelligence, US , 2018 ○ Early Career Award (22 out of 359), Research Grant Council, Hong Kong, 2014 ○ IEEE Computational Intelligence Society Outstanding PhD Dissertation Award, US, 2013
PROFESSIONAL EXPERIENCE	○ Professor of Machine Learning, University of Sheffield, Jan 2023 – present ○ Senior Lecturer in Machine Learning, University of Sheffield, Jan 2020 – Dec 2022 ○ Lecturer in Machine Learning, University of Sheffield, Nov 2016 – Dec 2019 ○ Assistant Professor in Computer Science, Hong Kong Baptist University, Aug 2013 – Jul 2016 ○ Scientist, Institute for Infocomm Research, A*STAR, Singapore, Oct 2009 – Jul 2013 ○ Post-doctoral fellow, Department of ECE, University of Toronto, Canada, Sep 2008 – Aug 2009
RESEARCH GRANTS	Total external funding awarded: **GBP 14.00M in the UK and HKD 2.01M in Hong Kong** ○ [Co-I] "Materials4.0 Industry Funding-Materials Health Monitoring", GBP 22,000, Exciting Instruments Ltd, UK, Oct 2025 – Sep 2029 ○ **[PI]** "UK Open Multimodal AI Network (UKOMAIN)", **GBP 1,820,300**, EPSRC Network Plus: Tomorrow's Engineering Research Challenges, UK, Jan 2025 – Dec 2027 ○ **[Co-I and Sheffield PI]** "Cancer Data Driven Detection (CD3)", **GBP 9,999,638**, CRUK, NIHR, and EPSRC, UK, April 2025 – Mar 2030 ○ [Co-I] "Heart Talk: Turning Cardiac Measurements into Clinical Reports with Large Language Models", GBP 27,500, Academy of Medical Sciences, UK, Sep 2024 – Aug 2026 ○ **[PI]** University of Sheffield Alumni Donation (for AIRE Team support), GBP 4,600, UK, April 2024 ○ **[Sheffield Technical PI]** "A Novel Artificial Intelligence Powered Neuroimaging Biomarker for Chronic Pain", GBP 445,541, EPSRC Artificial Intelligence Innovation to Accelerate Health Research, UK, Oct 2023 – Mar 2025

- **[PI]** "Workshop on Multimodal Data Integration", GBP 10,000, Turing Network Funding, the Alan Turing Institute, UK, Feb 2023 – Jul 2023
- **[PI]** "An Introduction to Transparent Machine Learning", GBP 24,919, Funding call for online learning courses in responsible AI, the Alan Turing Institute, UK, Jul 2022 – Dec 2022
- **[PI]** Turing Network Development Award, GBP 24,964, the Alan Turing Institute, UK, Feb 2022 – Sep 2022
- [Co-I] "Interactively Trained Human-in-the-Loop Deep Learning Approach to Improve Cardiac CT and MRI Assessment for Accurate Therapy Response and Mortality Prediction", GBP 836,551, Artificial Intelligence in Health and Care Award, NIHR, UK, Mar 2021 – Feb 2023
- **[Co-PI]** "Developing a Machine Learning Tool to Improve Prognostic and Treatment Response Assessment on Cardiac MRI Data", GBP 639,873, Innovator Awards: Digital Technologies, Wellcome Trust, UK, Oct 2019 – Mar 2022
- **[PI]** "Learning Representations of Higher-Order Structures for Networks via Tensor Embedding", USD 71,000, Amazon Research Awards, Amazon, US, Apr 2019 – Mar 2020
- **[PI]** "Learning Sparse Features from 4D fMRI Data for Brain Disease Diagnosis", GBP 100,730, First Grant, EPSRC, UK, Jan 2018 – Jun 2019
- **[PI]** "Relaxation Methods in Principal and Discriminative Component Analysis for Tensor Data", HKD 482,605, 2016/17 General Research Fund, Research Grant Council, Hong Kong
- **[PI]** "Learning Independent Components with Tensor-based Modelling for Big fMRI Data", HKD 695,861, 2015/16 General Research Fund, Research Grant Council, Hong Kong
- **[PI]** "Dimensionality Reduction for Learning Correlations between Big Multidimensional Data", HKD 831,737, 2014/15 Early Career Scheme, Research Grant Council, Hong Kong

Leadership and Strategic Roles

- **Director and founder** of the UK Open Multimodal AI Network (UKOMAIN), bringing together four institutions and 30+ partners across academia, industry, and nonprofit organisations to advance multimodal AI for healthcare and other real-world challenges, since Jan 2025
- Lead organiser and founder, Multimodal AI Workshops, attracted 100+ in-person attendees of diverse backgrounds across sectors annually, since Jun 2023
- **Head and founder** of AI Research Engineering, University of Sheffield, advancing open-source AI tools and multimodal AI solutions for healthcare and other interdisciplinary research, since Jan 2023
- **Lead organiser and founder**, Turing Interest Group on Meta-Learning for Multimodal Data, creating a Multimodal AI Community with 200+ members from diverse disciplines and backgrounds with research sprint, online forum, and seminars organised, since Oct 2022
- Turing Academic Lead at University of Sheffield, the academic liaison with the Alan Turing Institute, developing training materials and building partnerships within the Turing University Network since Apr 2023
- **Turing Network Development Award Lead** at University of Sheffield, setting vision and goals of growth, consulting on community needs, bringing together 300+ members across faculties as the Sheffield AI (Shef.AI) community, and securing GBP 3.6M to establish the Centre for Machine Intelligence, Feb 2022 – Mar 2023
- Insigneo Research Director for Healthcare Data and AI at University of Sheffield, setting directions and strategies, consulting on member needs, and organising events, Nov 2021 – Oct 2023
- Machine Learning Theme Lead for University of Sheffield in the N8 Centre of Excellence in Computationally Intensive Research, providing strategic input to N8 reports, consulting on community needs, organising or facilitating internal and external events, Dec 2021 – Nov 2023
- AI Strategy Lead at School of Computer Science, University of Sheffield, leading university-wide AI strategy development, analysing AI REF outputs, conducting SWOT analysis, supporting philanthropic campaign, and providing AI-related input to key guidance and policy development, since Mar 2021

Publications

- **Book**

[B1] **H. Lu**, K. N. Plataniotis and A. N. Venetsanopoulos, "Multilinear Subspace Learning: Dimensionality Reduction of Multidimensional Data", Chapman & Hall/CRC Press Machine Learning and Pattern Recognition Series, Taylor and Francis, ISBN: 978-1-4398572-4-3, 2013.

- **Refereed journal papers** [# indicates a supervised student/staff]

[J44] X. Liu#, J. Zhang#, S. Zhou#, T. L. van der Plas, A. Vijayaraghavan, A. Grishina, M. Zhuang, D. Schofield, C. Tomlinson, Y. Wang, R. Li, L. van Zeeland, S. Tabakhi#, C. Demeocq, X. Li, A. Das, O. Timmerman, T. Baldwin-McDonald, J. Wu, P. Bai#, Z. Al Sahili, O. Alwazzan, T. N. Do, M. N. Suvon#, A. Wang, L. Cipolina-Kun, L. A. Moretti, L. Farndale, N. Jain, N. Efremova, Y. Ge, M. Varela, H-K. Lam, O. Celiktutan, B. R. Evans, A. Coca-Castro, H. Wu, Z. S. Abdallah, C. Chen, V. Danchev, N. Tkachenko, L. Lu, T. Zhu, G. G. Slabaugh, R. K. Moore, W. K. Cheung, P. H. Charlton, and **H. Lu**, "Towards deployment-centric multimodal AI beyond vision and language", ***Nature Machine Intelligence***, 7, xxx-xxx, 2025.

[J43] P. Bai#, F. Miljkovi, X. Liu#, L. De Maria, R. Croasdale-Wood, O. Rackham, and **H. Lu**, "Mask-prior-guided denoising diffusion improves inverse protein folding", ***Nature Machine Intelligence***, 7, 876888, 2025. [**In collaboration with AstraZeneca**, Cambridge, UK and Gothenburg, Sweden]

[J42] X. Liu#, S. Rastegari#, Y. Huang, S. C. Cheong#, W. Liu#, W. Zhao#, Q. Tian#, H. Wang#, Y. Guo, S. Zhou#, S. Tabakhi#, X. Liu#, Z. Zhu, W. Sang, and **H. Lu**, "Interpretable multimodal learning for tumor protein-metal binding: Progress, challenges, and perspectives", *Methods*, 242, 97-112, 2025.

[J41] S. Zhou#, J. Luo, Y. Jiang, H. Wang#, **H. Lu**, and G. Gong, "Group-specific discriminant analysis enhances detection of sex differences in brain functional network lateralization", *GigaScience*, 14, giaf082, 2025.

[J40] S. Kariotis#, P. F. Tan, **H. Lu**, C. J. Rhodes, M. R. Wilkins, A. Lawrie, D. Wang, "Omada: Robust Clustering of Transcriptomes Through Multiple Testing", *GigaScience*, 13, giae039, 2024.

[J39] L. Allen#, **H. Lu**, and J. Cordiner, "Knowledge-Enhanced Spatiotemporal Analysis for Anomaly Detection in Process Manufacturing", *Computers in Industry*, 161, 104111, 2024.

[J38] P. Bai#, F. Miljkovi, B. John, and **H. Lu**, "Interpretable Bilinear Attention Network with Domain Adaptation Improves Drug-Target Prediction", ***Nature Machine Intelligence***, 5, 126-136, 2023. [**In collaboration with AstraZeneca**, Boston, US and Gothenburg, Sweden] [With a **reusability report** featured in ***Nature Machine Intelligence*** in April 2024, also **highlighted in the editorial**]

[J37] A. Carusi, P. Winter, I. Armstrong, F. Ciravegna, D. Kiely, A. Lawrie, **H. Lu**, I. Sabroe, A. Swift, "Medical Artificial Intelligence Is as Much Social as It Is Technological", ***Nature Machine Intelligence***, 5, 98-100, 2023.

[J36] X. Liu#, S. Zhou#, T. Lei, P. Jiang, Z. Chen and **H. Lu**, "First-Person Video Domain Adaptation with Multi-Scene Cross-Site Datasets and Attention-Based Methods", *IEEE Transactions on Circuits and Systems for Video Technology*, 33(12), 7774-7788, 2023.

[J35] L. Schöbs#, A. Swift, and **H. Lu**, "Uncertainty Estimation for Heatmap-based Landmark Localization", ***IEEE Transactions on Medical Imaging***, 42(4), 1021-1034, 2023.

[J34] M. Kunda#, S. Zhou#, G. Gong, and **H. Lu**, "Improving Multi-Site Autism Classification via Site-Dependence Minimization and Second-Order Functional Connectivity", ***IEEE Transactions on Medical Imaging***, 42(1), 55-65, 2023.

[J33] H. Xu#, S. Sang, P. Bai#, R. Li#, L. Yang, and **H. Lu**, "GripNet: Graph Information Propagation on Supergraph for Heterogeneous Graphs", *Pattern Recognition*, 133, 108973, 2023.

[J32] Y. Ge#, J. Ma, L. Zhang#, X. Li, and **H. Lu**, "Trustworthiness-Aware Knowledge Graph Representation for Recommendation", *Knowledge-Based Systems*, 110865, 2023. [**In collaboration with Amazon**, Seattle, US]

[J31] S. Tabakhi#, M. N. I. Suvon#, P. Ahadian, and **H. Lu**, "Multimodal Learning for Multi-Omics: A Survey", *World Scientific Annual Review of Artificial Intelligence*, 1, 2250004, 2023.

[J30] S. Alabed#, P. Garg, F. Alandejani, K. Dwivedi#, A. Maiter, K. Karunasaagarar, S. Rajaram, C. Hill, S. Thomas, R. Gossling, M. Sharkey, M. Salehi, J. Wild, L. Watson, A. Hameed, A. Charalampopoulos, **H. Lu**, A. Rothman, A. Thompson, C. Elliot, N. Hamilton, C. Johns, I. Armstrong, R. Condliffe, R. van der Geest, A. Swift, D. Kiely, "Establishing Minimally Important Differences for Cardiac MRI End-Points in Pulmonary Arterial Hypertension", *European Respiratory Journal*, 63(1), 2023.

[J29] L. Zhang#, H. Song, N. Aletras, and **H. Lu**, "Node-Feature Convolution for Graph Convolutional Networks", *Pattern Recognition*, 128, 108661, 2022.

[J28] L. Song#, S. Zhou#, and **H. Lu**, "Direct ICA on Data Tensor via Random Matrix Modeling", *Signal Processing*, 196, 108508, 2022.

[J27] S. Alabed#, A. Maiter, M. Salehi, A. Mahmood, S. Daniel, S. Jenkins, M. Goodlad, M. Sharkey, M. Mamalakis, V. Rakocevic, K. Dwivedi#, H. Assadi, J. Wild, **H. Lu**, D. ORegan, R. van der Geest, P. Garg, A. J Swift, "Quality of Reporting in AI Cardiac MRI Segmentation Studies – A Systematic Review and Recommendations for Future Studies". *Frontiers in Cardiovascular Medicine*, 9, 956811, 2022.

[J26] S. Alabed#, J. Uthoff#, S. Zhou#, P. Garg, K. Dwivedi#, F. Alandejani, R. Gosling, L. Schobs#, M. Brook, D. Capener, C. Johns, J. M Wild, A. Rothman, R. Geest, R. Condliffe, D. Kiely, **H. Lu**, A. Swift, "Machine Learning Cardiac-MRI Features Predict Mortality in Newly Diagnosed Pulmonary Arterial Hypertension". *European Heart Journal-Digital Health*, 3(2), 265275, 2022.

[J25] S. Alabed#, F. Alandejani, K. Dwivedi#, K. Karunasaagarar, M. Sharkey, P. Garg, P. Koning, A. Tóth, Y. Shahin, C. Johns, M. Mamalakis, S. Stott, D. Capener, S. Wood, P. Metherall, A. Rothman, R. Condliffe, N. Hamilton, J. Wild, D. ORegan, **H. Lu**, D. Kiely, R. Geest, A. Swift, "Validation of Artificial Intelligence Cardiac MRI Measurements: Relationship to Heart Catheterization and Mortality Prediction". ***Radiology***, 305(1), 68-79, 2022.

[J24] F. Alandejani, S. Alabed#, P. Garg, Z. M. Goh, K. Karunasaagarar, M. Sharkey, M. Salehi, Z. Aldabbagh, K. Dwivedi#, M. Mamalakis, P. Metherall, J. Uthoff#, C. Johns, A. Rothman, R. Condliffe, A. Hameed, A. Charalampoplous, **H. Lu**, S. Plein, J. Greenwood, A. Lawrie, J. Wild, P. Koning, D. Kiely, R. Geest, A. Swift, "Training and Clinical Testing of Artificial Intelligence-Derived Right Atrial Cardiovascular Magnetic Resonance Measurements". *Journal of Cardiovascular Magnetic Resonance*, 24(1), 1-11, 2022.

[J23] K. Dwivedii#, R. Condliffe, M. Sharkey, R. Lewis, S. Alabed#, S. Rajaram, C. Hill, L. Saunders, P. Metherall, F. Alandejani, D. Alkhanfar, J. Wild, **H. Lu**, D. Kiely, A. J. Swift, "Computed Tomography Lung Parenchymal Descriptions in Routine Radiological Reporting Have Diagnostic and Prognostic Utility in Patients with Idiopathic Pulmonary Arterial Hypertension and Pulmonary Hypertension Associated with Lung Disease", *ERJ Open Research*, 8: 00549-2021, 2022.

[J22] Y. Ge#, P. Peng, and **H. Lu**, "Mixed-Order Spectral Clustering for Networks", *Pattern Recognition*, 117, 107964, 2021.

[J21] K. Dwivedii#, M. Sharkey, J. Uthoff#, S. Alabed#, P. Metherall, **H. Lu**, R. Condliffe, J. Wild, E. Hoffman, A. J. Swift, D. Kiely, "Pulmonary Hypertension in Association with Lung Disease: Quantitative CT and Artificial Intelligence to the Rescue? State-of-the-Art Review", *Diagnostics*, 11(4), 679, 2021.

[J20] M. Schirmer, A. Venkataraman, I. Rekik, M. Kim, S. Mostofsky, M. Nebel, K. Rosch, K. Seymour, D. Crocetti, H. Irzan, M. Hütel, S. Ourselin, N. Marlow, A. Melbourne, E. Levchenko, S. Zhou#, M. Kunda#, **H. Lu**, N. C Dvornek, J. Zhuang, G. Pinto, S. Samal, J. Bernal-Rusiel, R. Pienaar, A. W. Chung, "Neuropsychiatric Disease Classification Using Functional Connectomics–Results of the Connectomics in NeuroImaging Transfer Learning Challenge", *Medical Image Analysis*, 70, 101972, 2021.

[J19] A. J Swift*, **H. Lu***, J. Uthoff#, P. Garg, M. Cogliano, J. Taylor, P. Metherall, S. Zhou#, C. S Johns, S. Alabed#, R. Condliffe, A. Lawrie, J. Wild and D. Kiely, "A Machine-Learning CMR Approach to Extract Disease Features and Automate Pulmonary Arterial Hypertension Diagnosis", ***European Heart Journal - Cardiovascular Imaging***, 22(2), 236–245, 2021. *joint first author

[J18] Y. Zhou#, **H. Lu**, and Y.-M. Cheung, "Probabilistic Rank-One Tensor Analysis with Concurrent Regularizations", *IEEE Trans. on Cybernetics*, 51(7), 3496-3509, 2021.

[J17] P. Bai#, Y. Ge#, F. Liu#, and **H. Lu**, "Joint Interaction with Context Operation for Collaborative Filtering", *Pattern Recognition*, 88, 729-738, 2019.

[J16] Q. Shi#, Y. M. Cheung, Q. Zhao, and **H. Lu** "Feature Extraction for Incomplete Data via Low-rank Tensor Decomposition with Feature Regularization", *IEEE Trans. on Neural Networks and Learning Systems*, 30(6), 1803-1817, 2019.

[J15] Q. Shi#, **H. Lu** and Y. M. Cheung, "Rank-One Matrix Completion with Automatic Rank Estimation via L1-Norm Regularization", *IEEE Trans. on Neural Networks and Learning Systems*, 29(10), 4744-4757, 2018.

[J14] X. Xie, Z.-L. Yu, **H. Lu**, Z. Gu and Y. Li, "Motor Imagery Classification based on Bilinear Sub-Manifold Learning of Symmetric Positive-Definite Matrices", *IEEE Trans. on Neural Systems & Rehabilitation Engineering*, 25(6), 504-516, 2017.

[J13] **H. Lu**, Y. Pan, B. Mandal, H.-L. Eng, C. Guan and D. W. S. Chan, "Quantifying Limb Movements in Epileptic Seizures through Color-based Video Analysis", *IEEE Trans. on Biomedical Engineering*, 60(2), 461-469, 2013.

[J12] **H. Lu**, K. N. Plataniotis and A. N. Venetsanopoulos, "A Survey of Multilinear Subspace Learning for Tensor Data", *Pattern Recognition*, 44(7), 1540-1551, 2011.

[J11] **H. Lu**, H.-L. Eng, C. Guan, K. N. Plataniotis and A. N. Venetsanopoulos, "Regularized Common Spatial Pattern With Aggregation for EEG Classification in Small-Sample Setting", *IEEE Trans. on Biomedical Engineering*, 57(12), 2936-2946, 2010.

[J10] F. Bui, K. Martin, **H. Lu**, K. N. Plataniotis and D. Hatzinakos, "Fuzzy Key Binding Strategies Based on Quantization Index Modulation (QIM) for Biometric Encryption (BE) Applications", *IEEE Trans. on Information Forensics and Security*, 5(1), 118-132, 2010.

[J9] K. Martin, **H. Lu**, F. Bui, K. N. Plataniotis and D. Hatzinakos, "A Biometric Encryption System for the Self-Exclusion Scenario of Face Recognition", *IEEE Systems Journal*, 3(4), 440-450, 2009.

[J8] **H. Lu**, K. N. Plataniotis and A. N. Venetsanopoulos, "Uncorrelated Multilinear Principal Component Analysis for Unsupervised Multilinear Subspace Learning", *IEEE Trans. on Neural Networks*, 20(11), 1820-1836, 2009.

[J7] **H. Lu**, K. N. Plataniotis and A. N. Venetsanopoulos, "Boosting Discriminant Learners for Gait Recognition using MPCA Features", *EURASIP Journal on Image and Video Processing*, 2009, 713183, 2009.

[J6] J. Wang, **H. Lu**, K. N. Plataniotis and J. Lu, "Gaussian Kernel Optimization for Pattern Classification", *Pattern Recognition*, 42(7), 1237-1247, 2009.

[J5] **H. Lu**, K. N. Plataniotis and A. N. Venetsanopoulos, "Uncorrelated Multilinear Discriminant Analysis with Regularization and Aggregation for Tensor Object Recognition", *IEEE Trans. on Neural Networks*, 20(1), 103-123, 2009.

[J4] **H. Lu**, K. N. Plataniotis and A. N. Venetsanopoulos, "MPCA: Multilinear Principal Component Analysis of Tensor Objects", *IEEE Trans. on Neural Networks*, (19), (1), 18-39, Jan. 2008. [**Over 1000 citations** on Google Scholar]

[J3] **H. Lu**, K. N. Plataniotis and A. N. Venetsanopoulos, "A Full-Body Layered Deformable Model for Automatic Model-Based Gait Recognition", *EURASIP Journal on Advances in Signal Processing*, 2008, 261317, 2008.

[J2] **H. Lu**, Y. Q. Shi, A. C. Kot and L. Chen, "Binary Image Watermarking through Blurring and Biased Binarization", *International Journal of Image and Graphics*, 5(1), 67-87, 2005.

[J1] **H. Lu**, A. C. Kot and Y. Q. Shi, "Distance-Reciprocal Distortion Measure for Binary Document Images", *IEEE Signal Processing Letters*, 11(2), 228-231, 2004.

○ **Refereed conference papers** [# indicates a supervised student/staff]

[C45] W. Fan#, L. M. Rizky#, J. Zhang#, C. Chen, **H. Lu**, K. Teh, D. Selvarajah, and S. Zhou, "Foundation-Model-Boosted Multimodal Learning for fMRI-based Neuropathic Pain Drug Response Prediction", in *Proceedings of the 28th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2025)*, Daejeon, Republic of Korea, pages. xxx-xxx, September 23-27, 2025.

[C44] J. Zhang#, X. Liu#, W Wu, S. Tabakhi#, W. Fan#, S. Zhou#, K.L. Tee, T.S. Wong, and **H. Lu**, "Classifying the Stoichiometry of Virus-like Particles with Interpretable Machine Learning", in *Proceedings of the 47th Annual Int. Conf. of the IEEE Engineering in Medicine and Biology Society (EMBC'25)*, Copenhagen, Denmark, July 14-17, 2025.

[C43] M. Suvon#, P. Tripathi#, W. Fan#, S. Zhou#, X. Liu#, S. Alabed#, V. Osmani, A. Swift, C. Chen, and **H. Lu**, "Multimodal Variational Autoencoder for Low-cost Cardiac Hemodynamics Instability Detection", in *Proceedings of the 27th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2024)*, Marrakesh, Morocco, pages. 296-306, October 06-10, 2024.

[C42] A. Thomas#, R. Gaizauskas, and **H. Lu**, "Leveraging LLMs for Post-OCR Correction of Historical Newspapers", in *Proceedings of the Third Workshop on Language Technologies for Historical and Ancient Languages (LT4HALA)@ LREC-COLING-2024*, Torino, Italy, May 20-25, 2024.

[C41] P. Pukowski#, J. Spoerhase, and **H. Lu**, "SkelEx and BoundEx - Geometrical Framework for Interpretable ReLU Neural Networks", in *Proceedings of the 2024 International Joint Conf. on Neural Networks (IJCNN)*, Yokohama, Japan, June 30 - July 5, 2024.

[C40] P. Tripathi#, M. Suvon#, L. Schobs#, S. Zhou#, S. Alabed#, A. Swift, and **H. Lu**, "Tensor-based Multimodal Learning for Prediction of Pulmonary Arterial Wedge Pressure from Cardiac MRI", in *Proceedings of the 26th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2023)*, Vancouver, Canada, pages. 206215, October 08-12, 2023.

[C39] L. Schobs#, T. M. McDonald, and **H. Lu**, "Bayesian Uncertainty Estimation in Landmark Localization Using Convolutional Gaussian Processes", in *Proceedins of International Workshop on Uncertainty for Safe Utilization of Machine Learning in Medical Imaging (UNSURE 2023)*, Vancouver, Canada, pages. 22-31, October 12, 2023.

[C38] M. N. I. Suvon#, P. C. Tripathi#, S. Alabed#, A. Swift, and **H. Lu**, "Multimodal Learning for Predicting Mortality in Patients with Pulmonary Arterial Hypertension", in *Proceedings of the IEEE International Conference on Bioinformatics and Biomedicine (BIBM 2022)*, pages 2704-2710, December 6-8, 2022.

[C37] **H. Lu**, X. Liu#, S. Zhou#, R. Turner, P. Bai#, R. Koot#, M. Chasmai#, L. Schobs#, and H. Xu#, "PyKale: Knowledge-Aware Machine Learning from Multiple Sources in Python", in *Proceedings of the 31st ACM Conference on Information and Knowledge Management (CIKM 2022)*, Atlanta, Georgia, USA, Pages. 4274-4278, October 17-21, 2022. [**Facebook AI reviewed and approved this library to join the PyTorch ecosystem**.]

[C36] S. Tabakhi# and **H. Lu**, "Multi-agent Feature Selection for Integrative Multi-omics Analysis", in *Proceedings of the 44th Annual Int. Conf. of the IEEE Engineering in Medicine and Biology Society (EMBC'22)*, Glasgow, UK, July 11-15, 2022.

[C35] L. Zhang#, L. Shi, J. Zhao, J. Yang, T. Lyu, D. Yin, and **H. Lu**, "A GNN-based Multi-task Learning Framework for Personalized Video Search", in Proceedings of the Fifteenth International Conference on Web Search and Data Mining (WSDM 2022), February 21-25, 2022.

[C34] A. Herghelegiu# and **H. Lu**, "Improving Negative Sampling in Graph Neural Networks for Predicting Drug-Drug Interactions", in *Proceedings of the IEEE International Conference on Bioinformatics and Biomedicine (BIBM 2021)*, pages 3728-3735, December 9-12, 2021.

[C33] P. Bai#, F. Miljkovi, Y. Ge#, N. Greene, B. John, and **H. Lu**, "Hierarchical Clustering Split for Low-Bias Evaluation of Drug-Target Interaction Prediction", in *Proceedings of the IEEE International Conference on Bioinformatics and Biomedicine (BIBM 2021)*, pages 641-644, December 9-12, 2021. [**In collaboration with AstraZeneca**, Boston, US and Gothenburg, Sweden]

[C32] L. Schobs#, S. Zhou#, M. Cogliano, A. Swift, and **H. Lu**, "Confidence-Quantifying Landmark Localisation for Cardiac MRI", in *Proceedings of the IEEE International Symposium on Biomedical Imaging (ISBI 2021)*, April 13-16, 2021.

[C31] L. Zhang#, and **H. Lu**, "A Feature-Importance-Aware and Robust Aggregator for GCN", in *Proceedings of the 29th ACM Conference on Information and Knowledge Management (CIKM 2020)*, Galway, Ireland, Pages. 1813-1822, October 19-23, 2020.

[C30] J. Uthoff#, S. Alabed#, A. Swift, and **H. Lu**, "Geodesically Smoothed Tensor Features for Pulmonary Hypertension Prognosis using the Heart and Surrounding Tissues", in *Proceedings of the 23rd International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2020)*, Lima, Peru, pages. 253-262, October 04-08, 2020.

[C29] S. Zhou#, W. Li#, C. Cox, and **H. Lu**, "Side Information Dependence as a Regularizer for Analyzing Human Brain Conditions across Cognitive Experiments", in *Proceedings of the 34th AAAI Conference on Artificial Intelligence (AAAI 2020)*, New York, USA. Pages. 6957-6964, February 07-12, 2020.

[C28] Q. Shi#, **H. Lu** and Y. M. Cheung, "Tensor Rank Estimation and Completion via CP-based Nuclear Norm", in *Proceedings of the 26th ACM Conf. on Information and Knowledge Management (CIKM 2017)*, Singapore, Pages 949-958, November 06-10, 2017.

[C27] Y. Zhou#, **H. Lu** and Y. M. Cheung, "Bilinear Probabilistic Canonical Correlation Analysis via Hybrid Concatenations", in *Proceedings of the 31st AAAI Conf. on Artificial Intelligence (AAAI 2017)*, San Francisco, U.S., Pages 2949-2955, February 04-09, 2017.

[C26] X. Song# and **H. Lu**, "Multilinear Regression for Embedded Feature Selection with Application to fMRI Analysis", in *Proceedings of the 31st AAAI Conf. on Artificial Intelligence (AAAI 2017)*, San Francisco, U.S., Pages 2562-2568, February 04-09, 2017.

[C25] L. Song# and **H. Lu**, "Proper Inner Product with Mean Displacement for Gaussian Noise Invariant ICA", in *Proceedings of the 8th Asian Conf. on Machine Learning, Hamilton (ACML 2016)*, Hamilton, New Zealand, Pages 398-413, November 16-18, 2016.

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[C8] **H. Lu**, K. N. Plataniotis and A. N. Venetsanopoulos, "Multilinear Principal Component Analysis of Tensor Objects for Recognition", in *Proceedings of the Int. Conf. on Pattern Recognition (ICPR 2006)*, Hong Kong, China, Vol. 2, Pages 776-779, Aug. 2006.

[C7] **H. Lu**, K. N. Plataniotis and A. N. Venetsanopoulos, "Coarse-to-Fine Pedestrian Localization and Silhouette Extraction for the Gait Challenge Data Sets", in *Proceedings of the IEEE Int. Conf. on Multimedia & Expo (ICME 2006)*, Toronto, Canada, Pages 1009-1012, Jul. 2006.

[C6] **H. Lu**, K. N. Plataniotis and A. N. Venetsanopoulos, "A Layered Deformable Model for Gait Analysis", in *Proceedings of the IEEE Int. Conf. on Automatic Face and Gesture Recognition (FG 2006)*, Southampton, UK, Pages 249-254, Apr. 2006.

[C5] **H. Lu**, A. C. Kot and R. Susanto, "Binary Image Watermarking through Biased Binarization", in *Proceedings of the 2003 IEEE Int. Conf. on Multimedia & Expo (ICME 2003)*, Baltimore, Maryland, USA, Vol. 3, Pages 101-104, Jul. 2003.

[C4] **H. Lu**, A. C. Kot and J. Cheng, "Secure Data Hiding in Binary Document Images for Authentication", in *Proceedings of the 2003 IEEE International Symposium on Circuits and Systems (ISCAS 2003)*, Bangkok, Thailand, Vol. 3, Pages 806-809, May 2003.

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- **Book chapters**

[BC2] **H. Lu**, K. N. Plataniotis and A. N. Venetsanopoulos, "A Taxonomy of Emerging Multilinear Discriminant Analysis Solutions for Biometric Signal Recognition", in *Biometrics: Theory, Methods, and Applications*, N. Boulgouris, K. N. Plataniotis, and E. Micheli-Tzanakou, Eds., Pages 21-45, Wiley-IEEE Press, ISBN: 978-0-470-24782-2, 2009.

[BC1] **H. Lu**, J. Wang and K. N. Plataniotis, "A Review on Face and Gait Recognition: System, Data and Algorithms", in *Advanced Signal Processing: Theory and Implementation for Sonar, Radar, and Non-Invasive Medical Diagnostic Systems, Second Edition*, S. Stergiopoulos, Editor, Pages 303-330, CRC Press, Boca Raton, Florida, ISBN: 978-1-4200-6238-0, 2009.

- **Patent**

[P1] A. C. Kot, H. Yang and **H. Lu**, "Method, Software and Device for Hiding Data in Binary Images While Preserving Image Quality", United States Patent 7,324,662, January 29, 2008.

STUDENT AND STAFF SUPERVISION

- Principal supervision of three postdoctoral researchers (completed), University of Sheffield
  - Prasun Chandra Tripathi, July 2022 – February 2024, now an Assistant Professor at Institute of Infrastructure, Technology, Research and Management, India
  - Johanna Uthoff, October 2019 – September 2021, now a Senior Data Engineer at GE HealthCare
  - Wenwen Li, June 2018 – August 2019, a Senior AI Training Engineer at MathWorks
- Principal supervision of five PhD students (completed), University of Sheffield
  - Peizhen Bai, "Transferable Representation Learning for Drug Discovery", completed in March 2025, now a Senior AI Scientist at AstraZeneca
  - Lawrence Schobs, "Anatomical Landmark Localisation and Uncertainty Estimation", completed in January 2024, now a Lead Machine Learning Engineer at ViewsML Technologies, Vancouver, Canada
  - Shuo Zhou, "Interpretable Domain-Aware Learning for Neuroimage Classification", completed in May 2022, now a Lecturer at University of Sheffield
  - Li Zhang, "Exploring Local Information for Graph Representation Learning", completed in February 2022, now an Associate Lecturer at University College London
  - Yan Ge, "Representation Learning with Motif Structures", completed in August 2021, now a Lecturer at University of Bristol
- Co-supervision of PhD students (completed), University of Sheffield
  - Louis Allen, Department of Chemical and Biological Engineering, completed in 2024
  - Ludmila Kucikova, School of Medicine and Population Health, completed in 2024
  - Samer Al-Abed, Department of Infection, Immunity and Cardiovascular Disease, completed in 2022
  - Sokratis Kariotis, Department of Neuroscience, completed in 2022
- Principal supervision of six PhD students, University of Sheffield
  - Alan Thomas (part-time), since January 2024
  - Haolin Wang (part-time), since January 2024
  - Wenrui Fan (part-time), since January 2024
  - Mohammod Naimul Islam Suvon (part-time), since January 2024
  - Sina Tabakhi, since November 2021
  - Pawel Pukowski, since November 2021
- Principal supervision of seven AI Research Engineers, University of Sheffield
  - Lalu Muhammad Riza Rizky, April 2024 – present
  - Jiayang Zhang, March 2024 – present
  - Mohammod Naimul Islam Suvon, October 2023 – present
  - Xianyuan Liu, September 2023 – present
  - Wenrui Fan, September 2023 – present
  - Haolin Wang, August 2023 – present
  - Alan Thomas, July 2023 – present

- Principal supervision of visiting researchers, University of Sheffield
  - Xianyuan Liu, September 2019 – September 2021
- The Fretwell-Downing Prize, for the best MSc dissertation in the Department of Computer Science, University of Sheffield
  - Mohammod Naimul Islam Suvon, 2022
  - Hao Xu, 2019
  - Peizhen Bai, 2017
- Principal supervision of two PhD students, Hong Kong Baptist University
  - Yang Zhou, completed in 2019
  - Qiquan Shi, completed in 2018

RELEASED OPEN-SOURCE SOFTWARE

60,000+ downloads in total:

[S4] **PyKale**: Open-source library for multimodal AI, part of the PyTorch ecosystem

[S3] Other open-source contributions and repositories on GitHub: github.com/haipinglu

[S2] MATLAB Central: www.mathworks.com/matlabcentral/fileexchange/authors/80417

[S1] Machine Learning Open Source Software: mloss.org/software/author/haiping-lu/

MEDIA COVERAGE

[M6] The Times - Special Supplement on the Future of Data and AI: How in silico testing is accelerating drug R&D, 22nd March 2023

[M5] The National Centre for Universities and Business (NCUB) - Artificial Intelligence: the present and future of technology: Understanding the effectiveness of new drugs (one of the eight selected), Spring 2023 Edition

[M4] The Engineer (UK magazine): DrugBAN AI could cut costs and accelerate drug discovery, 3rd February 2023

[M3] Pan European Networks Ltd (pharma portal): Using AI to accelerate drug discovery, 3rd February 2023

[M2] Pharmafile.com (pharma portal): DrugBAN AI expected to reduce costs and speed up drug discovery, 3rd February 2023

[M1] The Yorkshire Post (UK newspaper): Team uses AI to produce life-saving treatments, 3rd February 2023

SELECTED TALKS

[T12] "Deployment-Centric Multimodal AI: Principles, Practice, and Case Studies", **Turing-Roche Challenges in Multimodal AI Workshop**, the Alan Turing Institute, London, June 2025.

[T11] "Translational Multimodal AI from Brain Imaging to Protein Design", **Martinos Center Machine Learning seminar series**, Massachusetts General Hospital | Harvard Medical School, Boston, USA, June 2025.

[T10] "Exploring Multimodal AI Beyond Vision and Language", **Open Data Science Conference Europe**, London, September 2024

[T9] "Learning across Domains and Modalities for Drug Discovery", How is AI transforming the pharmaceutical industry?, Danish Pharmaceutical Society, **University of Copenhagen**, Denmark, May 2024

[T8] "Exploring Multimodal AI for Health and Biological Sciences: from Heart to Mind", North West Seminar Series in Mathematical Biology and Data Sciences, University of Manchester, April 2024

[T7] "Learning across Domains and Modalities for Drug Discovery", **AstraZeneca**, May 2023

[T6] "PyKale: Knowledge-Aware Machine Learning from Multiple Sources in Python", the Alan Turing Institute, February 2023

[T5] "Learning from healthcare data across domains and modalities", Advances in Data Science and AI seminar series, University of Manchester, February 2023

[T4] "Learning Relationships on Multimodal and Cross-Domain Data for Drug Discovery", **HealX**, August 2022

[T3] "PyKale: Knowledge-Aware Machine Learning from Multiple Sources in Python", Shenyang Institute of Automation, University of the Chinese Academy of Sciences, September 2021

[T2] Oxford BDI Seminar, "Interpretable Machine Learning with Tensor Models for Healthcare", the Big Data Institute (BDI), University of Oxford, April 2019

[T1] "Tensor Analysis and Learning", Artificial Intelligence and Natural Computation Seminars, University of Birmingham, December 2017

SELECTED PROFESSIONAL SERVICES

- Associate Editor:
  - IEEE Transactions on Neural Networks and Learning Systems, since Jan 2022
  - IEEE Transactions on Cognitive and Developmental Systems, since Jan 2022
  - World Scientific Annual Review of Artificial Intelligence, since July 2021
- Member of the 2024 IEEE Transactions on Cognitive and Developmental Systems Outstanding Awards Committee, 2024
- Invited panellist in the session on "Analytics, Data Integration and Multifactorial Modelling", Cancer Data Driven Detection (CD3) Workshop, London, September 2023
- Member of the Research and Innovation Advisory Committee, the Alan Turing Institute, since April 2023
- Area Chair:
  - International Joint Conf. on Artificial Intelligence (IJCAI): 2021
- Senior Program Committee Member:
  - AAAI Conf. on Artificial Intelligence (AAAI): 2019, 2020, 2022
  - International Joint Conf. on Artificial Intelligence (IJCAI): 2018, 2019, 2022
- Session Chair:
  - The 44th International Engineering in Medicine and Biology Conference (EMBC): 2022
  - The 31st AAAI Conf. on Artificial Intelligence (AAAI): 2017
- Organising Committee Member, Semantic Web Challenge: Mining HTML-embedded Product Data at International Semantic Web Conference 2020
- Member of the IEEE Computational Intelligence Society Subcommittee for Outstanding PhD Dissertation Award, 2014, 2015
- Nature journal reviewer
  - Nature Machine Intelligence
  - Nature Communications
- Grant proposal reviewer
  - National Institute for Health Research (NIHR), UK
  - The Engineering and Physical Sciences Research Council (EPSRC), UK
  - The Medical Research Council (MRC), UK
  - The Biotechnology and Biological Sciences Research Council (BBSRC), UK
  - The Economic and Social Research Council (ESRC), UK
  - Wellcome Trust, UK
  - Natural Sciences and Engineering Research Council, Canada
  - French National Research Agency
  - Irish Research Council

  - Romanian National Council for Scientific Research
- Book endorsement: Cambridge University Press, 2022
- Book reviewer: Cambridge University Press, 2018, 2020, 2021
- Selected external PhD examination
  - Ghadeer Ghosheh, Department of Engineering Science, University of Oxford, June 2025
  - Samuel Bond-Taylor, Department of Computer Science, Durham University, July 2024
  - Shota Saito, Department of Computer Science, University College London, June 2024
  - Asif Khan, School of Informatics, University of Edinburgh, October 2023
  - Rui Qin, Department of Computer Science, University of Manchester, July 2022

PROFESSIONAL MEMBERSHIPS

- Senior Member, the Institute of Electrical and Electronic Engineers (IEEE)
  - IEEE Computational Intelligence Society
  - IEEE Engineering in Medicine and Biology Society

TEACHING

- Lead creator and instructor, the Alan Turing Institute
  - An Introduction to Transparent Machine Learning, part of the Alan Turing Institute's online learning courses in responsible AI, and the Innovate UK's BridgeAI programme
- School/Department of Computer Science, University of Sheffield
  - Lead creator and instructor for COM6012 - Scalable Machine Learning: Spring 2017–2023, Spring 2025
  - Instructor for COM4509/COM6509 - Machine Learning and Adaptive Intelligence, Fall 2018–2021
- Instructor, Department of Computer Science, Hong Kong Baptist University
  - COMP1320/2006 - Computer Organization: Fall 2014, Fall 2015
  - COMP2230/3005 - Design and Analysis of Algorithms: Spring 2014, Fall 2014
  - COMP3090/4075 - Introduction to Web Intelligence/Social Computing and Web Intelligence: Fall 2013, Fall 2014, Fall 2015
  - COMP3110/4027/7650 - Data Mining and Knowledge Discovery: Spring 2015
  - COMP7630 - Web Intelligence and Its Applications: Fall 2013, Fall 2014, Fall 2015

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