Tianfu Li

Ph.D. Lecturer

Xi'an Jiaotong University | Mechanical engineering | @ tianfu.li@epfl.ch
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Google Scholar：https://scholar.google.com/citations?user=qgy8dygAAAAJhl=zh-CN

Research Direction

Signal Processing and Deep Learning; Graph neural networks; Explainable artificial intelligence；
Prognostics and Health Management; Condition monitoring of mechanical equipment

Education

2020.03-present	Xi'an Jiaotong University	Ph.D. in Engineering	Supervisor: Prof. Xuefeng Chen
2022.11-2023.10	EPFL, switzerland	Visiting Ph.D. Student	Co-supervisor：Prof. Olga Fink
2018.09-2020.01	Xi'an Jiaotong University	Master of Engineering	Supervisor: Prof. Xuefeng Chen
2014.09-2018.06	Chongqing University	Bachelor of Engineering	

Research Projects

2021.01-2023.12 **Research on the interpretable intelligent fault diagnosis algorithms of machine system**
·Embed the prior knowledge of wavelet theory into the deep neural network, and make the model output understandable and interpretable.

2021.01-2022.12 **Graph neural networks based intelligent fault diagnosis of fuel control system**
·Use graph neural network for multi-sensor signal fusion of and realize the fault diagnosis of fuel control system.

2021.01-2022.12 **Fault diagnosis of rotating machinery under variable working conditions**
·Use graph neural network to model the fault data collected under different working conditions, and realize the fault diagnosis under variable working conditions.

2020.01-2021.12 **Open source framework for intelligent fault diagnosis of rotating machinery**
·Release the code library for the commonly used deep learning based intelligent diagnosis algorithms, and give the benchmark results for further study.

Awards and Achievements

2023.10 **Andrew P. Sage Best Transactions Paper Award** of IEEE SMC Society
2023.02 **Academic Star (10 students/year)** of Xi'an Jiaotong University
2022.12 **Outstanding Reviewer** of IEEE Instrumentation and Measurement Society
2022.12 **National Scholarships for Doctoral Students (only for top 2% students)**
2022.12 **Xie Youbo Foundation Scholarship (2 students/year)**, Xi'an Jiaotong University
2022.12 **Outstanding Graduate** of Xi'an Jiaotong University

2019.09 | **Second Prize** of "Tian Wing" Cup Artificial Intelligence Application Innovation Contest
2017.07 | **Meritorious Winner** in American Mathematical Contest in Modeling

Miscellaneous Experience

Academic Work Reviewer of《IEEE Transactions on Industrial Informatics》,《IEEE/ASME Transactions on Mechatronics》,《IEEE Transactions on Instrumentation and Measurement》,《ISA Transactions》,《Reliability Engineering and System Safety》,《Mechanical Systems and Signal Processing》,《Engineering Applications of Artificial Intelligence》, etc.

Skills Python, Matlab, Office, vibration signal collection and analysis

Publications: 1st author

1. **T. Li**, C. Sun*, O. Fink, Y. Yang, X. Chen, R. Yan. **"Filter-Informed Spectral Graph Wavelet Networks for Multiscale Feature Extraction and Intelligent Fault Diagnosis,"** in IEEE Transactions on Cybernetics, doi: 10.1109/ TCYB.2023.3256080, 2023. (SCI:Q1, **IF: 11.8**)
2. **T. Li**, C. Sun*, S. Li, Z. Wang, X. Chen, R. Yan. **"Explainable Graph Wavelet Denoising Network for Intelligent Fault Diagnosis,"** in IEEE Transactions on Neural Networks and Learning Systems, doi: 10.1109/TNNLS.2022.3230458, 2022. (SCI:Q1, **IF: 10.4**)
3. **T. Li**, Z. Zhao, C. Sun, L. Cheng, X. Chen, R. Yan*, RX. Gao. **"WaveletKernelNet: An Interpretable Deep Neural Network for Industrial Intelligent Diagnosis,"** in IEEE Transactions on Systems, Man, and Cybernetics: Systems, vol. 52, no. 4, pp. 2302-2312, April 2022.(SCI:Q1, **IF: 8.7**, **Highly Cited Paper**)
4. **T. Li**, Z. Zhao, C. Sun*, R. Yan, X. Chen. **"Multireceptive Field Graph Convolutional Networks for Machine Fault Diagnosis,"** in IEEE Transactions on Industrial Electronics, vol. 68, no. 12, pp. 12739-12749, Dec. 2021.(SCI:Q1, IF:7.7, **Highly Cited Paper**)
5. **T. Li**, Z. Zhao, C. Sun*, R. Yan, X. Chen. **"Domain Adversarial Graph Convolutional Network for Fault Diagnosis Under Variable Working Conditions,"** in IEEE Transactions on Instrumentation and Measurement, vol. 70, pp. 1-10, 2021.(SCI:Q1, IF: 5.6, **Highly Cited Paper**)
6. **T. Li**, Z. Zhou, S. Li, C. Sun*, R. Yan, X. Chen. **"The emerging graph neural networks for intelligent fault diagnostics and prognostics: A guideline and a benchmark study,"** in Mechanical Systems and Signal Processing, vol. 168, pp. 108653, April 2022.(SCI:Q1, IF: 8.4)
7. **T. Li**, Z. Zhao, C. Sun*, R. Yan, X. Chen. **Hierarchical attention graph convolutional network to fuse multi-sensor signals for remaining useful life prediction,"** in Reliability Engineering and System Safety, vol. 215, pp. 107878, 2021.(SCI:Q1, IF: 8.1)
8. **T. Li**, Z. Zhao, C. Sun*, R. Yan, X. Chen. **"Adaptive Channel Weighted CNN With Multisensor Fusion for Condition Monitoring of Helicopter Transmission System,"** in IEEE Sensors Journal, vol. 20, no. 15, pp. 8364-8373, 2020.(SCI:Q1, IF: 4.3)
9. **T. Li**, Z. Zhao, C. Sun, R. Yan, X. Chen*. **"Multi-scale CNN for multi-sensor feature fusion in helical gear fault detection,"** in Procedia Manufacturing, vol. 49, pp. 89-93, USA, 2020.
10. **T. Li**, C. Sun*, R. Yan, X. Chen, O. Fink. **"A Novel Unsupervised Graph Wavelet Autoencoder for Mechanical System Fault Detection,"** in arXiv preprint arXiv:2307.01429, 2023.

Publications: co-author

1. Z. Zhao, **T. Li**, J. Wu, C. Sun, S. Wang, R. Yan*, X. Chen. **"Deep Learning Algorithms for Rotating Machinery Intelligent Diagnosis: An Open Source Benchmark Study,"** in ISA Transactions, vol. 107, pp. 224-255, 2020. (SCI:Q1, IF: 7.3, **Highly**

Cited Paper)

2. Z. Zhou, **T. Li**, Z. Zhang, Z. Zhao, C. Sun, R. Yan*, X. Chen. **"Bayesian Differentiable Architecture Search for Efficient Domain Matching Fault Diagnosis,"** in IEEE Transactions on Instrumentation and Measurement, vol. 70, pp. 1-11, 2021, Art no. 3516411. (SCI:Q1, IF: 5.6)
3. Z. Zhao, **T. Li**, B. An, S. Wang*, B. Ding, R. Yan, X. Chen. **"Model-driven deep unrolling: Towards interpretable deep learning against noise attacks for intelligent fault diagnosis,"** in ISA Transactions, vol. 129, pp. 664-662, 2022. (SCI:Q1, IF: 7.3)
4. Z. Zhou, **T. Li**, Z. Zhao, C. Sun, X. Chen, R. Yan*, J. Jia*. **"Time-varying trajectory modeling via dynamic governing network for remaining useful life prediction,"** in Mechanical Systems and Signal Processing, vol. 182, pp. 109610, 2023.(SCI:Q1, IF: 8.4)
5. J. Wang, **T. Li**, C. Sun*, R. Yan, X. Chen. **"Improved spiking neural network for intershaft bearing fault diagnosis,"** in Journal of Manufacturing Systems, vol. 65, pp. 208-219, 2022.(SCI:Q1, IF:12.1)
6. S. Li, **T. Li**, C. Sun*, X. Chen, R. Yan. **"Multilayer Grad-CAM: An effective tool towards explainable deep neural networks for intelligent fault diagnosis,"** in Journal of Manufacturing Systems, vol. 69, pp. 20-30, 2023.(SCI:Q1, IF:12.1)
7. S. Li, **T. Li**, C. Sun*, X. Chen, R. Yan. **"WPConvNet: An Interpretable Wavelet Packet Kernel-Constrained Convolutional Network for Noise-Robust Fault Diagnosis,"** in IEEE Transactions on Neural Networks and Learning Systems, doi: 10.1109/TNNLS.2023.3282599vol, 2023. (SCI:Q1, IF: 10.4)
8. Y. Yang, **T. Li**, C. Sun, L. Zhang, R. Yan*. **"Graph attention U-Net to fuse multi-sensor signals for long-tailed distribution fault diagnosis,"** in Engineering Applications of Artificial Intelligence, vol. 126, part B, 2023. (SCI:Q1, IF: 8)
9. W. Xu, Z. Zhou, **T. Li**, C. Sun, X. Chen, R. Yan*. **"Physics-Constraint Variational Neural Network for Wear State Assessment of External Gear Pump,"** in IEEE Transactions on Neural Networks and Learning Systems, doi:10.1109/TNNLS.2022.3213009, 2022.(SCI:Q1, IF: 10.4)
10. B. Dai,G. Frusque, **T. Li**, Q. Li*, Q. Fink. **"Smart filter aided domain adversarial neural network: An unsupervised domain adaptation method for fault diagnosis in noisy industrial scenarios,"** in Engineering Applications of Artificial Intelligence, vol. 126, part B, 2023. (SCI:Q1, IF: 8)
11. Z. Zhao, J. Wu, **T. Li**, C. Sun, R. Yan*, X. Chen. **"Challenges and opportunities of AI-enabled monitoring, diagnosis and prognosis: a review,"** in Chinese Journal of Mechanical Engineering, vol. 34, pp. 56, 2021.(SCI:Q2, IF: 2.78)

Patents

1. C. Sun, **T. Li**, Z. Zhao, et al. A fault identification method for gear transmission system based on multi-receptive field graph convolution, Patent No. CN202110589776.1, 2021.
2. C. Sun, **T. Li**, Z. Zhao, et al. A deep learning based method for helicopter flight posture recognition with imbalance data, Patent No. CN202110101522.0, 2021.
3. C. Sun, **T. Li**, Z. Zhao, et al. Sensor location optimization method for helicopter health management system, Patent No. CN202110100316.8, 2021.
4. C. Sun, **T. Li**, Z. Zhao, et al. A domain adaptive graph convolutional network for aero-engine transmission system fault diagnosis, Patent No. CN202110588075.6, 2021.

Personal Statement

In terms of academics, I have been engaged in the research of intelligent maintenance of high-end equipment for a long time during my doctoral period, participated in a number of natural science foundation projects of China, and conducted a one-year visiting study at the Swiss Federal Institute of Technology in Lausanne (EPFL). **Currently, more than 20 papers related to high-end equipment intelligent maintenance have been published, including 8 SCI papers and 3 highly cited papers, with the highest impact factor of 11.** In addition, the **Google Scholar citations of published papers have accumulated 1000+ times**, with an h-factor of 12.

In terms of work, I am active and conscientious in my work, careful and responsible, good at asking questions, finding answers, and solving problems at work.