Haobin Ke

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Research Interests

- Machine Learning & Graph Learning
- Data-driven fault diagnosis (i.e., intelligent condition monitoring)
- Computational intelligence

Education Background

- **Sep.2021-Now: M.E. student in Control Science and Engineering, School of Automation,**
  ***Central South University*, Changsha, China**
  GPA: 3.73/4.0 (A level)
  ***Skills Gained*:**
  1) Designing intelligence fault diagnosis algorithms (mainly Graph learning-based methods) for mechanical or electric systems by Python and Matlab;
  2) Developing real-time miner action recognition algorithms based on advanced computer vision methods (such as YoloV5);
  3) Operating and maintaining mine safety monitoring system based on Python;
  4) Developing information management system by WPF framework and SQL database;
  5) Enhancing skills of writing and reviewing academic papers and invention patents; Developing oral and poster presentation skills;
  6) Applying and independently accomplishing an innovation project for postgraduate students;
  7) Working as a research assistant, mainly responsible for equipment maintenance and freshmen technical guidance.
- **Sep.2017-Jun.2021: BEng in Automation (Outstanding Graduates), School of Automation,**
  ***Guangdong University of Technology*, Guangdong, China**
  GPA: 3.94/5.0 (Weighted average mark:89.36; Ranked 2nd in major, 2/196);
  ***Skills Gained*:**
  1) Developing clear interest in electronic design and computer science;
  2) Software skills including Python, C, SQL and SCM programme.

Language Level

- CET4/CET6: 568/490
- IELTS: 6.5 overall (Reading:7.5; Writing:6.5)

Publications (* In the college of applicant, if the supervisor is the first or corresponding author, the research student who is the second author is often seen as a co-first author who contributed equally to the work.)

Journal Papers

1. Z. Chen, **H. Ke,** etc., "Multi-Channel Domain Adaptation Graph Convolutional Networks-Based Fault Diagnosis Method and With Its Application," *IEEE Transactions on Industrial Informatics* (JCR-Q1, IF=11.648), 2023, vol. 19, no. 6, pp. 7790-7800, 2023. (Supervisor as the first author).
2. J. Xu, **H. Ke,** Z. Chen, etc., "Over-smoothing Relief Graph Convolutional Network-Based Fault Diagnosis Method With Application to the Rectifier of High-Speed Trains," *IEEE Transactions on Industrial Informatics* (JCR-Q1, IF=11.648), vol. 19, no. 1, pp. 771-779, 2022. (Supervisor as the corresponding author).
3. **H. Ke,** Z. Chen, etc., "Self-adaptive Selection Graph Pooling Based Fault Diagnosis Method with Its Robustness and Interpretability Analysis," *IEEE Transactions on Neural Networks and Learning Systems* (JCR-Q1, IF=14.255), (Under Review).
4. J. Xu, **H. Ke,** Z. Chen, etc., "A Novel Supervised Orthogonalized-Autoencode and Nearest-Neighbor Optimization Graph Convolutional Network-Based Fault Diagnosis Method," *IEEE Transactions on*

Neural Networks and Learning Systems (JCR-Q1, IF=14.255), (Under Review; Supervisor as corresponding author).

Conference Papers

1. **H. Ke,** Z. Chen, etc., "Time-frequency Hypergraph Neural Network for Rotating Machinery Fault Diagnosis with Limited Data," *The 2023 IEEE 12th Data Driven Control and Learning Systems Conference* (EI conference), 2023. **(Best paper award finalist)**
2. Z. Chen, J. Xu, **H. Ke,** etc., "Graph Convolution Network-Based Fault Diagnosis Method for The Rectifier of The High-speed Train," *The 2021 4th IEEE International Conference on Industrial Cyber-Physical Systems* (EI conference), 2021, pp. 491-497.

Invention Patents

1. **H. Ke,** Han. W, etc., "An Electrospinning Dual Channel Syringe with Its Instructions," China Patent, CN109989120B (Authorised), September. 2021.
2. **H. Ke,** Xin. X, etc., "A Fitting Platform Based on Three-dimensional Rotating Scanning," China Patent, CN111536922B (Authorised), May. 2022.
3. Z. Chen, **H. Ke,** etc., "A Novel Fault Diagnosis Method of High-speed Train Traction System Under Varying Working Conditions," China Patent, CN114994426A (Under Pending), September. 2022, (Supervisor as the first inventor).

Research Funding/Projects

1) **The Program of National Natural Science Foundation of China & Fundamental Research Foundation for Postgraduate Student.** ***"Research on Few Samples Fault Diagnosis of Railway Electric Traction System Based on Graph Network."*** **(Core member) Jan.2021-Dec.2023**
   Responsibilities**:** a) Construct graph topology of traction system based on physical mechanism and data similarity; b) Adopt the graph mapping method to analyse the fault diagnosability of traction systems; c) Establish advanced graph learning methods for high-precision health monitoring for the rail transit traction drive systems.
2) **Corporate Partnership Project,** ***"Intelligent monitoring platform for coal mine safety production."*** **(Main member in charge) Dec. 2021-Now**
   Responsibilities**:** a) Communicate and report project progress with partner enterprise. (The monitoring platform has been deployed to several coal mines in Hunan Province and connected with the National Mine Safety Administration); b) Participate in the whole process development of the monitoring platform, including equipment adjusting, system scheme design, model training, alarm logic construction, algorithm deployment, on-site testing, etc;
3) **Corporate Partnership Project,** ***"Archives room information management system."*** **(Main member in charge) Dec. 2021-Dec.2022**
   Responsibilities**:** a) Develop information management system based on WPF framework and MySQL database, including interface design, personnel login, information import, information export and information screening functions, on-site testing, etc; b) Project communication and post-maintenance.

Awards

- First Class Undergraduate Scholarship in 2017, 2018 and 2019.
- Model Student of Academic Records in 2017, 2018 and 2019.
- Honourable Winner of Mathematical Contest in Modelling in 2019.
- Outstanding Graduate of Guangdong University of Technology in 2021.
- Top Ten Outstanding Graduates in School of Automation, 2021.
- Outstanding Undergraduate Theses of Guangdong University of Technology in 2021.
- First Class Postgraduate Scholarship in 2021, 2023.
- The 2nd Prize of the 19th China Postgraduate Mathematical Contest in Modelling, 2022.
- The best paper award finalist in the 2023 IEEE 12th Data Driven Control and Learning Systems Conference.
- Postgraduate National Scholarship in 2023 (The highest honour in China for graduate students).