Tongkang Zhang Ph.D.

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Education

State Key Laboratory of Synthetical Automation for Process Industry, Northeastern University China
Ph.D. in Control Theory and Control Engineering 2017 - 2024

- Supervisor: Prof. Jinliang Ding
- Research Area: Fault Diagnosis and Root Cause Analysis, Industrial Big Data Visualization and Visual Analytics, Intelligent Industrial Software Design
- Ranking: ARWU's Global Ranking of Academic Subjects, Automation & Control, 15

College of Information Science and Engineering, Northeastern University China
M.Eng. in Control Engineering 2015 - 2017

- Supervisor: Prof. Mingxing Jia
- Research Area: Process Monitoring and Fault Diagnosis
- Ranking: ARWU's Global Ranking of Academic Subjects, Automation & Control, 15

College of Information Science and Engineering, Northeastern University China
B.Eng. in Automation 2011 - 2015

Publications

1. **Tongkang Zhang**, Jinliang Ding*, Cheng Zeng, Kaifeng Guan, Ye Liu, Chunhui Zhao, Tianyou Chai. iHPPPVis: Interactive Visual Analytics Approach for Production Performance Monitoring of Heavy-Plate Production Process[J]. *IEEE Transactions on Cybernetics*, 2024, 54(7):3864-3877.
2. **Tongkang Zhang**, Datong Li, Jinliang Ding*. EHOPN: A Novel Enhanced High-Order Pooling-Based Network for Industrial Fault Detection[J]. *Journal of Process Control*, 2024, 142:103296.
3. **Tongkang Zhang**, Ruibo Wang, Cheng Zeng, Jinliang Ding*. Interactive Visual Analytics-Based Diagnosis and Traceback of Shape Quality Anomalies in Multi-Category Heavy Plates[J]. *SCIENTIA SINICA Technologica*, 2024, 54: 1693–1706.
4. **Tongkang Zhang**, Yufei Ma, Depeng Xu, Changxin Liu, Jinliang Ding. iHPPVis: Interactive Visual Analysis of Industrial Data in Heavy Plate Production[C]. *The 21st IFAC World Congress*, *IFAC-PapersOnLine*, 2020, 53(2): 12050-12055.
5. Jinliang Ding*, **Tongkang Zhang**. State-of-the-Art and Prospects of Visualization for Industrial Big Data[J]. *Engineering*, 2024, *Submitted to Journal*.
6. Datong Li, Jun Lu*, **Tongkang Zhang**, Jinliang Ding*. Self-Supervised Learning and Multisource Heterogeneous Information Fusion Based Quality Anomaly Detection for Heavy-Plate Shape[J]. *IEEE Transactions on Automation Science and Engineering*, 2023, 21(2), 1223-1234.
7. Yupeng Xing, **Tongkang Zhang**, Jun Lu, Jinliang Ding*. Quality Prediction Analysis of Heavy Plate Shape Based on Optimal Feature Subset[J]. *Computer Integrated Manufacturing System*, 2022, 28(7): 2041-2049.
8. Jinliang Ding*, Kaifeng Guan, **Tongkang Zhang**. Big Data Visual Analytics for Heavy Plate Shape Quality Monitoring and Anomaly Diagnosis[J]. *Control and Decision*, 2023, 38(8): 2192-2202.
9. Depeng Xu, **Tongkang Zhang**, Changxin Liu, Ye Liu, Jinliang Ding*. Heavy Plate Shape Abnormal Analysis System Based on Big Data Visualization[J]. *Control Engineering of China*, 2023, 30(1): 98-104.

Projects

1. **Industrial Software for Integrated Optimization of Mineral Processing Decision-Making and Control for Green Production Towards the 'Dual Carbon' Goal, National Key R&D Plan Project**, Ministry of Science and Technology of China, 2022-11 to Present, 20 Million CNY, Key Researcher.
2. **Baosteel Co., Ltd.—Northeastern University Digital and Intelligent Process Industry Joint Laboratory**, State Key Laboratory of Synthetical Automation for Process Industry, Northeastern University, 2024-03 to Present, Key Researcher.
3. **Steel Plate Thickness and Performance Abnormality Diagnosis and Tracing System Based on Visual Analytics**, Baosteel Co., Ltd. Research Project, 2023-09 to 2024-08, Co-Principal Investigator.
4. **Research on Machine Learning Methods for Industrial Big Data Analysis and Product Quality Abnormality Tracing**, National Natural Science Foundation of China (NSFC)/Research Grants Council (RGC) of Hong Kong Joint Research Scheme (JRS), 2021-01 to Present, 1.248 Million CNY, Key Researcher.
5. **Multi-objective/Multi-task Coordinated Full-process Intelligent Control and Operation Optimization Platform and Application System**, National Key R&D Plan Project, Ministry of Science and Technology of China, 2019-5 to 2022-4, 3.8 Million CNY, Key Researcher.
6. **Research on Heavy Plate Shape Analysis and Decision Support Based on Industrial Big Data**, Baosteel Co., Ltd. Research Project, 2019-01 to 2020-12, Co-Investigator.
7. **Integrated Optimization Control and Decision-Making Methods for Process Manufacturing**, Xinliao Talent Program, Department of Science & Technology of Liaoning province, 2019-01 to 2021-12, 1 Million CNY, Key Researcher.
8. **Global Collaborative Optimization Operation Theory and Implementation Technology for Refining Production Process**, Major Program of the National Natural Science Foundation of China, 2016-9 to 2021-6, 2.9 Million CNY, Researcher.
9. **Comprehensive Automation Project for the Plant-Wide Process of Magnetic Roasting**, Jiuquan Iron & Steel Co., Ltd. Project, 2015-09 to 2018-6, 8 Million CNY, Key Software Developer.

Patents

1. Jinliang Ding, **Tongkang Zhang**, Yangyang Ou. A Visual Analytics Method and System for Heavy Plate Production Planning Decision Support, CN Patent No.117217421B, 2024.09, Authorized.
2. Jinliang Ding, Jiangtao Xu, **Tongkang Zhang**. A Rolling Gap Correction Method for Heavy Plate Rolling Based on Random Forest Algorithm, CN Patent No.115106384B, 2023.04, Authorized.
3. Jinliang Ding, Datong Li, **Tongkang Zhang**, Jun Lu. A Product Quality Measurement Method for Complex Industrial Processes Integrating Prior Knowledge, CN Patent No.118521013A, 2024.07, Accepted.

Awards and Honors

- **Excellence in Academic Nomination Award**, IAI 2023 : 5th International Conference on Industrial Artificial Intelligence Academic Salon 2023.08
- **Excellence in Academic Award**, IAI 2022 : 4th International Conference on Industrial Artificial Intelligence Academic Salon 2022.10
- **Excellence in Academic Award**, IAI 2021 : 3th International Conference on Industrial Artificial Intelligence Academic Salon 2021.12
- **Excellence in Academic Award**, IAI 2019 : 1th International Conference on Industrial Artificial Intelligence Academic Salon 2019.08
- **Fist Class Ph.D. Scholarship**, Northeastern University 2017.09 - 2021.06
- **Fist Class Master Scholarship**, Northeastern University 2015.09 - 2017.06

Teaching

- **Intermediate Course for Training Personnel in Digitalization and Intellectualization in Manufacturing—Practical Visualization for Industrial Big Data**
  Co-Lecturer, Human Resource Department, Baosteel Co., Ltd. 2024.01 - 2024.08
- **Elementary Course for Training Personnel in Digitalization and Intellectualization in Manufacturing—Visualization for Industrial Big Data**
  Co-Lecturer, Human Resource Department, Baosteel Co., Ltd. 2019.09 - 2024.08
- **Fundamentals and Practice of Digitalization and Intellectualization in Manufacturing**
  Co-Lecturer, State Key Laboratory of Synthetical Automation for Process Industry, Northeastern University 2019.09 - 2024.08

Skills

Languages: Mandarin, English.

Programming: Python, Java, Matlab, Android, SQL, HTML, CSS, Javascript, Vue.js, D3.js, Flask, Django, SpringBoot.

Data Engineering: Sklearn, Pandas, Pytorch, MySQL, PostgreSQL, MongoDB.

Academic Services

Reviewers for: *IEEE Transactions on Neural Networks and Learning Systems*,
IEEE Transactions on Cybernetics,
IEEE Transactions on Industrial Informatics,
IEEE Transactions on Industrial Electronics,
IEEE Sensors Journal.