Chair Professor Naiqi Wu
Department of Engineering Science,Faculty of Innovation Engineering
Macau Institute of Systems Engineering
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Academic Qualification:

- Ph. D. in Systems Engineering, Xi'an Jiaotong University, Xi'an, China, 1988.
- M. S. in Systems Engineering, Xi'an Jiaotong University, Xi'an, China, 1985.
- B. S. in Electrical Engineering, Anhui University of Technology, Huainan, China, 1982.

Teaching Area

- Algorithm theory
- Operations research and optimization
- Automation

Research Area

- Intelligent manufacturing
- Discrete event systems, and Petri net theory and applications
- Production planning, scheduling and control
- Intelligent logistics and transportation
- Energy systems

Working Experience

- **JAN. 2021 – present**: Macau University of Science and Technology, Chair Professor at the Department of Engineering Science and Macao Institute of Systems Engineering.
- **JUL. 2013 – DEC. 2020**: Macau University of Science and Technology, Professor at the Institute of Systems Engineering.
- **SEP. 1998- 2013**: Guangdong University of Technology, Professor & Head of the Department of Industrial Engineering.
- **JUN. 2010-OCT. 2011**: Visiting Professor, Laboratoire Informatique, Biologie Integrative et Systemes Complexes (IBISC), Universite d'Evry Val d'Essonne, France.
- **JAN. 2007 – MAR. 2009**: Visiting Professor, University of Technology of Troyes, France.
- **MAY. 2004-AUG. 2004**: Visiting professor, Department of Electrical and Computer Engineering, New Jersey Institute of Technology.
- **AUG. 1999 – DEC. 1999**: Visiting professor, Department of Industrial Engineering, Arizona State University.
- **MAY 1995- AUG. 1998**: Shantou University, Shantou, China, Associate Professor of department of Mechatronics Engineering.
- **AUG. 1993-MAY 1995**: Shenyang Institute of Automation, Chinese Academy of Sciences, Shenyang, P. R. China,

Associate Professor.

- **OCT. 1991-OCT. 1992**: School of Industrial Engineering, Purdue University, West Lafayette, Indiana, USA, Visiting Scholar.
- **MAY 1988-JUL. 1993**: Shenyang Institute of Automation, Chinese Academy of Sciences, Shenyang, P. R. China, Assistant Professor.

Research Grants

- Operational Optimization and Control of Cluster Tools with Multiple Chamber Configuration in a Process Module for Wafer Fabrication, FDCT.
- Self-Learning Optimal Control of City Energy Management System Based on Edge Computing, FDCT.
- Optimal Scheduling and Control of Cluster Tools for Wafer Fabrication with Strict Process Constraints in Semiconductor Manufacturing, FDCT.
- Maximally Permissive Supervisory Control of Resource Allocation Systems Based on Resource-Oriented Petri Nets, FDCT.
- Short-Term Scheduling Optimization for Continuous Process Industry by Using Hybrid System Control Theory, FDCT.

Representative publications (Complete publication refer to my webpage)

Book and book chapters:

[1] **N. Q. Wu** and M. C. Zhou, *System modeling and control with resource-oriented Petri nets*, CRC Press, Taylor & Francis Group, New York, October 2009.

[2] **N. Q. Wu** and M. C. Zhou, Resource-oriented Petri nets in deadlock prevention and avoidance, in M. C. Zhou and M. P. Fanti (Ed.), *Deadlock Resolution in Computer-Integrated Systems*, Marcel Dekker, NY, January 2005.

[3] **N. Q. Wu** and M. C. Zhou, A resource-oriented Petri net approach to scheduling and control of time-constrained cluster tools in semiconductor fabrication, in Z. W. Li and A. M. Al-Ahmari (Ed.), *Formal Methods in Manufacturing Systems: Recent Advances*, IGI Global, New York, May, 2013.

[4] Y. Qiao, **N. Q. Wu**, and M. C. Zhou, Real-time scheduling and control of single-arm cluster tools with residency time constraint and activity time variation by using resource-oriented Petri nets, in Z. W. Li and A. M. Al-Ahmari (Ed.), *Formal Methods in Manufacturing Systems: Recent Advances*, IGI Global, New York, May 2013.

[5] **N. Q. Wu**, M. C. Zhou, F. Chu, and S. Mammar, Modeling and scheduling of crude oil operations in refinery: a hybrid timed Petri net approach, in M. Khalgui, O. Mosbahi, and A. Valentini (Ed), *Embedded Computing Systems*: *Applications*, *Optimization*, *and Advanced Design*, IGI Global, New York, May 2013.

[6] **N. Q. Wu**, M. C. Zhou, F. Chu, and S. Mammar, Modeling, Analysis, Scheduling and Control of Cluster Tools in Semiconductor Fabrication, in *Contemporary Issues in Systems Science and Engineering*, Edited by M. C. Zhou, H.-X. Li and M. Weijnen, Wiley/IEEE Press, Hoboken, NJ, pp. 289-315, 2015.

Selected journal articles:

2023

[1] W. Q. Xiong, J. Li, Y. Qiao, L. P. Bai, B. Y. Huang, and **N. Q. Wu**, An efficient scheduling method for single-arm cluster tools with multifunctional process modules, *IEEE Transactions on Systems, Man, & Cybernetics: Systems*, early access, DOI: 10.1109/TSMC.2022.3222915.

[2] S. H. Teng, Z. F. Zheng, **N. Q. Wu**, L. Y. Teng, and W. Zhang, Adaptive graph embedding with consistency and specificity for domain adaptation, *IEEE/CAA Journal of Automatica Sinica*, accepted.

[3] Q. H. Zhu, B. Li, Y. Hou, H. P. Li, and **N. Q. Wu**, Scheduling dual-arm multi-cluster tools with regulation of post-processing time, *IEEE/CAA Journal of Automatica Sinica*, accepted.

[4] Y. X. Pan, K. Z. Gao, Z. W. Li, and **N. Q. Wu**, Solving Bi-objective Distributed Flow Shop Scheduling Problems with Lot-streaming Using an Improved Jaya Algorithm, *IEEE Transactions on Cybernetics*, early access, DOI: 10.1109/TCYB.2022.3164165.

[5] Y. X. Pan, K. Z. Gao, Z. W. Li, and **N. Q. Wu**, Improved meta-heuristics for solving distributed lot-streaming permutation flow shop scheduling problems, *IEEE Transactions on Automation Science and Engineering*, online, DOI: 10.1109/TASE.2022.3151648.

[6] S. F. Chen, **N. Q. Wu**, H. Fu, Y. F. Wang, and Y. Qiao, Urban Road Network Partitioning Based on Bi-modal Traffic Flows with Multi-objective Optimization, *IEEE Transactions on Intelligent Transportation Systems*, DOI: 10.1109/TITS.2022.3184082.

[7] **N. Q. Wu**, Y. Qiao, Z. W. Li, A. Al-Ahmari, A. El-Tamimi, and H. Kaid, A novel control-theory-based approach to scheduling of high throughput screening system for enzymatic assay, *IEEE Transactions on Systems, Man, & Cybernetics: Systems*, early access, DOI: 10.1109/TSMC.2022.3161643.

[8] Y. S. An, Y. X. Gao, **N. Q. Wu**, J. W. Zhu, H. Z. Li, and J. H. Yang, Optimal scheduling of electric vehicle charging operations considering real-time traffic condition and travel distance, *Expert Systems With Applications*, vol. 213, Article 118941, Mar. 2023.

[9] H. J. Ning, Y. S. An, Y. X. Wei, **N. Q. Wu**, C. Mu, H. H. Cheng, and C. X. Zhu, Modeling and analysis of traffic warning message dissemination system in VANETs, *Vehicular Communications*, vol. 39, Article 100566, Feb. 2023.

2022

[1] Y. F. Dong, Z. W. Li, and **N. Q. Wu**, Symbolic verification of current-state opacity of discrete event systems using Petri nets, *IEEE Transactions on Systems, Man, & Cybernetics*: *Systems*, online, vol. 52, no. 12, 7628-7641, Dec. 2022.

[2] Y. Qiao, **N. Q. Wu**, Y. F. He, Z. W. Li, and T. Chen, Adaptive genetic algorithm for two-stage hybrid flow-shop scheduling with sequence-independent setup time and no-interruption requirement, *Expert Systems with Applications*, vol. 208, Article 118068, Dec. 2022.

[3] H. Liao, F. C. Liu, and **N. Q. Wu**, Robust predictability of stochastic discrete-event systems and a polynomial-time verification, *Automatica*, vol. 144, Article 110477, Oct. 2022.

[4] S. F. Chen, H. Fu, Y. Qiao, and **N. Q. Wu**, Route choice behavior modeling for emergency evacuation and efficiency analysis based on type-II fuzzy theory, *IEEE Transactions on Intelligent Transportation Systems*, vol. 23, no. 7, 6934-6949, Jul. 2022.

[5] Y. Qiao, Y. J. Lu, **N. Q. Wu**, J. Li, and B. Liu, An efficient binary integer programming model for residency time-constrained cluster tools with chamber cleaning requirements, *IEEE Transactions on Automation Science and Engineering*, vol. 19, no. 3, 1757-1771, Jul. 2022.

[6] M. Ghahramani, M. C. Zhou, Y. Qiao, and **N. Q. Wu**, Spatio-temporal analysis of mobile phone network based on self-organizing feature map, *IEEE Internet of Things Journal*, vol. 9, no. 13, 10948-10960, Jul. 2022.

[7] Y. F. Chen, Y. T. Li, Z. W. Li, and **N. Q. Wu**, On optimal supervisor design for discrete event systems modeled with Petri nets via constraint simplification, *IEEE Transactions on Systems, Man, & Cybernetics*: *Systems*, vol. 52, no. 6, 3404-3418, Jun. 2022.

[8] Q. H. Zhu, G. H. Wang, Y. Hou, and **N. Q. Wu**, Optimally scheduling dual-arm multi-cluster tools to process two wafer types, *IEEE Robotics and Automation Letters*, vol. 7, no. 3, 5920-5927, Jul. 2022.

[9] Z. L. Yuan, X. R. Li, D. Wu, X. J. Ban, **N. Q. Wu**, H.-N. Dai, and H. Wang, Continuous-time prediction of industrial paste thickener system with differential ODE-net, *IEEE*/*CAA Journal of Automatica Sinica*, vol. 9, no. 9, 686-698, Apr. 2022.

[10] Z. Y. Yang, **N. Q. Wu**, Y. Liang, H. Zheng, and Y. Q. Ren, SMSPL: Robust multimodal approach to integrative

analysis of multi-omics data, *IEEE Transactions on Cybernetics*, vol. 52, no. 4, 2082-2095, Apr. 2022.

[11] Y. Hou, Y. X. Zhang, **N. Q. Wu**, and Q. H. Zhu, Constrained multi-objective optimization of short-term crude oil scheduling with dual pipelines and charging tank maintenance requirement, *Information Sciences*, vol. 588, 381-404, Jan. 2022.

[12] S. F. Chen, H. Fu, **N. Q. Wu**, Y. F. Wang, and Y. Qiao, Passenger-oriented Traffic Management Integrating Perimeter Control and Regional Bus Service Frequency Setting Using 3D-pMFD, Transportation Research Part C, vol. 135, Article 103529, Jan. 2022.

[13] J. Liu, **N. Q. Wu**, Y. Qiao, and Z. W. Li, Short-term traffic flow forecasting using ensemble approach based on deep belief networks, *IEEE Transactions on Intelligent Transportation Systems*, vol. 23, no. 1, 404-417, Jan. 2022.

[14] S. H. Teng, Z. F. Zheng, **N. Q. Wu**, L. K. Fei, and W. Zhang, Domain adaptation via incremental confidence samples into classification, *International Journal of Intelligent Systems*, vol. 37, 365-385, Jan. 2022.

2021

[1] Y. Qiao, M. C. Zhou, **N. Q. Wu**, Z. W. Li, and Q. H. Zhu, Closing-down optimization for single-arm cluster tools subject to wafer residency time constraints, *IEEE Transactions on Systems, Man, & Cybernetics*: *Systems*, vol. 51, no. 11, 6792-6807, Nov. 2021.

[2] W. Q. Xiong, C. R. Pan, Y. Qiao, **N. Q. Wu**, M. X. Chen, and P. H. Hsieh, Reducing wafer delay time by robot idle time regulation for single-arm cluster tools, *IEEE Transactions on Automation Science and Engineering*, vol. 18, no. 4, 1653-1667, Oct. 2021.

[3] H. F. Chen, **N. Q. Wu**, Z. W. Li, and T. Qu, Decision on maximal permissiveness of linear constraints via structural analysis of a subclass of Petri nets, *IEEE Transactions on Systems, Man, & Cybernetics*: *Systems*, vol. 51, no. 7, 4347-4358, Jul. 2021.

[4] J. L. Liu, S. H. Teng, L. K. Fei, W. Zhang, X. Z. Fang, Z. X. Zhang, and **N. Q. Wu**, A Novel Consensus Learning Approach to Incomplete Multi-view Clustering, *Pattern Recognition*, vol. 115, Article NO 107890, Jul. 2021.

[5] B. Y. Huang, H. B. Zhu, D. N. Liu, **N. Q. Wu**, Y. Qiao, and Q. Jiang, Solving last-mile logistics problem in spatiotemporal crowdsourcing via role awareness with adaptive clustering, *IEEE Transactions on Computational Social Systems*, vol. 8, no. 3, 668-681, Jun. 2021.

[6] W. Q. Xiong, Y. Qiao, L. P. Bai, M. Ghahramani, **N. Q. Wu**, P. H. Hsieh, and B. Liu, Wafer reflectance prediction for complex etching process based on *K*-Means clustering and neural network, *IEEE Transactions on Semiconductor Manufacturing*, vol. 34, no. 2, 207-216, May 2021.

[7] G. H. Zhu, L. Feng, Z. W. Li, and **N. Q. Wu**, An efficient fault diagnosis approach based on integer linear programming for labeled Petri nets, *IEEE Transactions on Automatic Control*, vol. 66, no. 5, 2393-2398, May 2021.

[8] Y. Wang, Y. T. Li, Z. H. Yu, **N. Q. Wu**, and Z. W. Li, Supervisory control of discrete-event systems under external attacks, *Information Sciences*, vol. 562, 398-413, Jul. 2021.

[9] Y. Qiao, S. W. Zhang, **N. Q. Wu**, M. C. Zhou, Z. W. Li, and T. Qu, Efficient approach to failure response of process module in dual-arm cluster tools with wafer residency time constraints, *IEEE Transactions on Systems, Man, & Cybernetics*: *Systems*, vol. 51, no. 3, 1612-1629, Mar. 2021.

[10] Z. C. Liu, **N. Q Wu**, Y. Qiao, Z. W Li, Performance evaluation of public bus transportation by using DEA models and Shannon's entropy: an example from a company in a large city of China, *IEEE/CAA Journal of Automatica Sinica*, vol. 8, no. 4, 779-795, Apr. 2021.

[11] Y. H. Pan, T. Qu, **N. Q. Wu**, H. F. Guo, M. Khalgui, and G. Q. Huang, Digital twin based real-time production logistics synchronization system in a multi-level computing architecture, *Journal of Manufacturing Systems*, vol. 58, Part B, 246-260, Jan. 2021.

[12] Y. J. Zhou, H. R. Ren, Z. W. Li, **N. Q. Wu**, and A. M. Al-Ahmari, Anomaly Detection via a Combination Model in Time Series Data, *Applied Intelligence*, vol. 51, 4874-4887, Jan. 2021.

[13] X. B. Li, Z. H. Yu, Z. W. Li, and **N. Q. Wu**, Group consensus via pinning control for a class of heterogeneous multi-agent systems with input constraints, *Information Sciences*, vol. 542, 247-262, Jan. 2021.

[14] J. Liu, **N. Q. Wu**, Y. Qiao, and Z. W. Li, A scientometric review of researches on traffic forecasting in Transportation, *IET Intelligent Transport Systems*, vol. 15, no. 1, 1-16, Jan. 2021.

[15] Y. H. Pan, **N. Q. Wu**, T. Qu, P. Z. Li, K. Zhang, and H. F. Guo, Digital-twin-driven production logistics synchronization system for vehicle routing problems with pick-up and delivery in industrial park, *International Journal of Computer Integrated Manufacturing*, vol. 34, nos. 7-8, 814-824, Feb. 2020.

[16] F. J. Yang, **N. Q. Wu**, Y. Qiao, M. C. Zhou, R. Su, and C. J. Zhang, (Digital Twin) Wafer sojourn time fluctuation analysis for time-constrained dual-arm multi-cluster tools with activity time variation, *International Journal of Computer Integrated Manufacturing*, vol. 34, nos. 7-8, 1-17, Feb. 2021.

2020

[1] Q. L. Wei, X. Wang, X. N. Zhong, and **N. Q. Wu**, Consensus control of leader-following multi-agent systems in directed topology with heterogeneous disturbances, *IEEE/CAA journal of Automatica Sinica*, vol. 8, no. 2, 433-441, Feb. 2020.

[2] Q. H. Zhu, M. C. Zhou, Y. Qiao, **N. Q. Wu**, and Y. Hou, Multiobjective scheduling of dual-blade robotic cells in wafer fabrication, *IEEE Transactions on Systems, Man, & Cybernetics*: *Systems*, vol. 50, no. 12, 5015-5023, Dec. 2020.

[3] O. Karoui, Y. F. Chen, Z. W. Li, **N. Q. Wu**, and M. Khalgui, On hierarchical construction of the state space of an automated manufacturing system modeled with Petri nets, *IEEE Transactions on Systems, Man, & Cybernetics*: *Systems*, vol. 50, no. 10, 3613-3627, Oct. 2020.

[4] F. J. Yang, Y. Qiao, K. Z. Guo, **N. Q. Wu**, Y. T. Zhu, I. W. Simon, and R. Su, Efficient approach to scheduling of transient processes for time-constrained single-arm cluster tools with parallel chambers, *IEEE Transactions on Systems, Man, & Cybernetics*: *Systems*, vol. 50, no. 10, 3646-3657, Oct. 2020.

[5] Z. P. Xu, Y. Wang, **N. Q. Wu**, and X. C. Fu, Propagation dynamics of a periodic epidemic model on weighted interconnected networks, *IEEE Transactions on Network Science and Engineering*, vol. 7, no. 3, 1545-1556, Sep. 2020.

[6] F. J. Yang, X. Tang, **N. Q. Wu**, C. J. Zhang, and L. Gao, Wafer residency time analysis for time-constrained single-robot-arm cluster tools with activity time variation, *IEEE Transactions on Control Systems Technology*, vol. 28, no. 4, 1177-1188, Jul. 2020.

[7] I. Saadaoui, Z. W. Li, and **N. Q. Wu**, Current-state opacity modeling and verification in partially observed Petri nets, *Automatica*, vol. 116, Article 108907, Jun. 2020.

[8] Y. Hou, **N. Q. Wu**, Z. W. Li, and Y. X. Zhang, T. Qu, and Q. H. Zhu, Many-objective optimization for scheduling of crude oil operations based on NSGA-III with consideration of energy efficiency, *Swarm and Evolutionary Computation*, vol. 57, Paper NO. 100714, Sep. 2020.

[9] Q. H. Zhu, Y. Qiao, **N. Q. Wu**, and Y. Hou, Post-processing time-aware optimal scheduling of single robotic cluster tools, *IEEE/CAA Journal of Automatica Sinica*, vol. 7, no. 2, 597-605, Feb. 2020.

[10] F. J. Yang, **N. Q. Wu**, Y. Qiao, M. C. Zhou, R. Su, and T. Qu, Modeling and optimal cyclic scheduling of time-constrained single-robot-arm cluster tools via Petri nets and linear programming, *IEEE Transactions on Systems, Man, and Cybernetics*: *Systems*, vol. 50, no. 3, 871-883, Mar. 2020.

[11] G. Y. Liu, L. C. Zhang, L. Chang, A. Al-Ahmari, and **N. Q. Wu**, Robust deadlock control for automated manufacturing systems based on elementary siphon theory, *Information Sciences*, vol. 510, 165-182, 2020.

2019

[1] Y. T. Li, L. Yin, Y. F. Chen, Z. H. Yu, and **N. Q. Wu**, Optimal Petri net supervisor synthesis for forbidden state problems using marking mask, *Information Sciences*, vol. 505, 183-197, Dec. 2019.

[2] Y. Qiao, S. W. Zhang, **N. Q. Wu**, X. Wang, Z. W. Li, M. C. Zhou, and T. Qu, Data-driven approach to optimal control of ACC systems and layout design in large rooms with thermal comfort consideration by using PSO, *Journal of Cleaner Production*, vol. 236, Article 117578, Nov. 2019.

[3] X. Y. Cong, A. R. Wang, Y. F. Chen, **N. Q. Wu**, T. Qu, M. Khalgui, and Z. W. Li, Most permissive liveness-enforcing Petri net supervisors for discrete event systems via linear monitors, *ISA Transactions*, vol. 92, 145-154, Sep. 2019.

[4] G. Y. Liu, P. Li, Z. W. Li, and **N. Q. Wu**, Robust deadlock control for automated manufacturing systems with unreliable resources based on Petri net reachability graphs, *IEEE Transactions on Systems, Man, & Cybernetics*: *Systems*, vol. 49, no. 7, 1371-1385, Jul. 2019.

[5] H. F. Chen, **N. Q. Wu**, Z. W. Li, and T. Qu, On a maximally permissive deadlock prevention policy for automated manufacturing systems by using resource-oriented Petri nets, *ISA Transactions*, vol. 80, 67-76, Jun. 2019.

[6] Y. Qiao, **N. Q. Wu**, F. J. Yang, M. C. Zhou, Q. H. Zhu, and T. Qu, Robust scheduling of time-constrained dual-arm cluster tools with wafer revisiting and activity time disturbance, *IEEE Transactions on Systems, Man, and Cybernetics*: *Systems*, vol. 49, no. 6, 1228-1240, Jun. 2019.

[7] C. F. Zhong, W. L. He, Z. W. Li, **N. Q. Wu**, and T. Qu, Deadlock analysis and control using Petri net decomposition techniques, *Information Sciences*, vol. 482, 440-452, May 2019.

[8] J. Wang, Y. F. Zhang, Y. Liu, and **N. Q. Wu**, Multiagent and bargaining-game-based real-time scheduling for Internet of Things-enabled flexible job shop, *IEEE Internet of Things Journal*, vol. 6, no. 2, 2518-2531, Apr. 2019.

[9] Q. H. Zhu, Y. Qiao, and **N. Q. Wu**, Optimal integrated schedule of entire process of dual-blade multi-cluster tools from start-up to close-down, *IEEE/CAA Journal of Automatica Sinica*, vol. 6, no. 2, 553-565, Mar. 2019.

[10] G. H. Zhu, Z. W. Li, **N. Q. Wu** and A. Al-Ahmari, Fault identification of discrete event systems modeled by Petri nets with unobservable transitions, *IEEE Transactions on Systems, Man, & Cybernetics*: *Systems*, vol. 49, no. 2, 333-345, Feb. 2019.

2018

[1] C. Gu, X. Wang, Z. W. Li, and **N. Q. Wu**, Supervisory control of state-tree structures with partial observation, *Information Sciences*, vol. 465, 523-544, Oct. 2018.

[2] Z. Y. Jiang, Z. W. Li, **N. Q. Wu**, and M. C. Zhou, A Petri net approach to fault diagnosis and restoration for power transmission systems to avoid the output interruption of substations, *IEEE Systems Journal*, Vol. 12, no. 3, 2566-2579, Sep. 2018.

[3] G. H. Zhu, Z. W. Li, and **N. Q. Wu**, Model-based fault identification of discrete event systems using partially observed Petri nets, *Automatica*, vol. 96, 201-212, Jul. 2018.

[4] F. J. Yang, **N. Q. Wu**, K. Z. Gao, C. J. Zhang, Y. T. Zhou, R. Su, and Y. Qiao, Efficient approach to cyclic scheduling of single-arm cluster tools with chamber cleaning operations and wafer residency time constraint, *IEEE Transactions on Semiconductor Manufacturing*, vol. 31, no. 2, 196-205, May 2018.

[5] C. R. Pan, M. C. Zhou, Y. Qiao, and **N. Q. Wu**, Scheduling cluster tools in semiconductor manufacturing: recent advances and challenges, *IEEE Transactions on Automation Science and Engineering*, vol. 15, no. 2, 586-601, Apr. 2018.

[6] Y. Qiao, **N. Q. Wu**, F. J. Yang, M. C. Zhou, and Q. H. Zhu, Wafer sojourn time fluctuation analysis of time-constrained dual-arm cluster tools with wafer revisiting and activity time variation, *IEEE Transactions on Systems, Man, and Cybernetics*: *Systems*, vol. 48, no. 4, 622-636, Apr. 2018.

[7] Q. H. Zhu, M. C. Zhou, Y. Qiao, and **N. Q. Wu**, Petri net modeling and scheduling of a close-down process for time-constrained single-arm cluster tools, *IEEE Transactions on Systems, Man, and Cybernetics*: *Systems*, vol. 48, no. 3, 389-400, Mar. 2018.

[8] F. J. Yang, **N. Q. Wu**, Y. Qiao, and M. C. Zhou, Optimal one-wafer cyclic scheduling of hybrid multirobot cluster tools with tree topology, *IEEE Transactions on Systems, Man, and Cybernetics*: *Systems*, vol. 48, no. 2, 289-298, Feb. 2018.

[9] H. M. Zhang, L. Feng, **N. Q. Wu**, and Z. W. Li, Integration of learning-based testing and supervisory control for requirements conformance of black-box reactive systems, *IEEE Transactions on Automation Science and Engineering*, vol. 15, no. 1, 2-15, Jan. 2018.

[10] X. Wang, Y. Qiao, **N. Q. Wu**, Z. W. Li, and T. Qu, On optimization of thermal sensation satisfaction rate and energy efficiency of public rooms: A case Study, *Journal of Cleaner Production*, vol. 176, 990-998, Jan. 2018.

[11] F. J. Yang, **N. Q. Wu**, Y. Qiao, and M. C. Zhou, Polynomial approach to optimal one-wafer cyclic scheduling of treelike hybrid multi-cluster tools via Petri nets, *IEEE/CAA Journal of Automatica Sinica*, vol. 5, no. 1, 270-280, Jan. 2018.

[12] S. H. Teng, **N. Q. Wu**, H. B. Zhu, L. Y. Teng, and W. Zhang, SVM–DT–Based adaptive and collaborative intrusion detection, *IEEE/CAA Journal of Automatica Sinica*, vol. 5, no. 1, 108-118, Jan. 2018.

Professional Certification and Awards

- 2021 Hsue-shen Tsien Paper Award for the paper "Polynomial Approach to Optimal One-wafer Cyclic Scheduling of Treelike Hybrid Multi-Cluster Tools via Petri Nets, *IEEE/CAA J. Autom. Sinica*, vol. 5, no. 1, pp. 270-280, Jan. 2018", Nov. 2021.
- Third Class Award of Natural Science, Macau, 2018.
- Third Class Award of Technological Invention, Macau, 2016.
- Highly cited researchers in Thomson Reuters' Highly Cited Researchers 2012.
- First Class Award of Natural Science of Guangdong Province, China, 2010.
- *Who's* Who in Science and Engineering (Marquis *Who's* Who), 7th Edition (2003-2004).
- *Who's* Who in Science and Engineering (Marquis *Who's* Who), 8th Edition (2005-2006).
- *Who's* Who in the World (Marquis *Who's* Who), 8th Edition (2007-2008).
- 2011 QSI Best Application Paper Award Finalist, for the paper "Modeling and Analysis of Dual-Arm Cluster Tools for Wafer Fabrication with Revisiting," by Y. Qiao, N. Wu, and M. C. Zhou, *2011 IEEE International Conference on Automation Science and Engineering*, Trieste, Italy, August 24 - 27, 2011.
- Best student paper award, for the paper "Real-time control policy for single-arm cluster tools with residency time constraints and activity time variation by using Petri net," By Y. Qiao, N. Q. Wu, and M. C. Zhou, 2012 *IEEE International Conference on Networking, Sensing and Control*, Beijing, China, April 11-13, 2012.
- 2016 Best Conference Paper Award Finalist, for the paper "Optimizing close-down processes of single-robot cluster tools via linear programming," by Y. Qiao, M. C. Zhou, N. Q. Wu, Q. H. Zhu, and Z. W. Li, *2016 IEEE International Conference on Automation Science and Engineering*, Fort Worth, TX USA, August 21-24, 2016.

Journal Editorship

- Associate Editor: Information Sciences, 2017-
- Associate Editor: IEEE/CAA Journal of Automatica Sinica, 2015-2018.

- Associate Editor: IEEE Transactions on Systems, Man, & Cybernetics, Part C, 2007-2012.
- Associate Editor: IEEE Transactions on Automation Science and Engineering, 2009-2012.
- Editor in Chief: Industrial Engineering Journal, 2009-2014.
- Associate Editor: IEEE Transactions on Systems, Man, & Cybernetics: Systems, 2013-2016.

Personal Website