

IEEE TRANSACTIONS ON AUTOMATION SCIENCE AND ENGINEERING

A PUBLICATION OF THE IEEE ROBOTICS AND AUTOMATION SOCIETY

JANUARY 2023

VOLUME 20

NUMBER 1

ITASC7

(ISSN 1545-5955)

SPECIAL ISSUE ON MACHINE LEARNING FOR RESILIENT INDUSTRIAL CYBER-PHYSICAL SYSTEMS

GUEST EDITORIAL

- Machine Learning for Resilient Industrial Cyber-Physical Systems *S. Hu, Y. Chen, Q. Zhu, and A. W. Colombo* 3

SPECIAL ISSUE PAPERS

| | | |
|---|--|-----|
| Robust Structure Identification of Industrial Cyber-Physical System From Sparse Data: A Network Science Perspective | <i>Y. Zhang, C. Yang, K. Huang, C. Zhou, and Y. Li</i> | 5 |
| Temperature-Constrained Reliability Optimization of Industrial Cyber-Physical Systems Using Machine Learning and Feedback Control | <i>J. Zhou, L. Li, A. Vajdi, X. Zhou, and Z. Wu</i> | 20 |
| Hybrid Statistical-Machine Learning for Real-Time Anomaly Detection in Industrial Cyber-Physical Systems | <i>W. Hao, T. Yang, and Q. Yang</i> | 32 |
| Graph Convolutional Network-Based Interpretable Machine Learning Scheme in Smart Grids | <i>Y. Luo, C. Lu, L. Zhu, and J. Song</i> | 47 |
| Learning-Based Edge Sensing and Control Co-Design for Industrial Cyber-Physical System | <i>Z. Ji, C. Chen, J. He, S. Zhu, and X. Guan</i> | 59 |
| Reliability-Driven Memristive Crossbar Design in Neuromorphic Computing Systems | <i>Q. Xu, J. Wang, B. Yuan, Q. Sun, S. Chen, B. Yu, Y. Kang, and F. Wu</i> | 74 |
| Custom Grasping: A Region-Based Robotic Grasping Detection Method in Industrial Cyber-Physical Systems | <i>Y. Laili, Z. Chen, L. Ren, X. Wang, and M. J. Deen</i> | 88 |
| Filtering Out High Noise Data for Distributed Deep Neural Networks ... | <i>Y. Cui, L. Li, Z. Tao, M. Chen, and T. Wei</i> | 101 |
| <hr/> | | |
| REGULAR PAPERS | | |
| Five-Axis Contour Error Control Based on Spatial Iterative Learning | <i>J. Li, Z. You, Y. Li, E. Miao, and R. Yue</i> | 112 |
| An Efficient Robot Precision Assembly Skill Learning Framework Based on Several Demonstrations | <i>Y. Ma, Y. Xie, W. Zhu, and S. Liu</i> | 124 |
| Continual Learning for Multimode Dynamic Process Monitoring With Applications to an Ultra-Supercritical Thermal Power Plant | <i>J. Zhang, D. Zhou, M. Chen, and X. Hong</i> | 137 |
| Physics-Constrained Deep Learning for Robust Inverse ECG Modeling | <i>J. Xie and B. Yao</i> | 151 |

(Contents Continued on Page I)



| | | |
|---|---|-----|
| No-Delay Multimodal Process Monitoring Using Kullback-Leibler Divergence-Based Statistics in Probabilistic Mixture Models | <i>Y. Cao, N. M. Jan, B. Huang, Y. Wang, Z. Pan, and W. Gui</i> | 167 |
| A Fixed-Wing UAV Formation Algorithm Based on Vector Field Guidance | <i>X. Wang, S. Baldi, X. Feng, C. Wu, H. Xie, and B. De Schutter</i> | 179 |
| Generation of Configuration Space Trajectories Over Semi-Constrained Cartesian Paths for Robotic Manipulators | <i>R. K. Malhan, S. Thakar, A. M. Kabir, P. Rajendran, P. M. Bhatt, and S. K. Gupta</i> | 193 |
| Design and Development of a New Piezoelectric-Actuated Biaxial Compliant Microgripper With Long Strokes | <i>Z. Lyu, Q. Xu, and L. Zhu</i> | 206 |
| A Novel Operation Optimization Method Based on Mechanism Analytics for the Quality of Molten Steel in the BOF Steelmaking Process | <i>D. Song, L. Tang, C. Liu, J. Wu, and X. Song</i> | 218 |
| An SEM-Based Nanomanipulation System for Multiphysical Characterization of Single InGaN/GaN Nanowires | <i>J. Qu, R. Wang, P. Pan, L. Du, Z. Mi, Y. Sun, and X. Liu</i> | 233 |
| Graph Wasserstein Autoencoder-Based Asymptotically Optimal Motion Planning With Kinematic Constraints for Robotic Manipulation | <i>C. Xia, Y. Zhang, S. A. Coleman, C.-Y. Weng, H. Liu, S. Liu, and I.-M. Chen</i> | 244 |
| A Stability and Safety Control Method in Robot-Assisted Decompressive Laminectomy Considering Respiration and Deformation of Spine | <i>M. Li, X. Qi, Y. Sun, B. Li, Y. Hu, and W. Tian</i> | 258 |
| An Angle-Based Bi-Objective Optimization Algorithm for Redundancy Allocation in Presence of Interval Uncertainty | <i>Y. Xu, D. Pi, S. Yang, Y. Chen, S. Qin, and E. Zio</i> | 271 |
| Multi-Task Learning With Latent Variation Decomposition for Multivariate Responses in a Manufacturing Network | <i>Y. Li, H. Yan, and R. Jin</i> | 285 |
| Artificial Learning for Part Identification in Robotic Disassembly Through Automatic Rule Generation in an Ontology | <i>G. Foo, S. Kara, and M. Pagnucco</i> | 296 |
| Fault Detection for Dynamic Processes Based on Recursive Innovational Component Statistical Analysis | <i>X. Ma, Y. Si, Y. Qin, and Y. Wang</i> | 310 |
| Hierarchical Decision-Making for Qualification Management in Wafer Fabs: A Simulation Study | <i>D. Kopp and L. Mönch</i> | 320 |
| Dynamic Hypergames for Synthesis of Deceptive Strategies With Temporal Logic Objectives | <i>L. Li, H. Ma, A. N. Kulkarni, and J. Fu</i> | 334 |
| Robust Optimization on Unrelated Parallel Machine Scheduling With Setup Times ... | <i>W. Wang, C. Gao, and L. Shi</i> | 346 |
| Improved Meta-Heuristics for Solving Distributed Lot-Streaming Permutation Flow Shop Scheduling Problems | <i>Y. Pan, K. Gao, Z. Li, and N. Wu</i> | 361 |
| SGL-PCA: Health Index Construction With Sensor Sparsity and Temporal Monotonicity for Mixed High-Dimensional Signals | <i>F. Wang, A. Wang, T. Tang, and J. Shi</i> | 372 |
| Precise Aspiration and Positioning Control Based on Dynamic Model <i>Inside</i> and <i>Outside</i> the Micropipette | <i>M. Sun, Y. Yao, X. Zhao, L. Li, H. Gong, J. Qiu, Y. Liu, and X. Zhao</i> | 385 |
| Optimization Strategies for Bayesian Source Localization Algorithms | <i>R. B. Anderson, C. Pehlivantürk, and M. Pryor</i> | 394 |
| Distributed Fixed-Time Optimal Resource Management for Microgrids | <i>L.-N. Liu and G.-H. Yang</i> | 404 |
| Integrated Task Sensing and Whole Body Control for Mobile Manipulation With Series Elastic Actuators | <i>X. Ren, Y. Liu, Y. Hu, and Z. Li</i> | 413 |
| Predicting the Force Map of an ERT-Based Tactile Sensor Using Simulation and Deep Networks | <i>H. Lee, H. Sun, H. Park, G. Serhat, B. Javot, G. Martius, and K. J. Kuchenbecker</i> | 425 |
| Cooperative Product Agents to Improve Manufacturing System Flexibility: A Model-Based Decision Framework | <i>I. Kovalenko, E. C. Balta, D. M. Tilbury, and K. Barton</i> | 440 |
| Adaptive Fixed-Time Position Precision Control for Magnetic Levitation Systems | <i>J. Wang, J. Rong, and J. Yang</i> | 458 |
| Fast Global Collision Detection Method Based on Feature-Point-Set for Robotic Machining of Large Complex Components | <i>Q. Fan, B. Tao, Z. Gong, X. Zhao, and H. Ding</i> | 470 |
| A Deep-Learning-Based Surrogate Model for Thermal Signature Prediction in Laser Metal Deposition | <i>S. Guo, W. Guo, L. Bian, and Y. B. Guo</i> | 482 |
| Anisotropic Generalized Bayesian Coherent Point Drift for Point Set Registration | <i>A. Zhang, Z. Min, Z. Zhang, X. Yang, and M. Q.-H. Meng</i> | 495 |
| A Learning Based Hierarchical Control Framework for Human–Robot Collaboration | <i>Z. Jin, A. Liu, W.-A. Zhang, L. Yu, and C.-Y. Su</i> | 506 |
| Image-Based Visual Impedance Force Control for Contact Aerial Manipulation | <i>M. Xu, A. Hu, and H. Wang</i> | 518 |
| Observer-Based Event-Triggered Composite Anti-Disturbance Control for Multi-Agent Systems Under Multiple Disturbances and Stochastic FDIs | <i>X.-G. Guo, D.-Y. Zhang, J.-L. Wang, J. H. Park, and L. Guo</i> | 528 |

| | | |
|--|---|-----|
| A Dynamic Scheduling Framework for Byproduct Gas System Combining Expert Knowledge and Production Plan | T. Wang, J. Zhao, Q. Xu, W. Pedrycz, and W. Wang | 541 |
| Physician Scheduling for Emergency Departments Under Time-Varying Demand and Patient Return | Z. Wang, R. Liu, and Z. Sun | 553 |
| Combined Dual-Prediction Based Data Fusion and Enhanced Leak Detection and Isolation Method for WSN Pipeline Monitoring System | L. Yang and Q. Zhao | 571 |
| Robust Tensor Decomposition Based Background/Foreground Separation in Noisy Videos and Its Applications in Additive Manufacturing | B. Shen, R. R. Kamath, H. Choo, and Z. Kong | 583 |
| Event Circuit Structures for Deadlock Avoidance in Flexible Manufacturing Systems | X. Fan, H. Hu, B. Yang, Y. Liu, and G. He | 597 |
| Design of Optimal Supervisors for the Enforcement of Nonlinear Constraints on Petri Nets | Y. Chen, L. Pan, and Z. Li | 611 |
| A Cross-Layer Design Approach to Strategic Cyber Defense and Robust Switching Control of Cyber-Physical Wind Energy Systems | J. Chen and Q. Zhu | 624 |
| Spatiotemporal Co-Attention Hybrid Neural Network for Pedestrian Localization Based on 6D IMU | Y. Wang, H. Cheng, and M. Q.-H. Meng | 636 |
| Design and Autonomous Navigation of a New Indoor Disinfection Robot Based on Disinfection Modeling | I. Chio, K. Ruan, Z. Wu, K. I. Wong, L. M. Tam, and Q. Xu | 649 |
| Revisiting State Estimation and Weak Detectability of Discrete-Event Systems | X. Han, J. Wang, Z. Li, X. Chen, and Z. Chen | 662 |
| An Interactive Two-Stage Framework for Simultaneous Machine Selection and Buffer Allocation | K.-H. Chang and C.-C. Huang | 675 |
| A Lagrangian Algorithm for Multiple Depot Traveling Salesman Problem With Revisit Period Constraints | D. Scott, S. G. Manyam, D. W. Casbeer, and M. Kumar | 690 |
| Equitable Allocation of Operations and Makespan Minimization for Autonomous Agents | R. Sengupta, R. Nagi, and R. S. Sreenivas | 703 |
| Kinodynamic Generation of Wafer Scanners Trajectories Used in Semiconductor Manufacturing | Y. M. Al-Rawashdeh, M. A. Janaideh, and M. F. Heertjes | 718 |
| <hr/> | | |
| ANNOUNCEMENTS | | |
| Call for Papers: IEEE TRANSACTIONS ON AUTOMATION SCIENCE AND ENGINEERING 19th IEEE International Conference on Automation Science and Engineering (CASE) | | 733 |
