

Guest Editorial

Special Section for Third International Conference on Sensing, Measurement, and Data Analytics in the Era of Artificial Intelligence (ICSMD 2022)

THE Third International Conference on Sensing, Measurement, and Data Analytics in the Era of Artificial Intelligence (ICSMD 2022) aimed at providing a dedicated forum for researchers, scientists, engineers, and practitioners throughout the world to present their latest research findings in the area of sensing technology, measurement methodology, and data analytics approaches in the fast-changing era of artificial intelligence. ICSMD 2022 was jointly organized by the Harbin Institute of Technology, the China Instrument and Control Society, the Heilongjiang Instrument and Control Society, the Chinese Institute of Electronics, and the IEEE Instrumentation and Measurement Society Harbin Chapter on December 22–24, 2022, in an online and offline manner. Over 500 attendees from academia and industry joined ICSMD 2022. Three keynote speeches were respectively given by Prof. Shervin Shirohamadi at the University of Ottawa, Prof. Mingjian Zuo at Alberta University, and Dr. Fushun Nian at Ceyear Company Ltd. Over 100 oral presentations and over 70 poster presentations appeared in ICSMD 2022. Researchers, scientists, engineers, and practitioners joined several different sessions and had deep discussions.

ICSMD 2022 received more than 200 conference papers, 170 of which were finally accepted by peer-review recommendations and the conference program committee. All authors of accepted conference papers were warmly encouraged to submit their significant extensions to IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT (IEEE TIM) to promote their new results and ideas, and maximally expose their ICSMD 2022 conference papers and presentations; 31 extended journal articles from ICSMD 2022 conference papers were received via the IEEE TIM submission system. Subsequently, these extended journal papers were randomly assigned to IEEE TIM associate editors and went through peer-review processes. Finally, 11 extended journal papers received positive comments and accepted recommendations from IEEE TIM associate editors and anonymous reviewers.

The contents of these accepted 11 journal articles are simply summarized as follows. In [A1], based on an adaptive optimal search angle band, an adaptive fast chirplet transform was proposed to reduce the calculation cost of

chirplet transform and its extensions, and then provide precise rotation frequency estimation for the use of tachless order tracking for bearing fault diagnosis under variable speeds. In [A2], a material-enabled filter using phononic crystals as functional units for eliminating unapplicable inherent nonlinearity components was proposed to provide a methodology for potential applications of a phononic crystals-based nonlinear non-destructive testing and evaluation technology. In [A3], a nonlinear total variation denoising (TVD) algorithm with an adjustable majorization-minimization (MM) upper bound function for optimization of a TVD solution process was proposed to improve the amplitude accuracy of micronewton thrust signal processing in the domain of astronautics. In [A4], a wavelet capsule network (WavCapsNet) was proposed to achieve intelligent compound fault diagnosis and improve the transparency and interpretability of deep learning-based networks and prediction results. In [A5], studies of cracks in gear transmission systems on vibration responses were reported to help engineers and scholars to understand the relationship between cracks, system fault status, and condition indicators. In [A6], a knowledge distillation-based multiple source-free domain adaptation framework was proposed to make progress toward data privacy protection for intelligent fault diagnosis and derive fault knowledge related to different fault categories from multiple source domains. In [A7], a generation method of quasi-monochromatic X-ray was developed to satisfy the requirements of detector calibration and numerical calculation of radiation-induced conductivity. In [A8], a sinc-based multiplication-convolution network (SincMCN) was proposed to contribute a small samples-based machine fault diagnosis. In [A9], a contrastive learning model called dual contrastive learning was proposed to relieve a problem about low label rate in practical diagnostic engineering. In [A10], an accelerated algorithm based on generalized minimax-concave (GMC) sparse regularization was proposed to improve the identification accuracy of vibration parameters from undersampled blade tip timing. In [A11], source-free unsupervised domain adaptation was studied for privacy-preserve machinery fault diagnosis.

We would like to sincerely thank all conference attendants and authors for their ICSMD 2022 conference papers and special section papers. Special thanks are given to all IEEE TIM associate editors who handled randomly assigned

special section papers and to all reviewers who provided constructive and valuable comments on special section papers. Final special thanks go to the Editor-in-Chief of IEEE TIM, Prof. Ruqiang Yan, and Reta Wehmeier for their strong support and kind help and assistance in the whole publication process of Special Section articles.

DONG WANG, *Guest Editor*

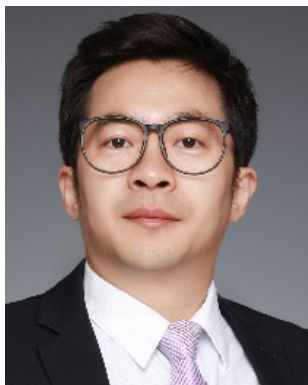
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APPENDIX: RELATED ARTICLES

- [A1] Y. Qin, R. Yang, H. Shi, B. He, and Y. Mao, "Adaptive fast chirplet transform and its application into rolling bearing fault diagnosis under time-varying speed condition," *IEEE Trans. Instrum. Meas.*, vol. 72, pp. 1–12, 2023.
- [A2] W. Li, H. Cao, L. Zhang, and X. Chen, "Nonlinear ultrasonic detection enhanced by 3-D printed phononic crystals," *IEEE Trans. Instrum. Meas.*, vol. 72, pp. 1–8, 2023.
- [A3] Z. Liu et al., "High-accurate robust total variation denoising algorithm with adjustable exponential upper bound function for micro-thrust measurement," *IEEE Trans. Instrum. Meas.*, vol. 72, pp. 1–18, 2023.
- [A4] W. Li, H. Lan, J. Chen, K. Feng, and R. Huang, "WavCapsNet: An interpretable intelligent compound fault diagnosis method by backward tracking," *IEEE Trans. Instrum. Meas.*, vol. 72, pp. 1–11, 2023.
- [A5] X. Liu, Z. Fan, Z. Cao, Y. Liu, Z. Kang, and Y. Hu, "Fault signal simulation and service condition monitoring of cracked gear system," *IEEE Trans. Instrum. Meas.*, vol. 72, pp. 1–14, 2023.
- [A6] K. Yue, J. Li, Z. Chen, R. Huang, and W. Li, "Multiple source-free domain adaptation network based on knowledge distillation for machinery fault diagnosis," *IEEE Trans. Instrum. Meas.*, vol. 72, pp. 1–11, 2023.
- [A7] H. Zhong et al., "Radiation-induced conductivity of polyimide under monochromatic X-ray irradiation: Calculation, numerical simulation, and measurement," *IEEE Trans. Instrum. Meas.*, vol. 72, pp. 1–9, 2023.
- [A8] R. Liu, X. Ding, S. Liu, Q. Wu, and Y. Shao, "Sinc-based multiplication-convolution network for small-sample fault diagnosis and edge application," *IEEE Trans. Instrum. Meas.*, to be published.
- [A9] L. Lu, J. Wang, W. Huang, C. Shen, J. Shi, and Z. Zhu, "Dual contrastive learning for semi-supervised fault diagnosis under extremely low label rate," *IEEE Trans. Instrum. Meas.*, vol. 72, pp. 1–12, 2023.
- [A10] Y. Zhu, B. Qiao, Y. Wang, B. Pan, L. Chen, and X. Chen, "A GMC-based accelerated algorithm for identifying the frequency and amplitude of multimode BTT signals," *IEEE Trans. Instrum. Meas.*, vol. 72, pp. 1–11, 2023.
- [A11] M. Zhu, X. Zeng, J. Liu, C. Yang, and K. Zhou, "Source-free cluster adaptation for privacy-preserving machinery fault diagnosis," *IEEE Trans. Instrum. Meas.*, vol. 72, pp. 1–10, 2023.



Dong Wang received the Ph.D. degree from the City University of Hong Kong, Hong Kong, in 2015.

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Dr. Wang is an Editorial Board Member of *Mechanical Systems and Signal Processing*. He is an Associate Editor of IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, IEEE SENSORS JOURNAL, *Measurement*, and *Journal of Dynamics, Monitoring and Diagnostics*.



Yuchen Song received the Ph.D. degree from the Harbin Institute of Technology, China, Harbin, China, in 2021.

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Dr. Song serves as a reviewer for more than 20 journals including IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS, etc.