IEEE Trans. Fuzzy Systems Special Issue on Fuzzy Intelligence for Flexible Electronics and Systems

1. Aim and Scope

With the rapid progress in material technology, flexible electronics and systems are rapidly developing towards thinner, more flexible, high-performance, and high-efficiency systems, featuring intelligent sensing and complex control. These systems possess a number of properties which make them suitable for various applications involving humans and animals. In doing so, researchers may employ fuzzy intelligence (combining fuzzy logic and artificial intelligence) to address real-world problems with high levels of uncertainty and ambiguity, such as human behavioral intention recognition, complex condition handling, sensory feedback generation and high-density sensor data processing. The integration of fuzzy intelligence with flexible electronics and systems provides multiple advantages in this emerging field, including adaptability, rule-based control, and human-like decision-making. This has sparked a growing interest in studying such systems, encompassing advanced sensor and stimulation technology, intelligent control, large-scale computing intelligence, and more. Fuzzy intelligence aims to enhance the functionality and accuracy, providing them with adaptive and human-like decision-making capabilities, and facilitating their application in healthcare, robotics, industrial, and other fields.

The goal of this special issue is to promote the integration of fuzzy systems and artificial intelligence within the theoretical framework of fuzzy intelligence for applications in flexible electronics and systems. It explores the full potential of such techniques and systems, offers new opportunities in various research fields, and presents cutting-edge research and practical applications. The research includes topics such as fuzzy-based multi-sensing data fusion algorithms, fuzzy intelligent environment cognition, and fuzzy neural network optimal control technologies. Furthermore, the special issue covers the combination of new technologies, efficient scientific and engineering solutions, visionary future research, and the development of fuzzy intelligence for flexible electronics and systems.

The rapid development of fuzzy technology, and flexible electronics and systems has led to the belief that fuzzy intelligent systems can assist humans in overcoming challenges such as robot environment perception and cyber-physical system control. Nonetheless, numerous challenges persist. This special issue serves as an essential and timely update on the topic and should be of interest to a wide range of readers.

2. Topics Covered

The lists of possible topics include, but are not limited to:

● Theoretical methods

➢ Fuzzy control theory through extensions of ordinary fuzzy sets
➢ Human-robot interface with fuzzy intelligence
➢ Fuzzy intelligent sensing, fusion, and features extraction on flexible electronics and systems
➢ Sensory feedback with fuzzy intelligence
➢ Fuzzy mechanisms for learning approaches
➢ Data-driven approaches for flexible electronics and systems
➢ Computational methods via fuzzy logic
➢ High-density sensing and feedback using fuzzy intelligence
➢ Cyber-physical system fuzzy intelligent control

● Application areas

➢ Cyber-physical systems
➢ Skin-like soft electronics
➢ Rehabilitation robotics, prosthesis, and exoskeleton robotics
➢ Medical and surgical robots, biomimetic robots
➢ Energy-efficient optimization in flexible electronic systems
➢ Robot perception and environmental adaptability
➢ Human-in-the-loop control
➢ Human-robot interaction and collaboration
➢ Robot skin and haptic feedback
➢ Sensory feedback
➢ Autonomous robots decision making
➢ Sensor fusion of flexible electronic systems
➢ Bio-inspired control

3. Submission Guidelines

All authors should read 'Information for Authors' before submitting a manuscript at https://cis.ieee.org/publications/t-fuzzy-systems/tfs-manuscript-submission.

Submissions should be through the IEEE TFS journal website http://mc.manuscriptcentral.com/tfs-ieee.

Submissions should also be in the **correct format** https://journals.ieeeauthorcenter.ieee.org/create-your-ieee-journal-article/authoring-tools-and-templates/tools-for-ieee-authors/ieee-article-templates/.

It is essential that your manuscript is identified as a Special Issue contribution:
- Ensure you choose 'Special Issue' when submitting.
- A cover letter must be included which includes the title 'Special Issue on Fuzzy Intelligence for Flexible Electronics and Systems'

4. Important Dates

- Dec. 31, 2024: Submission deadline
- Feb. 28, 2025: Notification of first round of reviews
- Apr. 30, 2025: Revised submissions due (for guidance only)
- Jun. 30, 2025: Final notice of acceptance/rejection

5. Guest Editors

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Prof. **Haisheng Xia** (Member, IEEE) received his B.E. in Mechatronics Engineering from Northwest A&F University in 2014 and Ph.D. degree in Mechanical Engineering from Shanghai Jiao Tong University in 2020. From Mar. 2019 to Jun. 2019, he was a visiting scholar at the University of British Columbia, and from Aug. 2019 to Mar. 2020, he was a visiting scholar at Seoul National University. From Jul. 2020 to Apr. 2022, he was a postdoc research fellow in the Department of Automation, University of Science and Technology of China. He is currently an associate professor at University of Science and Technology of China. He is the co-chair of IEEE-SMC Technical Committee on Flexible Electronic Systems, and a member of the IEEE-RAS Technical Committee on Neuro-Robotics Systems. He has served as a guest editor of IEEE TCDS, IEEE SMC Magazine, and Robotica. He served as an associate editor of the IEEE International Conference on Advanced Robotics and Mechatronics (ICARM 2021/2022/2023). He has authored more than 30 papers in international journals and conferences, 8 invention patents, and directed 7 national/provincial research projects. He was a recipient of the Best Conference Paper Award at IEEE International Conference on Development and Learning (2023), the Silver Medal at the International Exhibition of Inventions Geneva (2023), and the OARSI Collaborative Scholarship Award (2018). His research interests mainly include wearable robotics and wearable systems.

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Prof. **Jonathan M. Garibaldi** (Fellow, IEEE) received the B.Sc (Hons) degree in

Physics from Bristol University, UK in 1984, and the M.Sc. degree in Intelligent Systems and the Ph.D. degree in Uncertainty Handling in Immediate Neonatal Assessment from the University of Plymouth, UK in 1990 and 1997, respectively. He is Head of the School of Computer Science at the University of Nottingham, UK, and leads the Intelligent Modelling and Analysis (IMA) Research Group. The IMA research group undertakes research into intelligent modeling, utilizing data analysis and transformation techniques to enable a deeper and clearer understanding of complex problems. His main research interests are modeling uncertainty and variation in human reasoning, and in modeling and interpreting complex data to enable better decision-making, particularly in medical domains. He has made many theoretical and practical contributions in fuzzy sets and systems, and in a wide range of generic machine learning techniques in real-world applications. Prof. Garibaldi has published over 300 papers on fuzzy systems and intelligent data analysis, and was the Editor-in-Chief of IEEE Transactions on Fuzzy Systems (2017-2022).

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Prof. **Guanglin Li** (Senior Member, IEEE) received the Ph.D. degree in biomedical engineering from Zhejiang University, China, in 1997. From 1999 to 2002, he was a Post-Doctoral Research Associate with the Department of Bioengineering at the University of Illinois at Chicago. From 2002 to 2006, he was a Senior Engineer with the BioTechPlex Corporation, where he was involved in the research and development of the biomedical and biological products. From 2006 to 2009, he served as a Senior Research Scientist in the Neural Engineering Center for Artificial Limbs at the Rehabilitation Institute of Chicago, and jointly served as an Assistant Professor of Physical Medicine and Rehabilitation, at the Northwestern University. Since 2009, he has been with the Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences (CAS), and is currently the Professor and Director of the Research Center for Neural Engineering. And he also has served as the Director of the CAS Key Laboratory of Human-Machine Intelligence-Synergy Systems since 2014. He has authored over 230 peer-reviewed papers and filed over 110 patents in the field of the biomedical engineering and rehabilitation engineering. His current research interests include flexible sensing technologies, neuro-rehabilitation engineering, human-machine interaction, rehabilitation robotics, and neural functional reconstructions.

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Prof. **Zhijun Li** (Fellow, IEEE) is currently a Professor of Tongji University. He received the Ph.D. degree in mechatronics from Shanghai Jiao Tong University, Shanghai, China, in 2002. From 2003 to 2006, he was a Postdoctoral Fellow at the University of Electro-Communications, Tokyo, Japan, and the National University of Singapore, Singapore. He has published over 400 papers, where the prestigious contributions were wearable robotics and bio-mechatronics systems. He has received the Distinguished Lecturer (RAS), the Web of Science Highly Cited Researcher (2019-2022), the 2018 National Ten-thousand Talents Program in China, and the 2016 National Distinguished Young Scholar (NSFC). He is an IEEE Fellow and AAIA Fellow. He is a Member of the Board of Governors, IEEE Systems, Man and Cybernetics Society (2023-2025). Since 2016, he has been the Co-Chairs of IEEE SMC Technical Committee on Bio-mechatronics and Bio-robotics Systems (B^2S), and IEEE-RAS Technical Committee on Neuro-Robotics Systems. He has served as Senior Editors of IEEE Transactions on Automation Science and Engineering and Journal of Intelligent & Robotic Systems, and Associate Editors of several IEEE Transactions including TRO, TFS, TNNLS, TASE, TMech, TCyber, TCDS, TSMCS, etc.