ISOEN 2026

Chongqing, China

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International Symposium on Olfaction and Electronic Nose

SPECIAL SESSION 03

Lightweight Deep Learning for Resource-Efficient Electronic Nose Signal Processing

The rapid advancement of artificial intelligence, particularly deep learning, has opened new frontiers in electronic nose (e-nose) technology. This special session focuses on fundamental advances in lightweight deep learning (DL) architectures and training strategies specifically designed to address the unique challenges of e-nose signal processing, such as high-dimensional sensor array data, spatio-temporal signal dependencies, and resource efficiency constraints. We emphasize innovations in model efficiency-accuracy co-design, including dynamic neural networks that adapt computational complexity to gas concentration dynamics, sparse transformer architectures for modeling long-sequence sensor responses, and sensor-adaptive knowledge distillation frameworks. Particular attention will be given to sensor-aware compression techniques—such as differential pruning of redundant sensors and quantization with robustness to drift—as well as label-efficient paradigms like self-supervised pre-training for cross-device generalization.

Topics of interest include, but are not limited to: neural architecture search (NAS) for automated design of sensor-adaptive micro-deep neural networks; model compression methods (pruning, quantization, knowledge distillation) tailored to multi-sensor systems; self-supervised learning for low-label drift compensation; temporal sparsity modeling in transient gas signals using sparse transformers; and interpretable lightweight models for explainable gas classification. The session aims to bridge the gap between theoretical AI methodologies and practical e-nose system development, establishing lightweight DL as a foundational component for scalable, adaptive, and energy-efficient olfactory sensing technologies and catalyzing theoretical and algorithmic breakthroughs in efficient DL for next-generation olfactory sensing systems. Researchers and practitioners from academia and industry are invited to submit original contributions, including novel algorithms, benchmarking studies, and reproducible frameworks.

Special Session Organizers

Jia Yan

Southwest University, China

Yinsheng Chen

Harbin University of Science and Technology, China

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*The accepted papers after proper registration and presentation will be included in the conference proceedings, which will be published in **IEEE Xplore**.

* Paper Submission Closes: **19 January 2026**

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