

Editorial: Special Issue on the ICASSP 2023 Signal Processing Grand Challenges

The 2023 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2023) took place in Rhodes, Greece, running from June 4th to June 10th, with a record number of paper submissions and attendees. Since 2021, ICASSP has featured the “Signal Processing Grand Challenges” (SPGC) program, which has become an annual highlight at the conference. ICASSP 2023 featured a record number of 15 SPGCs, carefully selected from a large number of submissions, and covering a wide variety of application domains, including audio, acoustics, speech, biomedical signals, communications, and image processing. A list of accepted SPGCs can be found at <https://2023.ieeeicassp.org/signal-processing-grand-challenges/>, which also includes links to detailed information for each challenge.

During the ICASSP conference, each SPGC was allocated a dedicated oral session, wherein the top 5 teams were invited to present their methods or strategies, accompanied by a concise 2-page paper for inclusion in the ICASSP proceedings. In an effort to extend the reach of each Grand Challenge’s outcomes and incentivize top teams to delve deeper into their winning approaches, a novel collaborative framework was introduced for the 2023 edition, partnering with the IEEE OPEN JOURNAL OF SIGNAL PROCESSING (OJSP). The organizers of each SPGC were encouraged to submit an overview paper detailing the challenge’s rationale, context, datasets, evaluation metrics, ranking tables, summary of results, strategic trends, and future prospects. Moreover, the top 5 submissions from each challenge were encouraged to provide a detailed technical paper highlighting any innovative contributions within their winning strategy, considered significant for sharing within the community.

This special issue collects all papers that were submitted in the context of the ICASSP 2023 Signal Processing Grand Challenges. It covers 10 SPGC overview papers from challenge organizers, and 5 technical papers from participants in one of the 15 SPGCs featured at ICASSP 2023.

We would like to express our sincere gratitude to all ICASSP 2023 challenge organizers and participants, as well as to all authors who contributed to this special issue. We also thank the Challenges and Data Collections Committee of the IEEE Signal Processing Society for their help in coordinating and promoting the grand challenge program. Special thanks are also due to Dr. Brendt Wohlberg, Editor-in-Chief of OJSP, for his instrumental role in facilitating this new collaboration between the ICASSP SPGC program and OJSP. We are

convinced that this collaboration will significantly increase the reach and influence of the Signal Processing Grand Challenge program.

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APPENDIX RELATED ARTICLES

- [A1] R. F. Gramaccioni, C. Marinoni, C. Chen, A. Uncini, and D. Comminiello, “L3DAS23: Learning 3D audio sources for audio-visual extended reality,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 632–640, 2024.
- [A2] A. Zlatintsi et al., “Person identification and relapse detection from continuous recordings of biosignals challenge: Overview and results,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 641–651, 2024.
- [A3] M. J. Monesi, L. Bollens, B. Accou, J. Vanthornhout, H. van Hamme, and T. Francart, “Auditory EEG decoding challenge for ICASSP 2023,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 652–661, 2024.
- [A4] R. Cutler, A. Saabas, B. Naderi, N.-C. Ristea, S. Braun, and S. Branets, “ICASSP 2023 speech signal improvement challenge,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 662–674, 2024.
- [A5] R. Cutler et al., “ICASSP 2023 acoustic echo cancellation challenge,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 675–685, 2024.
- [A6] L. Yang, B. van Dyck, and M. M. van Hulle, “Sea-Wave: Speech envelope reconstruction from auditory EEG with an adapted WaveNet,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 686–699, 2024.

- [A7] M. D. Thornton, D. P. Mandic, and T. J. Reichenbach, “Decoding envelope and frequency-following EEG responses to continuous speech using deep neural networks,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 700–716, 2024.
- [A8] M. Bhagubai, L. Swinnen, E. Cleeren, W. van Paesschen, M. de Vos, and C. Chatzichristos, “Towards automated seizure detection with wearable EEG – grand challenge,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 717–724, 2024.
- [A9] H. Dubey et al., “ICASSP 2023 deep noise suppression challenge,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 725–737, 2024.
- [A10] S. Luz, F. Haider, D. Fromm, I. Lazarou, I. Kompatsiaris, and B. Macwhinney, “An overview of the ADReSS-M signal processing grand challenge on multilingual alzheimer’s dementia recognition through spontaneous speech,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 738–749, 2024.
- [A11] H. Sallouha, S. Sarkar, E. Krijestorac, and D. Cabric, “REM-U-Net: Deep learning based agile REM prediction with energy-efficient cell-free use case,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 750–765, 2024.
- [A12] A. Coluccia, A. Fascista, L. Sommer, A. Schumann, A. Dimou, and D. Zarpalas, “The drone-vs-bird detection grand challenge at ICASSP 2023: A review of methods and results,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 766–779, 2024.
- [A13] J. Richter et al., “Causal diffusion models for generalized speech enhancement,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 780–789, 2024.
- [A14] A. Singh et al., “Lightweight, multi-speaker, multilingual indic text-to-speech,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 790–798, 2024.
- [A15] M. Borsdorf, S. Cai, S. Pahuja, D. de Silva, H. Li, and T. Schultz, “Attention and sequence modeling for match-mismatch classification of speech stimulus and EEG response,” *IEEE Open J. Signal, Process.*, vol. 5, pp. 799–809, 2024.