

Tomohiko Nakamura

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Research Interests

Signal-processing-inspired deep learning, audio and music signal processing, and machine learning

Job

Senior Researcher <i>The National Institute of Advanced Industrial Science and Technology (AIST), Japan.</i>	Apr. 2023–Present
Project Research Associate <i>Graduate School of Information Science and Technology, The University of Tokyo, Japan.</i>	Sept. 2019–Mar. 2023
Researcher <i>Intelligent Systems Laboratory, SECOM, Japan.</i>	Apr. 2016–Aug. 2019
Research Fellow (DC2) <i>Japan Society for the Promotion of Science (JSPS), Japan.</i>	Apr. 2015–Mar. 2016

Education

Ph.D. degree in Information Science and Technology <i>Graduate School of Information Science and Technology, The University of Tokyo, Japan.</i>	Mar. 2016
Master's degree in Information Science and Technology <i>Graduate School of Information Science and Technology, The University of Tokyo, Japan.</i>	Mar. 2013
Bachelor's degree in Engineering <i>Faculty of Engineering, The University of Tokyo, Japan.</i>	Mar. 2011

Teaching

Applied Gaussian Process and Machine Learning <i>Graduate School of Information Science and Technology, The University of Tokyo, Japan.</i>	6, Dec. 2021
Advanced Signal Processing <i>Graduate School of Information Science and Technology, The University of Tokyo, Japan.</i>	23, June 2020 and 21, June 2022
Student Experiment <i>Department of Mathematical engineering and information physics, The University of Tokyo, Japan.</i>	Apr. 2020–Mar. 2023

Languages

Japanese (native), English (basic)

Competitive Funds

Development of deep-layered analysis-by-synthesis techniques for acoustic scene analysis with human intervention <i>JSPS KAKENHI</i>	Apr. 2023–Mar. 2027
Sampling-frequency-independent deep learning for audio media processing <i>JST ACT-X (Frontier of Mathematics and Information Science)</i>	Oct. 2021–Mar. 2024
Research on acoustic scene analysis by integrating time-domain deep learning and multiresolution analysis <i>JSPS KAKENHI</i>	Apr. 2020–Mar. 2023

+ 3 funds received as representative, 4 funds received as co-researcher, and 3 travel grants.

Publications

Journal Papers

- [1] Kanami Imamura, Tomohiko Nakamura, Kohei Yatabe, and Hiroshi Saruwatari, "Neural analog filter for sampling-frequency-independent convolutional layer," *APSIPA Transactions on Signal and Information Processing*, Dec. 2024.
- [2] Takaaki Saeki, Shinnosuke Takamichi, Tomohiko Nakamura, Naoko Tanji, and Hiroshi Saruwatari, "SelfRemaster: Self-supervised speech restoration for historical audio resources," *IEEE Access*, vol. 11, pp. 144831–144843, Jan. 2024.
- [3] Takuya Hasumi, Tomohiko Nakamura, Norihiro Takamune, Hiroshi Saruwatari, Daichi Kitamura, Yu Takahashi, and Kazunobu Kondo, "PoP-IDLMA: Product-of-prior independent deeply learned matrix analysis for multichannel music source separation," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 31, pp. 2680–2694, Jul. 2023.
- [4] Koichi Saito, Tomohiko Nakamura, Kohei Yatabe, and Hiroshi Saruwatari, "Sampling-frequency-independent convolutional layer and its application to audio source separation," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 30, pp. 2928–2943, Sep. 2022.
- [5] +5 papers

Peer-Reviewed International Conferences

- [1] Hiroaki Hyodo, Shinnosuke Takamichi, Tomohiko Nakamura, Junya Koguchi, and Hiroshi Saruwatari, "DNN-based ensemble singing voice synthesis with interactions between singers," in *Proceedings of IEEE Spoken Language Technology Workshop*, Dec. 2024.
- [2] Hitoshi Suda, Shunsuke Yoshida, Tomohiko Nakamura, Fukayama Satoru, and Jun Ogata, "FruitsMusic: A real-world corpus of Japanese idol-group songs," in *Proceedings of International Society for Music Information Retrieval Conference*, Nov. 2024.
- [3] Yuto Ishikawa, Tomohiko Nakamura, Norihiro Takamune, and Hiroshi Saruwatari, "Real-time framework for speech extraction based on independent low-rank matrix analysis with spatial regularization and rank-constrained spatial covariance matrix estimation," in *Workshop on Spoken Dialogue Systems for Cybernetic Avatars (SDS4CA)*, Sep. 2024.
- [4] Kwanghee Choi, Ankita Pasad, Tomohiko Nakamura, Satoru Fukayama, Karen Livescu, and Shinji Watanabe, "Self-supervised speech representations are more phonetic than semantic," in *Proceedings of INTERSPEECH*, Sep. 2024, pp. 4578–4582.
- [5] +30 papers

Invited Talks

- [1] Daichi Kitamura, Tomohiko Nakamura, "Fundamentals and Applications of Audio Source Separation — A Guide to Becoming an Expert," *2023 Otagaku Symposium*, Jun. 2023. (in Japanese)
- [2] Tomohiko Nakamura, "Signal-processing-inspired deep learning," *IEEE NZ Signal Processing/Information Theory Joint Chapter in co-hosted by the Acoustics Research Centre, University of Auckland*, Dec. 2022.
- [3] Tomohiko Nakamura, "Audio source separation combining wavelet transform and deep neural network," *Meeting on Technical Committee on Engineering Acoustics, IEICE*, Nov. 2022. (in Japanese)

Overview Papers

- [1] Shoichi Koyama, Juliano Ribeiro, Tomohiko Nakamura, Natsuki Ueno, and Mirco Pezzoli, "Physics-informed machine learning for sound field estimation," *Special Issue on Model-Based and Data-Driven Audio Signal Processing, IEEE Signal Processing Magazine*, 2024.
- [2] Hirokazu Kameoka, Tomohiko Nakamura, and Norihiro Takamune, "Recent Advances in Music Signal Processing Techniques," *The Journal of Institute of Electronics, Information and Communication Engineers*, vol. 98, no. 6, pp. 467–474, Jun. 2015. (in Japanese)

Patents

- [1] Tomohiko Nakamura, "Object recognition device, method, and program," Japan Patent JP7349288, 13-Sep-2023.
- [2] Tomohiko Nakamura, "Object recognition device, method, and program," Japan Patent JP7349290, 13-Sep-2023.
- [3] +8 patents

Awards

- 1. The Awaya Kiyoshi Research Award, ASJ, Mar. 2024.
- 2. The Itakura Prize Innovative Young Researcher Award, ASJ, Mar. 2022.
- 3. Dean's Award of Graduate School of Information Science and Technology, The University of Tokyo, Mar. 2016.
- 4. +11 awards