

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] 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.
- [2] 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.
- [3] Tomohiko Nakamura, Shihori Kozuka, and Hiroshi Saruwatari, "Time-domain audio source separation with neural networks based on multiresolution analysis," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 29, pp. 1687–1701, Apr. 2021.
- [4] Tomohiko Nakamura and Hirokazu Kameoka, "Harmonic-temporal factor decomposition for unsupervised monaural separation of harmonic sounds," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 29, pp. 68–82, Nov. 2020.
- [5] +3 papers

Peer-Reviewed International Conferences.....

- [1] Kanami Imamura, Tomohiko Nakamura, Norihiro Takamune, Kohei Yatabe, and Hiroshi Saruwatari, "Algorithms of sampling-frequency-independent layers for non-integer strides," in *Proceedings of European Signal Processing Conference*, Sep. 2023, pp. 326–330.
- [2] Joonyong Park, Shinnosuke Takamichi, Tomohiko Nakamura, Kentaro Seki, Detai Xin, and Hiroshi Saruwatari, "How generative spoken language model encodes noisy speech: Investigation from phonetics to syntactics," in *Proceedings of INTERSPEECH*, Aug. 2023, pp. 1085–1089.
- [3] Tomohiko Nakamura, Shinnosuke Takamichi, Naoko Tanji, Satoru Fukayama, and Hiroshi Saruwatari, "jaCappella corpus: A japanese a cappella vocal ensemble corpus," in *Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing*, Jun. 2023.
- [4] Kota Arai, Yutaro Hirao, Takuji Narumi, Tomohiko Nakamura, Shinnosuke Takamichi, and Shigeo Yoshida, "Tim-ToShape: Supporting practice of musical instruments by visualizing timbre with 2D shapes based on crossmodal correspondences," in *Proceedings of ACM Conference on Intelligent User Interfaces*, Mar. 2023, pp. 850–865.
- [5] +24 papers

Patents.....

- [1] Rintaro Ikeshita, Tomohiro Nakatani, Naoki Narisawa, Norihiro Takamune, Tomohiko Nakamura, and Hiroshi Saruwatari, "Signal processing device, method, and program," Japan Unexamined Patent JP2023-089431, 16-Dec-2021.
- [2] Tomohiko Nakamura, "Trained model, training device, training method, and training program," Japan Patent JP7304235, 16-Aug-2019.
- [3] +8 patents

Invited Talks.....

- [1] Daichi Kitamura, Tomohiko Nakamura, "Fundamentals and Applications of Audio Source Separation — A Guide to Becoming an Expert," *2023 Otogaku 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)

Awards

- 1. The Itakura Prize Innovative Young Researcher Award, ASJ, Mar. 2022.
- 2. Dean's Award of Graduate School of Information Science and Technology, The University of Tokyo, Mar. 2016.
- 3. IPSJ Yamashita SIG Research Award, Mar. 2016.
- 4. +10 awards and 10 awards received by my students and collaborators