Tomohiko Nakamura

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https://github.com/TomohikoNakamura

Research Interests

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

Job

Senior Researcher **Apr. 2023–Present**
The National Institute of Advanced Industrial Science and Technology (AIST), Japan.

Project Research Associate **Sept. 2019–Mar. 2023**
Graduate School of Information Science and Technology, The University of Tokyo, Japan.

Researcher **Apr. 2016–Aug. 2019**
Intelligent Systems Laboratory, SECOM, Japan.

Research Fellow (DC2) **Apr. 2015–Mar. 2016**
Japan Society for the Promotion of Science (JSPS), Japan.

Education

Ph.D. degree in Information Science and Technology **Mar. 2016**
Graduate School of Information Science and Technology, The University of Tokyo, Japan.

Master's degree in Information Science and Technology **Mar. 2013**
Graduate School of Information Science and Technology, The University of Tokyo, Japan.

Bachelor's degree in Engineering **Mar. 2011**
Faculty of Engineering, The University of Tokyo, Japan.

Teaching

Applied Gaussian Process and Machine Learning **6, Dec. 2021**
Graduate School of Information Science and Technology, The University of Tokyo, Japan.

Advanced Signal Processing **23, June 2020 and 21, June 2022, June 2024**
Graduate School of Information Science and Technology, The University of Tokyo, Japan.

Student Experiment **Apr. 2020–Mar. 2023**
Department of Mathematical engineering and information physics, The University of Tokyo, Japan.

Languages

Japanese (native), English (basic)

Competitive Funds

Development of deep-layered analysis-by-synthesis techniques for acoustic scene analysis with human intervention
JSPS KAKENHI *Apr. 2023–Mar. 2027*

Sampling-frequency-independent deep learning for audio media processing
JST ACT-X (Frontier of Mathematics and Information Science) *Oct. 2021–Mar. 2024*

Research on acoustic scene analysis by integrating time-domain deep learning and multiresolution analysis
JSPS KAKENHI *Apr. 2020–Mar. 2023*

+ 3 funds as representative and 5 funds as co-researcher.

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*, vol. 13, no. 1, e28, Nov. 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 and Workshops

[1] Yuto Ishikawa, Tomohiko Nakamura, Norihiro Takamune, and Hiroshi Saruwatari, "Hearing-aids system using distributed assistive device and blind speech extraction method under diffuse noise," in *International Congress on Acoustics*, May 2025.

[2] Tomohiko Nakamura, Kwanghee Choi, Keigo Hojo, Yoshiaki Bando, Satoru Fukayama, and Shinji Watanabe, "Discrete speech unit extraction via independent component analysis," in *SALMA: Speech and Audio Language Models - Architectures, Data Sources, and Training Paradigms, IEEE International Conference on Acoustics, Speech, and Signal Processing Workshops*, Apr. 2025.

[3] Yuto Ishikawa, Osamu Take, Tomohiko Nakamura, Norihiro Takamune, Yuki Saito, Shinnosuke Takamichi, and Hiroshi Saruwatari, "Real-time noise estimation for Lombard-effect speech synthesis in human–avatar dialogue systems," in *Asia Pacific Signal and Information Processing Association Annual Summit and Conference*, Dec. 2024.

[4] +35 papers

Invited Talks

[1] Tomohiko Nakamura, "Trends and prospects for audio source separation using deep learning," *Meeting on Technical Committee on Engineering Acoustics, IEICE*, Mar. 2025. (in Japanese)

[2] Daichi Kitamura, Tomohiko Nakamura, "Fundamentals and applications of audio source separation — A guide to becoming an expert," *2023 Otogaku Symposium*, Jun. 2023. (in Japanese)

[3] 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.

[4] +1 invited presentation

Overview Papers

[1] Shoichi Koyama, Juliano Ribeiro, Tomohiko Nakamura, Natsuki Ueno, and Mirco Pezzoli, "Physics-informed machine learning for sound field estimation: Fundamentals, state of the art, and challenges," *Special Issue on Model-Based and Data-Driven Audio Signal Processing, IEEE Signal Processing Magazine*, vol. 41, pp. 60–71, 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