

# Tomohiko Nakamura

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🌐 <http://tomohikonakamura.github.io/Tomohiko-Nakamura/>

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## Research Interests

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DSP-inspired deep learning, audio signal processing, music information processing, machine learning, and image processing.

## Job

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### Project Research Associate

Sept. 2019–Present

*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

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### Ph.D. degree in Information Science and Technology

Mar. 2016

*Graduate School of Information Science and Technology,  
The University of Tokyo, Japan.*

### M.S. degree in Information Science and Technology

Mar. 2013

*Graduate School of Information Science and Technology,  
The University of Tokyo, Japan.*

### B.S. degree in Engineering

Mar. 2011

*Faculty of Engineering, The University of Tokyo, Japan.*

## Teaching

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### Student Experiment

Apr. 2020–Present

*Department of Mathematical engineering and information physics,  
The University of Tokyo, Japan.*

I lecture active and passive measurement for 3D reconstruction from images (in Japanese).

### Advanced Signal Processing

23, June 2020

*Graduate School of Information Science and Technology,  
The University of Tokyo, Japan.*

I lecture about music information processing (in Japanese).

## Skills

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- Languages: Japanese (native) and English (basic)
- Programming: Python, C/C++, Golang, Matlab, Javascript, HTML

## Competitive Funds

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### Research Funds.....

#### **JSPS KAKENHI (Grant No. 20K19818)**

*Japan Society of the Promotion of Science (JSPS)*

**Research representative**

*Apr. 2020–Present*

#### **JSPS KAKENHI (Grant No. 19H01116)**

*Japan Society of the Promotion of Science (JSPS)*

**Co-researcher**

*Apr. 2020–Present*

#### **Research Grant (A)**

*The Tateisi Science and Technology Foundation*

**Research representative**

*Apr. 2020–Mar. 2021*

#### **2020 Research Grant for Sound Technology Promotion**

*Kawai Foundation for Sound Technology and Music*

**Research representative**

*Apr. 2020–Mar. 2021*

#### **Grant-in-Aid for JSPS Fellows (Grant No. 15J09992)**

*Japan Society of the Promotion of Science (JSPS)*

**Research representative**

*Apr. 2015–Mar. 2016*

#### **Research Fellowship for Young Scientists (DC2)**

*Japan Society of the Promotion of Science (JSPS)*

*Apr. 2015–Mar. 2016*

### Travel Grants.....

#### **Grants for Researchers Attending International Conferences**

*The Tateishi Science and Technology Foundation*

*Oct. 2014.*

#### **Grants for Researchers Attending International Conferences**

*The Hara Research Foundation*

*Sept. 2014.*

#### **Grants for Researchers Attending International Conferences**

*The Telecommunications Advancement Foundation*

*Aug. 2013.*

## Publications

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### Journal Papers.....

- [1] 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.
- [2] 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.
- [3] Tomohiko Nakamura, Eita Nakamura, and Shigeki Sagayama, "Real-Time Audio-to-Score Alignment of Music Performances Containing Errors and Arbitrary Repeats and Skips," *IEEE/ACM Transactions on Audio, Speech and Language Processing*, vol. 24, issue 2, pp. 329–339, Feb. 2016.
- [4] Tomohiko Nakamura, Yutaka Hori and Shinji Hara, "Hierarchical Modeling and Local Stability Analysis for Repressilators Coupled by Quorum Sensing," *SICE Journal of Control, Measurement, and System Integration*, vol. 7, no. 3, pp. 133–140, May 2014. **[Best Paper Award (Takeda Award) from the Society of Instrument and Control Engineers]**
- [5] Eita Nakamura, Tomohiko Nakamura, Yasuyuki Saito, Nobutaka Ono, and Shigeki Sagayama, "Outer-Product Type Hidden Markov Model and Polyphonic MIDI Score Following," *Journal of New Music Research*, vol. 43, issue 2, pp. 183–201, Apr. 2014.

### Peer-Reviewed International Conferences.....

- [1] Koichi Saito, Tomohiko Nakamura, Kohei Yatabe, Yuma Koizumi, and Hiroshi Saruwatari, "Sampling-Frequency-Independent Audio Source Separation Using Convolution Layer Based on Impulse Invariant Method," *Proc. 29th European Signal Processing Conference (EUSIPCO2021)*, Aug. 2021. (to appear)
- [2] Naoki Narisawa, Rintaro Ikeshita, Norihiro Takamune, Daichi Kiramura, Tomohiko Nakamura, Hiroshi

- Saruwatari, and Tomohiro Nakatani, "Independent Deeply Learned Tensor Analysis for Determined Audio Source Separation," *Proc. 29th European Signal Processing Conference (EUSIPCO2021)*, Aug. 2021. (to appear)
- [3] Takuya Hasumi, Tomohiko Nakamura, Norihiro Takamune, Hiroshi Saruwatari, Daichi Kitamura, Yu Takahashi, and Kazunobu Kondo, "Empirical Bayesian Independent Deeply Learned Matrix Analysis for Multichannel Audio Source Separation," *Proc. 29th European Signal Processing Conference (EUSIPCO2021)*, Aug. 2021. (to appear)
  - [4] Shihori Kozuka, Tomohiko Nakamura, and Hiroshi Saruwatari, "Investigation on Wavelet Basis Function of DNN-based Time Domain Audio Source Separation Inspired by Multiresolution Analysis," *Proc. 49th International Congress and Exposition on Noise Control Engineering (INTERNOISE2020)*, Aug. 2020.
  - [5] Tomohiko Nakamura and Hiroshi Saruwatari, "Time-domain Audio Source Separation based on Wave-U-Net Combined with Discrete Wavelet Transform," *Proc. 45th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP2020)*, pp. 386–390, May 2020.
  - [6] Tomohiko Nakamura and Hirokazu Kameoka, "Shifted and Convolutional Source-Filter Non-Negative Matrix Factorization for Monaural Audio Source Separation," *Proc. 41st IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP2016)*, pp. 489–493, Mar. 2016.
  - [7] Tomohiko Nakamura and Hirokazu Kameoka, " $L_p$ -Norm Non-Negative Matrix Factorization and Its Application to Singing Voice Enhancement," *Proc. 40th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP2015)*, pp. 2115–2119, Apr. 2015.
  - [8] Tomohiko Nakamura, Kotaro Shikata, Norihiro Takamune and Hirokazu Kameoka, "Harmonic-Temporal Factor Decomposition Incorporating Music Prior Information for Informed Monaural Source Separation," *Proc. 15th International Society for Music Information Retrieval Conference (ISMIR2014)*, pp. 623–628, Oct. 2014.
  - [9] Takuya Higuchi, Hirofumi Takeda, Tomohiko Nakamura, Hirokazu Kameoka, "A Unified Approach for Underdetermined Blind Signal Separation and Source Activity Detection by Multichannel Factorial Hidden Markov Models," *Proc. 15th Annual Conference of the International Speech Communication Association (Interspeech2014)*, pp. 850–854, Sept. 2014.
  - [10] Tomohiko Nakamura and Hirokazu Kameoka, "Fast Signal Reconstruction from Magnitude Spectrogram of Continuous Wavelet Transform based on Spectrogram Consistency," *Proc. 17th International Conference on Digital Audio Effects (DAFx-14)*, pp. 129–135, Sept. 2014.
  - [11] Tomohiko Nakamura, Hirokazu Kameoka, Kazuyoshi Yoshii and Masataka Goto, "Timbre Replacement of Harmonic and Drum Components for Music Audio Signals," *Proc. 2014 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP2014)*, pp. 7520–7524, May, 2014.
  - [12] Takuya Higuchi, Norihiro Takamune, Tomohiko Nakamura and Hirokazu Kameoka, "Underdetermined Blind Separation and Tracking of Moving Sources based on DOA-HMM," *Proc. 2014 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP2014)*, pp. 3215–3219, May, 2014.
  - [13] Shigeki Sagayama, Tomohiko Nakamura, Eita Nakamura, Yasuyuki Saito, Hirokazu Kameoka and Nobutaka Ono, "Automatic Music Accompaniment Allowing Errors and Arbitrary Repeats and Jumps," *Proc. Meetings on Acoustics (POMA)*, vol. 21, 035003, 2014.
  - [14] Tomohiko Nakamura, Eita Nakamura and Shigeki Sagayama, "Acoustic Score Following to Musical Performance with Errors and Arbitrary Repeats and Skips for Automatic Accompaniment," *Proc. Sound and Music Computing Conference (SMC2013)*, pp. 299–304, Aug. 2013.
  - [15] Masahiro Nakano, Jonathan Le Roux, Hirokazu Kameoka, Tomohiko Nakamura, Nobutaka Ono and Shigeki Sagayama, "Bayesian Nonparametric Spectrogram Modeling Based on Infinite Factorial Infinite Hidden Markov Model," *Proc. 2011 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA2011)*, pp. 325–328, Oct. 2011.
  - [16] Tomohiko Nakamura, Shinji Hara and Yutaka Hori, "Local Stability Analysis for a class of Quorum-Sensing Networks with Cyclic Gene Regulatory Networks," *Proc. SICE Annual Conference*, pp. 2111–2116, Sept. 2011. **[SICE Annual Conference 2011 International Award, SICE Annual Conference**

## 2011 Finalist of Young Author Award]

### Ph.D. Thesis.....

- [1] Tomohiko Nakamura, "Source-Filter Representation and Phase Estimation in Continuous Wavelet Transform Domain for Monaural Music Audio Editing," Ph.D. Thesis, The University of Tokyo, Mar. 2016. **[Dean's Award, IPSJ recommended Ph.D thesis]**

### Patents.....

- [1] Tomohiko Nakamura, "Object recognition device, method, and program," Japan Unexamined Patent Application JP2021-033374, Mar. 1, 2021.
- [2] Tomohiko Nakamura, "Trained model and training device, method, and program," Japan Unexamined Patent Application JP2021-033395, Mar. 1, 2021.
- [3] Tomohiko Nakamura, "Object recognition device, method, and program," Japan Unexamined Patent Application JP2021-026685, Feb. 22, 2021.
- [4] Tomohiko Nakamura, Shohei Kunimatsu, Toshihiko Sakurai, and Ohnishi Ittoku, "Camera placement evaluation device, method, and program," Japan Unexamined Patent Application JP2021-10070, Jan. 28, 2021.
- [5] Tomohiko Nakamura, "Object recognition device, method, and program." Japan Patent JP6773829, Oct. 21, 2020.
- [6] Tomohiko Nakamura, "Training device, method, and program and object recognition device" Japan Patent JP6773825, Oct. 21, 2020.
- [7] Tomohiko Nakamura, "Database integration device, method, and program, and data imputation device," Japan Patent JP6768101, Oct. 14, 2020.
- [8] Tomohiko Nakamura, Tadahiko Ito and Masaki Shimaoka, "Certificate management device." Japan Patent JP6647259, Jan. 16, 2020.
- [9] Tomohiko Nakamura and Hirokazu Kameoka, "Vocal tract spectrum estimation device, method, and program," Japan Patent JP6420781, Oct. 19, 2018.

### Awards

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- 1. IPSJ Recommended Ph.D. Thesis, Aug. 2016.
- 2. Dean's Award from Graduate School of Information Science and Technology, The University of Tokyo, Mar. 2016.
- 3. Best Paper Award (Takeda Award) from SICE, Oct. 2015.
- 4. IPSJ Yamashita SIG Research Award, Mar. 2015.
- 5. Best Poster Award from Otogaku Symposium 2015, May 2015.
- 6. Student Presentation Award from ASJ, Mar. 2014.
- 7. IPSJ Certificate of Excellent Master's Thesis, Mar. 2013.
- 8. Student Encouragement Award of IPSJ National Convention, Mar. 2013.
- 9. SICE Annual Conference 2011 International Award, Sept. 2011.
- 10. SICE Annual Conference 2011 Finalist of Young Author Award, Sept. 2011.