Shogo MURAMATSU

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Personal Information

Nationality Japan

Gender Male

Designation Professor

Education

Ph.D. Tokyo Metropolitan University, Nov. 1998
   Dissertation: *"Linear-Phase Paraunitary Filter Banks for Image Processing"*
   Committee: Hitoshi KIYA, Akinori NISHIHARA, Akihiko YAMADA and Norio TAGAWA

M.E. Tokyo Metropolitan University, Mar. 1995

B.E. Tokyo Metropolitan University, Mar. 1993

Experience

Niigata University, Department of Engineering, Faculty of Engineering, Professor, April 2019 - present.

Niigata University, College of Creative Studies, Professor, Apr. 2021 - Mar. 2024

Niigata University, Department of Electrical and Electronic Engineering, Faculty of Engineering, Associate Professor, Feb. 2001 - Mar. 2019.

University of Florence, Department of System and Information, Faculty of Engineering, Visiting Researcher, Oct. 2003 - Sep. 2004.

Niigata University, Department of Electrical and Electronic Engineering, Faculty of Engineering, Research Associate, Oct. 1999 - Jan. 2001.

Tokyo Metropolitan University, Department of Electric Engineering, Graduate School of Engineering, Research Associate, Apr. 1997 - Sep. 1999.

Tokyo Metropolitan University, Department of Electronic and Information Engineering, Faculty of Engineering, Research Associate, Jan. 1997 - Mar. 1997.

Area of Expertise

His professional expertise encompasses multidimensional signal and image processing. Especially, he is working on design of multidimensional filter banks, image restoration, image and video analysis, and embedded implementation of digital systems.

Major Publications

Peer-Reviewed Journal Papers

1. Y. Godage, E. Kobayashi and <u>S. Muramatsu</u>: "Locally-Structured Unitary Network," *APSIPA Trans. on Signal and Information Processing*, Vol. 13, No. 1, e9, http://dx.doi.org/10.1561/116.00000308, May 2024.

2. R. Kobayashi, G. Fujii, Y. Yoshida, T. Ota, F. Nin, H. Hibino, S. Choi, S. Ono and S. Muramatsu: "Sparsity-Aware OCT Volumetric Data Restoration Using Optical Synthesis Model," *IEEE Trans. on Computational Imaging*, Vol. 8, pp.505-520, June 2022.

3. S. Muramatsu, K. Furuya and N. Yuki: "Multidimensional Nonseparable Oversampled Lapped Transforms: Theory and Design," *IEEE Trans. on Signal Process.*, Vol. 65, No. 5, pp.1251-1264, Mar. 2017

4. K. Furuya, S. Hara, K. Seino and S. Muramatsu: "Boundary operation of 2D non-separable over-sampled lapped transforms," *APSIPA Trans. on Signal and Information Processing*, Vol.5, e9, April 2016

5. S. Muramatsu, D. Han, T. Kobayashi and H. Kikuchi: "Directional Lapped Orthogonal Transform: Theory and Design," *IEEE Trans. on Image Process.*, Vol.21, No.5, pp.2434-2448, May 2012

6. S. Muramatsu, T. Kobayashi, M. Hiki and H. Kikuchi: "Boundary Operation of 2-D Non-separable Linear-phase Paraunitary Filter Banks," *IEEE Trans. on Image Process.*, Vol.21, No.4, pp.2314-2318, Apr. 2012

7. T. Ishida, S. Muramatsu and H. Kikuchi: "Motion-JPEG2000 Codec Compensated for Interlaced Scanning Videos," *IEEE Trans. on Image Processing*, Vol. 14, No. 12, pp. 2179-2191, Dec. 2005

8. S. Muramatsu, T. Ishida and H. Kikuchi: "Invertible Deinterlacing with Sampling-Density Preservation: Theory and Design," *IEEE Trans. on Signal Processing*, Vol.51, No.9, pp.2343-2356, Sep 2003

9. S. Muramatsu, A. Yamada and H. Kiya: "A Design Method of Multidimensional Linear-Phase Paraunitary Filter Banks with a Lattice Structure," *IEEE Trans. on Signal Process.*, Vol.47, No.3, pp.690-700, Mar 1999

10. S. Muramatsu, H. Kiya: "Extended Overlap-Add and -Save Method for Multirate Signal Processing," *IEEE Trans. on Signal Process.*, Vol.45, No.9, pp.2376-2380, Sep. 1997

Proceedings

1. H. Kitamura, H. Yasuda, Y. Tanaka and S. Muramatsu, "Realization of Digraph Filters Via Augmented GFT," 2023 IEEE International Conference on Image Processing (ICIP), Kuala Lumpur, Malaysia, 2023, pp. 2885-2889, doi: 10.1109/ICIP49359.2023.10222618.

2. J. Li and S. Muramatsu, "Inter-Scale Sure-Let Image Restoration with Deep Unrolled Image Prior," 2023 IEEE International Conference on Image Processing (ICIP), Kuala Lumpur, Malaysia, 2023, pp. 3095-3099, doi: 10.1109/ICIP49359.2023.10222110.

3. E. Kobayashi, H. Yasuda, K. Hayasaka, Y. Otake, S. Ono and S. Muramatsu, "Multi-Resolution Convolutional Dictionary Learning for Riverbed Dynamics Modeling," ICASSP 2023 - 2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Rhodes Island, Greece, 2023, pp. 1-5, doi: 10.1109/ICASSP49357.2023.10096452.

4. J. Li and S. Muramatsu, "Inter-Scale Sure-Let Denoise with Structured Deep Image Prior: Interpretable Self-Supervised Learning," ICASSP 2023 - 2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Rhodes Island, Greece, 2023, pp. 1-5, doi: 10.1109/ICASSP49357.2023.10097253.

5. Y. Takahashi, S. Muramatsu, H. Yasuda, K. Hayasaka and Y. Otake, "Flow-Path Fitting from Images with Fourier Basis for River Health Assessment," 2022 IEEE International Conference on Image Processing (ICIP), Bordeaux, France, 2022, pp. 3687-3691, doi: 10.1109/ICIP46576.2022.9897196.

6. G. Yamamoto, Y. Kodama, S. Muramatsu, S. Choi and G. Jeon, "Acceleration of PDS-Based High-Dimensional Signal Restoration," 2021 Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC), Tokyo, Japan, 2021, pp. 1528-1535.

7. R. Kobayashi, <u>S. Muramatsu</u> and S. Ono, "Proximal Gradient-Based Loop Unrolling with Interscale Thresholding," 2021 Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC), Tokyo, Japan, 2021, pp. 1687-1692.

8. D. Liu, Y. Naito, C. Zhang, <u>S. Muramatsu</u>, H. Yasuda, K. Hayasaka and Y. Otake "River Flow Path Control With Reinforcement Learning," 2021 IEEE International Conference on Autonomous Systems (ICAS), Montreal, QC, Canada, 2021, pp. 1-5, doi: 10.1109/ICAS49788.2021.9551113.

9. Y. Arai, <u>S. Muramatsu</u>, H. Yasuda, K. Hayasaka, Y. Otake, "Sparse-Coded Dynamic Mode Decomposition on Graph for Prediction of River Water Level Distribution," ICASSP 2021 - 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Toronto, ON, Canada, 2021, pp. 3225-3229, doi: 10.1109/ICASSP39728.2021.9414533.

10. Y. Kodama, <u>S. Muramatsu</u> and H. Yamada, "Fixed-Point Arithmetic of 2-Norm Approximation for 2-Tuple Arrays with Rotated ℓ_1-Norm Evaluation," 2020 Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC), Auckland, New Zealand, 2020, pp. 1216-1221.

Lectures

1. Seminar talk, "Development of Cyber-Physical System (CPS) for Active Control of River Channels," APSIPA Winter School 2021, Dec. 13, 2021

2. Invited talk, "Development of a Cyber-Physical System for Active Control of River Channels," Technical Meeting, IEEE Sapporo Section, Sep. 17, 2021

3. Seminar talk, "Sparsity-Aware Image and Volumetric Data Restoration with Convolutional Dictionary Learning," APSIPA Summer School 2020, Dec. 11, 2020

4. Invited talk, "Sparsity-Aware High-Dimensional Data Restoration with Convolutional Dictionary Learning, " IEEE/IEIE ICCE-Asia 2020, Nov. 1, 2020

5. Invited tak, "Image Restoration with Convolutional Dictionary Learning," Joint Workshop of IEIE JB and IEEE Shin-etsu SSB (WEIE2019), Dec. 12, 2019

Grants

1. "Challenges in data-driven integrated water level control of river channel networks: dynamics modeling in directed graph structures," *JSPS Kakenhi*, Grant Number JP24K21314, July 2024 - March 2027

2. "Locally Structured Unitary Networks and Tangent Space Learning for Dynamic Systems Modeling," *JSPS Kakenhi*, Grant Number JP22H00512, April 2022 - March 2026

3. "Embedded Image Restoration Techniques for Edge Computing," *JSPS / NRF Bilateral Programs between Japan and Korea*, Grant Number JPJSBP120208804, April 2020 - March 2022

4. "Data-driven Active River Channel Control for Maintenance and Recovery of Stream Integrity," *JSPS Kakenhi*, Grant Number JP19K22026, July 2019 - Mar. 2021

5. "Structured Convolutional Networks for High-dimensional Signal Restoration," *JSPS Kakenhi*, Grant Number JP19H04135, Apr. 2019 - Mar. 2022

6. "Learning-Based Design and Implementation of Non-separable Oversampled Lapped Transforms for Multidimensional Signal Restoration," *JSPS Kakenhi*, Research Project No. 26420347, Apr. 2014 - Mar. 2017

7. "Design and Real-Time Implementation of 2-D Orthogonal Transforms with Trend Vanishing Moments for High-Functioning Image Representation," *JSPS Kakenhi*, Grant Number JP23560443, Apr. 2011 - Mar. 2014

8. "Scalable Coding of Interlaced Videos for Retrieval and Editing," *JSPS Kakenhi*, Grant Number JP14750283, Apr. 2002 - Mar. 2004

9. "Digital Signal Processing Architecture for Wavelet Transforms," *JSPS Kakenhi*, Grant Number JP12750322, April 2000 - March 2002

Academic Activities

Membership

- Senior Member of the Institute of Electrical and Electronics Engineers, Inc. (IEEE)

  - Signal Processing Society (SP)
  - Control System Society (CSS)
  - Circuits and Systems Society (CAS)
  - Computer Society (COMP)

- Senior Member of the Institute of Electronics, Information and Communication Engineers (IEICE)

  - Engineering Sciences Society (A)
  - Information and Systems Society (D)

- Member of the Asia-Pacific Signal and Information Processing Association (APSIPA)

  - TC Member of Image, Video and Multimedia (IVM), 2018-present
  - Distinguished Lecturer, 2020-2021

- Member of the Institute of Image Information and Television Engineers (ITE)

Journal Editorship

- Associate Editor, IEEE Trans. on Signal Process., 2019-2023

- Area Editor, *Image and Vision*, IEICE Trans. on Fundamentals, 2017-2019

- Secretary, *Special Section of Selected Papers from the 18th Workshop on Circuits and Systems in Karuizawa*, IEICE Trans. on Fundamentals, 2005

- Associate Editor, *Special Section on Recent Advances in Image Sampling and Reconstruction*, IEICE Trans. on Fundamentals, 2015-2016

- Associate Editor, IEICE Trans. on Fundamentals, 2009-2013

- Associate Editor, ITE Trans. on Media Technology and Applications, 2013

- Associate Editor, *Special Section on the Latest Advances in Fundamental Theories of Signal Processing*, IEICE Trans. on Fundamentals, 2008

- Associate Editor, *Special Section on Signal Processing*, IEICE Trans. on Fundamentals, 2007-2008

- Associate Editor, *Special Section on Signal Processing for Audio and Visual Systems and Its Implementations*, IEICE Trans. on Fundamentals, 2007

- Associate Editor, *Special Section on Papers Selected from the 21st Symposium on Signal Processing*, IEICE Trans. on Fundamentals, 2006-2007

- Associate Editor, *Special Section on Applications and Implementations of Digital Signal Processing*, IEICE Trans. on Fundamentals, 2003

- Associate Editor, *Special Section on Papers Selected from ITC-CSCC*, IEICE Trans. on Fundamentals, 2002-2003

- Associate Editor, *Special Section of Selected Papers from the 15th Workshop on Circuits and Systems in Karuizawa*, IEICE Trans. on Fundamentals, 2002

- Reviewer, IEEE Trans. on Emerging Topics in Computing

- Reviewer, IEEE Trans. on Neural Networks and Learning Systems

- Reviewer, IEEE Trans. on Signal Processing

- Reviewer, IEEE Trans. on Image Processing

- Reviewer, IEEE Signal Processing Letters

- Reviewer, IEEE Trans. on Circuits and Systems I

- Reviewer, IEEE Trans. on Circuits and Systems for Video Tech.

- Reviewer, Signal Processing, Elsevier

- Reviewer, Digital Signal Processing, Elsevier

- Reviewer, Journal of Computational and Applied Mathematics, Elsevier

- Reviewer, International Journal of Electronics and Communications, Elsevier

- Reviewer, EURASIP Journal on Advances in Signal Processing

- Reviewer, APSIPA Trans. on Signal and Information Processing

- Reviewer, WSPC Journal of Circuits, Systems, and Computers

- Reviewer, IEICE Trans. on Fundamentals

- Reviewer, IEICE Trans. on Communications

- Reviewer, IEICE Trans. on Information and Systems

- Reviewer, ITE Trans. on Media Technology and Applications

- Reviewer, Multidimensional Systems and Signal Processing, Springer

- Reviewer, Circuits Systems and Signal Processing, Springer

Conference organization

- Special Session Chair, IEEE VCIP 2024

- Special Session Chair, ITC-CSCC 2024

- Special Session Chair, IEEE VCIP 2023

- Special Session Co-chair, APSIPA ASC 2022

- Program Co-chair, IWAIT 2022

- Special Session Organizer: *Advanced Topics in Low Precision Image Processing*, APSIPA ASC 2021

- General Co-chair, ITC-CSCC 2021

- pecial Session Organizer: *Advanced Topics on High-dimensional Data Analytics and Processing*, APSIPA ASC S2019

- Special Session Organizer: *Advanced Topics on Signal Analysis and Compression for Monitoring Systems*, APSIPA ASC 2018

- Special Session Organizer: *Advanced Topics on Structured Dictionary for Multidimensional Signal Processing*, APSIPA ASC 2017

- Special Session Organizer: *Advanced Topics in Volumetric Image Processing*, APSIPA ASC 2015

- Special Session Organizer: *Recent Advances in Non-Linear and Multi-Dimensional Signal Processing*, APSIPA ASC 2014

- Special Session Organizer: *Recent Advances in Multirate Processing and Transforms*, APSIPA ASC 2013

- Special Session Organizer: *Recent Advances in Signal Representations - Filters, Transforms and Sparse Representations*, APSIPA ASC 2010

- Special Session Organizer: *Advanced Wavelet Transforms and Their Applications*, IEEE ISPACS 2009

Supervision

Yasas GODAGE , Ph.D., Niigata University, *under review* (Primary advisor)
Dissertation: *"Locally Structured Unitary Networks for Efficient Tangent Space*

Shin KURIHARA *, Ph.D., Niigata University, 20 Sep. 2017 (Primary advisor)*
Dissertation: "Study on Low Bit-Rate Distributed Compressive Video Sensing" Embedding"

Zhiyu CHEN Ph.D., Niigata University, 24 Sep. 2015 (Primary advisor)
Dissertation: *"Image Restoration with Multiple Directional Transforms"*

Hidenori WATANABE Ph.D., Niigata University, 25 Mar. 2013 (Primary advisor)
Dissertation: *"Efficient Arithmetic of Gaussian Mixture Model for Pattern Recognition and Machine Learning"*

Minoru HIKI Ph.D., Niigata University, 23 Mar. 2010 (Primary advisor)
Dissertation: *"A Study on a Motion-Compensated Spatiotemporal Non-Separable Filtering"*

Takuma ISHIDA Ph.D., Niigata University, 23 Mar. 2006 (Primary advisor) Dissertation: *"Scalable Video Coding with Invertible Sampling Lattice Conversion"*

Miscellaneous

- Open Sources

  AuGFT Supplemental materials for article "Realization of DiGraph Filters Via Augmented GFT", `https://github.com/msiplab/AuGFT`, 2023

  TanSacNet Package Project for developing tangent space adaptive control networks, `https://github.com/msiplab/TanSacNe`, 2022

  OctVolRstr Project Supplemental materials for the paper "Sparsity-Aware OCT Volumetric Data Restoration Using Optical Synthesis Model," IEEE Transactions on Computational Imaging, DOI: 10.1109/TCI.2022.3183396
  `https://codeocean.com/capsule/5824110/`

  EmbVision Tutorial Tutorial documents of video streaming processing on MATLAB$^{®}$/Simulink$^{®}$ for training beginners,
  `http://www.mathworks.com/matlabcentral/fileexchange/52693-embvision-tutorial`, 2015

  SaivDr Package System object definitions for sparsity-aware image and volume data restoration, `http://www.mathworks.com/matlabcentral/fileexchange/45084-saivdr-package`, 2014

  DirLOT Toolbox MATLAB class definitions for directional lapped orthogonal transforms,
  `http://www.mathworks.com/matlabcentral/fileexchange/32603-dirlot-toolbox`, 2011

Last updated: August 21, 2024