# Michal Byra, PhD, DSc

# Curriculum Vitæ

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**Profiles** Scholar, Scopus
**Webpage** mbyr.github.io


## Research interests

biomedical image analysis, imaging sciences, neural networks, representation learning

## Education

| | |
|---|---|
| Nov 2024 | **DSc (habilitation) in Biomedical Engineering**<br>Polish Academy of Sciences, Warsaw, Poland |
| Aug 2017 | **PhD in Electrical Engineering**, with honors<br>Polish Academy of Sciences, Warsaw, Poland |
| Sep 2012 | **MSc in Automation and Robotics**<br>Warsaw University of Technology, Warsaw, Poland |
| Feb 2011 | **BSc in Automation and Robotics**<br>Warsaw University of Technology, Warsaw, Poland |

## Positions

| | |
|---|---|
| Feb 2019 – present | **Assistant Professor**<br>IFTR, Polish Academy of Sciences, Warsaw, Poland<br>implicit neural representations, efficient transfer learning, weight spaces |
| Jul 2024 – present | **AI Research Scientist**<br>Samsung AI Center, Warsaw, Poland<br>video understanding, multimodal AI, representation learning |
| Jan 2024 – present | **Visiting Scientist (remotely)**<br>RIKEN Center for Brain Science, Wako, Japan |
| Jun 2022 – Dec 2023 | **Research Fellow**<br>RIKEN Center for Brain Science, Wako, Japan |
| Mar 2018 – Feb 2019 | **Postdoc**<br>Department of Radiology, University of California, San Diego, USA |
| Oct 2012 – Sep 2017 | **PhD Student**<br>IFTR, Polish Academy of Sciences, Warsaw, Poland |

## Short visits

| | |
|---|---|
| Nov 2024 (2 weeks) | RIKEN Center for Brain Science, Wako, Japan |
| Jan 2015 (4 weeks) | Department of Biomedical Engineering, Erasmus University Rotterdam, Netherlands |
| Oct 2014 (4 weeks) | Department of Information Engineering, University of Florence, Italy |

## Awards and honors

2025 Technical Program Committee Member, Medical Ultrasonics, IEEE International Ultrasonic Symposium (IUS)
2024 World's top 2% scientists by Stanford University (ongoing since 2020)
2024 Distinguished reviewer award, IEEE Transactions on Medical Imaging
2024 Edward Wrobel award for scientists conducting research in computer science, biomedical engineering and AI
2024 Award for scientific achievements, Polish Academy of Sciences
2024 Chair, session on domain adaptation and generalization, MIUA 2024
2023 Honorable mention for excellence in reviewing, MICCAI 2023
2023 Technical program committee, Data Engineering in Medical Imaging Workshop, DEMI, MICCAI 2023
2023 Award for scientific achievements, Polish Academy of Sciences
2022 Fellowship of the Japan Society for the Promotion of Science
2022 Award for scientific achievements, Polish Academy of Sciences
2021 Scholarship for outstanding young scientists, Polish Ministry of Science and Higher Education
2021 Award for scientific achievements, Polish Academy of Sciences
2020 Recognition for excellence in reviewing, European Radiology
2020 Award for scientific achievements, Polish Academy of Sciences
2020 Featured article with editorial, Radiology
2019 Best ranked paper, Iberian Conference on Pattern Recognition and Image Analysis, IbPRIA 2019

## Journal papers

[30] **M. Byra**, M. Rachmadi, H. Skibbe
*Few-shot medical image classification with simple shape and texture text descriptors using vision-language models*
Bulletin of the Polish Academy of Sciences, 2025

[29] M. Rachmadi, **M. Byra**, H. Skibbe
*A new family of instance-level loss functions for improving instance-level segmentation and detection of white matter hyperintensities in routine clinical brain MRI*
Computers in Biology and Medicine, 2024

[28] M. Yap, B. Cassidy, **M. Byra**, T. Liao, H. Yi, A. Galdran, Y. Chen, R. Brüngel, S. Koitka, C. Friedrich, Y. Lo, C. Yang, K. Li, Q. Lao, M. Ballester, G. Carneiro, Y. Ju, J. Huang, J. Pappachan, N. Reeves, V. Chandrabalan, D. Dancey, C. Kendrick
*Diabetic foot ulcers segmentation challenge report: benchmark and analysis*
Medical Image Analysis, 2024

[27] **M. Byra**, C. Poon, M. Rachmadi, M. Schlachter H. Skibbe
*Exploring the performance of implicit neural representations for brain image registration*
Scientific Reports, 2023

[26] **M. Byra**, C. Szmigielski, P. Kalinowski, R. Paluszkiewicz, B. Ziarkiewicz, K. Zieniewicz, G. Styczynski
*Ultrasound and biomarker based assessment of hepatic steatosis in patients with severe obesity*
Polish Archives of Internal Medicine, 2023

[25] **M. Byra**, K. Dobruch-Sobczak, H. Piotrzkowska-Wroblewska, Z. Klimonda, J. Litniewski
*Prediction of response to neoadjuvant chemotherapy in breast cancer with recurrent neural networks and raw ultrasound signals*
Physics in Medicine and Biology, 2022

[24] **M. Byra**, Z. Klimonda, E. Kruglenko, B. Gambin
*Unsupervised deep learning based approach to temperature monitoring in focused ultrasound treatment*
Ultrasonics, 2022

[23] **M. Byra**, P. Jarosik, K. Dobruch-Sobczak, Z. Klimonda, H. Piotrzkowska-Wroblewska, J. Litniewski, A. Nowicki
*Joint segmentation and classification of breast masses based on ultrasound radio-frequency data and convolutional neural networks*
Ultrasonics, 2022

[22] **M. Byra**, K. Dobruch-Sobczak, Z. Klimonda, H. Piotrzkowska-Wroblewska, J. Litniewski
*Explaining a deep learning based breast ultrasound image classifier with saliency maps*
Journal of Ultrasonography, 2022

[21] J. Strzelczyk , P. Kalinowski, C. Szmigielski, **M. Byra**, G. Styczyński
*The influence of surgical weight reduction on left atrial strain*
Obesity Surgery, 2021

[20] **M. Byra**
*Breast mass classification with transfer learning based on scaling of deep representations*
Biomedical Signal Processing and Control, 2021

[19] Y. Xue, H. Jang, **M. Byra**, Z. Cai, M. Wu, E. Chang, Y. Ma, J. Du
*Automated cartilage segmentation and quantification using 3D ultrashort echo time (UTE) cones MR imaging with deep convolutional neural networks*
European Radiology, 2021

[18] **M. Byra**, A. Han, A. Boehringer, Y. Zhang, W. O'Brien, J. Erdman, R. Loomba, C. Sirlin, M. Andre
*Liver fat fraction assessment in multi-view sonography using deep learning*
Journal of Ultrasound in Medicine, 2021

[17] **M. Byra**, K. Dobruch-Sobczak, Z. Klimonda, H. Piotrzkowska-Wroblewska, J. Litniewski
*Early prediction of response to neoadjuwant chemotherapy in breast cancer sonography using Siamese convolutional neural networks*
IEEE Journal of Biomedical and Health Informatics, 2020

[16] **M. Byra**, P. Jarosik. A. Szubert, M. Galperin, H. Ojeda-Fournier, L. Olson, M. O'Boyle, C. Comstock, M. Andre
*Breast mass segmentation in ultrasound with selective kernel U-Net convolutional neural network*
Biomedical Signal Processing and Control, 2020

[15] P. Jarosik, Z. Klimonda, M. Lewandowski, **M. Byra**
*Breast lesion classification based on ultrasonic backscattered echoes using convolutional neural networks*
Biocybernetics and Biomedical Engineering, 2020

[14] A. Han, **M. Byra**, E. Heba, M. Andre, J. Erdman, R. Loomba, C. Sirlin, W. O'Brien
*Noninvasive diagnosis of nonalcoholic fatty liver disease and quantification of liver fat with radiofrequency ultrasound data using one-dimensional convolutional neural networks*
Radiology, 2020

[13] **M. Byra**, M. Wu, X. Zhang, H. Jang, Y. Ma, E. Chang, S. Shah, J. Du
*Knee menisci segmentation and relaxometry of 3D ultrashort echo time (UTE) cones MR imaging using attention U-Net with transfer learning*
Magnetic Resonance in Medicine, 2020

[12] **M. Byra**, E. Hentzen, J. Du, M. Andre, E. Chang, S. Shah
*Assessing the performance of morphological and echogenicity features in median nerve ultrasound for carpal tunnel syndrome diagnosis*
Journal of Ultrasound in Medicine, 2019

[11] T. Guo, Y. Ma, R. High, Q. Tang, J. Wong, **M. Byra**, A. Searleman, S. To, L. Wan, N. Le, J. Du, E. Chang
*Assessment of an in vitro model of rotator cuff tendinopathy using quantitative magnetic resonance and ultrasound imaging with biochemical and histological correlation*
European Journal of Radiology, 2019

[10] **M. Byra**, L. Wan, J. Wong, J. Du, S. Shah, M. Andre, E. Chang
*Quantitative ultrasound and B-mode image texture features correlate with collagen and myelin content in human ulnar nerve fascicles*
Ultrasound in Medicine and Biology, 2019

[9] **M. Byra**, M. Galperin, H. Ojeda-Fournier, L. Olson, M. O'Boyle, C. Comstock, M. Andre
*Breast mass classification in sonography with transfer learning using a deep convolutional neural network and color conversion*
Medical Physics, 2019

[8] **M. Byra**, G. Styczynski, C. Szmigielski, P. Kalinowski, Ł. Michałowski, R. Paluszkiewicz, B. Ziarkiewicz, K. Zieniewicz, P. Sobieraj, A. Nowicki
*Transfer learning with deep convolutional neural network for liver steatosis assessment in ultrasound images*
International Journal of Computer Assisted Radiology and Surgery, 2018

[7] **M. Byra**, J. Wójcik, A. Nowicki
*Using empirical mode decomposition of backscattered ultrasound signal power spectrum for assessment of tissue compression*
Archives of Acoustics, 2018

[6] **M. Byra**
*Discriminant analysis of neural style representations for breast lesion classification in ultrasound*
Biocybernetics and Biomedical Engineering, 2018

[5] H. Piotrzkowska-Wróblewska, K. Dobruch-Sobczak, **M. Byra**, A. Nowicki
*Open access database of raw ultrasonic signals acquired from malignant and benign breast lesions*
Medical Physics, 2017

[4] **M. Byra**, E. Kruglenko, B. Gambin, A. Nowicki
*Temperature monitoring during focused ultrasound treatment by means of the homodyned K distribution*
Acta Physica Polonica, 2017

[3] T. Kujawska, W. Secomski, **M. Byra**, M. Postema, A. Nowicki
*Annular phased array transducer for preclinical testing of anti-cancer drug efficacy on small animals*
Ultrasonics, 2017

[2] B. Gambin, **M. Byra**, E. Kruglenko, O. Doubrovina, A. Nowicki
*Ultrasonic measurement of temperature rise in breast cyst and in neighbouring tissues as a method of tissue differentiation*
Archives of Acoustics, 2016

[1] **M. Byra**, A. Nowicki, H. Piotrzkowska-Wróblewska, K. Dobruch-Sobczak
*Classification of breast lesions using segmented quantitative ultrasound maps of homodyned K distribution parameters*
Medical Physics, 2016

## Conference papers

[23] **M. Byra**, P. Karwat, A. Zylka, K. Dobruch-Sobczak, M. Dedecjus, J. Litniewski
*Supporting thyroid nodule assessment in contrast-enhanced ultrasound with implicit neural representations*
IEEE International Ultrasonics Symposium, IUS, 2025

[22] P. Jarosik, M. Lewandowski, Z. Klimonda, P. Karwat, **M. Byra**
*Ultrasound speckle reduction using frequency compounding with variational autoencoder*
IEEE International Ultrasonics Symposium, IUS, 2025

[21] Z. Klimonda, P. Jarosik, P. Karwat, **M. Byra**, M. Lewandowski
*Accelerating ultrasound computer tomography data acquisition using a deep convolutional neural network*
IEEE International Ultrasonics Symposium, IUS, 2025

[20] **M. Byra**, H. Skibbe
*Generating visual explanations from deep networks using implicit neural representations*
IEEE/CVF Winter Conference on Applications of Computer Vision, WACV, 2025

[19] **M. Byra**, P. Jarosik, P. Karwat, Z. Klimonda, M. Lewandowski
*Implicit neural representations for speed-of-sound estimation in ultrasound*
IEEE Ultrasonics, Ferroelectrics, and Frequency Control Joint Symposium, 2024

[18] C. Poon, **M. Byra**, T. Shimogori, H. Skibbe
*Meta-learning for segmentation of in-situ hybriization gene expression images*
Medical Imaging with Deep Learning Conference, MIDL (short paper), 2024

[17] **M. Byra**, C. Poon, T. Shimogori, H. Skibbe
*Implicit neural representations for joint decomposition and registration of gene expression images in the marmoset brain*
International Conference on Medical Image Computing and Computer Assisted Intervention, MICCAI, 2023

[16] **M. Byra**, Z. Klimonda, J. Litniewski
*Network pre-training using synthetic ultrasound data with application to breast mass segmentation and classification*
Data Engineering in Medical Imaging Workshop, DEMI MICCAI, 2023

[15] C. Poon, F. Rachmadi, **M. Byra**, M. Schlachter, B. Xu, T. Shimogori, H. Skibbe
*An automated pipeline to create an atlas of in situ hybridization gene expression data in the adult marmoset brain*
IEEE International Symposium on Biomedical Imaging, ISBI, 2023

[14] **M. Byra**, P. Karwat, I. Ryzhankow, P. Komorowski, Z. Klimonda, L. Fura, A. Pawlowska, N. Zolek, J. Litniewski
*Deep meta-learning for the selection of accurate ultrasound based breast mass classifier*
IEEE International Ultrasonics Symposium, IUS, 2022

[13] P. Jarosik, M. Lewandowski, Z. Klimonda, **M. Byra**
*Pixel-wise deep reinforcement learning approach for ultrasound image denoising*
IEEE International Ultrasonics Symposium, IUS, 2021

[12] **M. Byra**, G. Styczyński, C. Szmigielski, P. Kalinowski, Ł. Michałowski, R. Paluszkiewicz, B. Ziarkiewicz, K. Zieniewicz, A. Nowicki
*Adversarial attacks on deep learning models for fatty liver disease classification by modification of ultrasound image reconstruction method*
IEEE International Ultrasonics Symposium, IUS, 2020

[11] **M. Byra**, T. Sznajder, D. Korżinek, H. Piotrzkowska-Wróblewska, K. Dobruch-Sobczak, A. Nowicki, K. Marasek
*Impact of ultrasound image reconstruction method on breast lesion classification with deep learning*
Iberian Conference on Pattern Recognition and Image Analysis, IbPRIA, 2019

[10] P. Jarosik, **M. Byra**, M. Lewandowski
*WaveFlow - towards integration of ultrasound processing with deep learning*
IEEE International Ultrasonics Symposium, IUS, 2018

[9] **M. Byra**, J. Wójcik, A. Nowicki
*Ultrasound nonlinearity parameter assessment using plane wave imaging*
IEEE International Ultrasonics Symposium, IUS, 2017

[8] **M. Byra**, H. Piotrzkowska-Wróblewska, K. Dobruch-Sobczak, A. Nowicki
*Combining Nakagami imaging and convolutional neural network for breast lesion classification*
IEEE International Ultrasonics Symposium, IUS, 2017

[7] J. Wójcik, **M. Byra**, A. Nowicki
*A spectral-based method for tissue characterization*
Symposium on Hydroacoustics, 2016

[6] **M. Byra**, A. Nowicki, H. Piotrzkowska-Wróblewska, K. Dobruch-Sobczak, J. Litniewski
*Correcting the influence of attenuation on Nakagami distribution shape parameter estimation*
IEEE International Ultrasonics Symposium, IUS, 2015

[5] A. Nowicki, H. Piotrzkowska-Wróblewska, K. Dobruch-Sobczak, J. Litniewski, B. Gambin, **M. Byra**, E. Kruglenko
*Differentiation of normal tissue and lesions using statistical properties of backscattered ultrasound in breast*
IEEE International Ultrasonics Symposium, IUS, 2015

[4] A. Ramalli, **M. Byra**, A. Dallai, C. Palombo, K. Aizawa, P. Tortoli
*A multiparametric approach integrating vessel diameter, wall shear rate and physiologic signals for optimized flow mediated dilation studies*
IEEE International Ultrasonics Symposium, IUS, 2015

[3] **M. Byra**, B. Gambin
*Temperature detection based on nonparametric statistics of ultrasound echoes*
Symposium on Hydroacoustics, 2014

[2] A. Nowicki, **M. Byra**, J. Litniewski, J. Wójcik
*Ultrasound imaging of stiffness with two frequency pulse*
Symposium on Hydroacoustics, 2014

[1] A. Nowicki, **M. Byra**, J. Litniewski, J. Wójcik
*Two frequencies push-pull differential imaging*
IEEE International Ultrasonics Symposium, IUS, 2014

## Conference abstracts & posters

[21] P. Jarosik, **M. Byra**, Z. Klimonda, P. Dluzewski, M. Lewandowski
*Deep reinforcement learning approach for adaptive ultrasound image reconstruction with a flexible array probe*
IEEE Ultrasonics, Ferroelectrics, and Frequency Control Joint Symposium, 2024

[20] **M. Byra**
*Implicit neural networks for breast ultrasound image segmentation*
28th UK Conference on Medical Image Understanding and Analysis (MIUA), 2024

[19] **M. Byra**, H. Skibbe
*Generating visual explanations from deep networks using implicit neural representations*
5th Polish Conference on Artificial Intelligence, 2024

[18] P. Jarosik, M. Lewandowski, Z. Klimonda, P. Dluzewski, **M. Byra**
*Pixel-wise deep reinforcement learning approach for improving the quality of ultrasound B-mode images*
5th Polish Conference on Artificial Intelligence, 2024

[17] C. Poon, **M. Byra**, M. Rachmadi, M. Schlachter, B. Xu, M. Decroocq, T. Shimogori, H. Skibbe
*A 3D gene expression atlas of the adult marmoset brain*
RIKEN Center for Brain Science Retreat, 2023

[16] **M. Byra**, M. Rachmadi, H. Skibbe
*Few-shot medical image classification with simple shape and texture text descriptors using vision-language models*
Foundation Models for General Medical AI Workshop, MedAGI MICCAI, 2023

[15] C. Poon, M. Rachmadi, **M. Byra**, T. M. Schlachter, B. Xu, Shimogori, H. Skibbe
*An automated pipeline to create a gene expression atlas in the marmoset brain*
The 46th Annual Meeting of the Japan Neuroscience Society, 2023

[14] **M. Byra**, C. Poon, M. Rachmadi, M. Schlachter, B. Xu, T. Shimogori, H. Skibbe
*Deep learning based registration and segmentation of in situ hybridization gene expression data in marmoset brain*
RIKEN Center for Brain Science Retreat, 2022

[13] C. Poon, M. Rachmadi, **M. Byra**, T. Shimogori, H. Skibbe
*Semi-supervised contrastive learning for semantic segmentation of ISH gene expression in the marmoset brain*
The 45th Annual Meeting of the Japan Neuroscience Society, 2022

[12] H. Piotrzkowska-Wroblewska„ K. Dobruch-Sobczak, Z. Klimonda, Piotr Karwat, **M. Byra**, J. Litniewski
*Assessment of the response of breast cancer patients to neoadjuvant chemotherapy using quantitative ultrasound*
Annual Integrated Ultrasound Meeting, 2022

[11] V. Barrere, Y. Wu, **M. Byra**, E. Chang, A. Han, M. Andre, S. Shah
*Repeatability and reproducibility of quantitative ultrasound of the median nerve in vivo derived from backscatter measurements at high frequency*
Annual Integrated Ultrasound Meeting, 2022

[10] Y. Xue, H. Jang, Z. Cai, H. Sirazian, M. Wu, **M. Byra**, Y. Ma, E. Chang, J. Du
*Whole knee cartilage segmentation using deep convolutional neural networks for quantitative 3D UTE cones magnetization transfer modeling*
28th ISMRM Annual Meeting, 2020

[9] **M. Byra**, A. Han, A. Boehringer, Y. Zhang, J.Erdman, R. Loomba, M. Valasek, C. Sirlin, W. O'Brien, M. Andre
*Quantitative liver fat fraction measurement by multi-view sonography using deep learning and attention maps*
178th Meeting of the Acoustical Society of America, 2019

[8] **M. Byra**, M. Galperin, H. Ojeda-Fournier, L. Olson, M. O'Boyle, C. Comstock, M. Andre
*Comparison of deep learning and classical breast mass classification methods in ultrasound*
178th Meeting of the Acoustical Society of America, 2019

[7] **M. Byra**, J. Wong, S. Shah, A. Han, W. O'Brien, J. Du, S. Shah, E. Chang, M. Andre
*High-frequency quantitative ultrasound and B-mode analysis for characterization of peripheral nerves including carpal tunnel syndrome*
178th Meeting of the Acoustical Society of America, 2019

[6] **M. Byra**, M. Wu, X. Zhang, H. Jang, Y. Ma, E. Chang, S. Shah, J. Du
*Assessing the performance of knee meniscus segmentation with deep convolutional neural networks in 3D ultrashort echo time (UTE) Cones MR imaging*
27th ISMRM Annual Meeting, 2019

[5] **M. Byra**, L. Wan, J. Wong, J. Du, S. Shah, M. Andre, E. Chang
*Characterization of ulnar nerve fascicles using quantitative ultrasound*
10th Institute of Engineering in Medicine Symposium, 2018

[4] B. Gambin, E. Kruglenko, **M. Byra**
*Acoustical Properties of Tissue Phantoms with Different Stiffness and Water-Like Absorption*
10th EAA International Symposium on Hydroacoustics, 2016

[3] B. Gambin, E. Kruglenko, **M. Byra**
*Thermocouple measurement of temperature variations in soft tissue phantoms versus backscattered ultrasonic signals properties*
Open Seminar on Acoustics, 2016

[2] B. Gambin, **M. Byra**, O. Doubrovina
*Nonparametric statistics for indirect temperature estimation by ultrasound imaging*
International Scientific Seminar on Analytic Methods of Analysis and Differential Equations, 2015

[1] T. Kujawska, W. Secomski, **M. Byra**, A. Nowicki
*Controlling the depth of local tissue necrosis induced by pulsed nonlinear focused ultrasonic beam with electronically sliding focus*
7th Forum Acusticum, 2014

## Reviewing service

- Archives of Acoustics
- Biocybernetics and Biomedical Engineering
- Biomedical Physics and Engineering Express
- Biomedical Signal Processing and Control
- Bulletin of the Polish Academy of Sciences
- Computer Assisted Methods in Engineering and Science
- Computers and Electrical Engineering
- Computer Methods and Programs in Biomedicine
- eClinicalMedicine
- European Radiology
- IEEE International Ultrasonics Symposium (IUS)
- IEEE Journal of Biomedical and Health Informatics
- IEEE Signal Processing Letters
- IEEE Transactions on Antennas and Propagation
- IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control
- IEEE Transactions on Medical Imaging
- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)
- International Journal of Computer Assisted Radiology and Surgery
- International Journal of Imaging Systems and Technology
- Journal of Magnetic Resonance Imaging
- Journal of Ultrasonography

- Journal of Ultrasound in Medicine
- Machine Learning: Science and Technology
- Medical Physics
- Nature Communications
- Physics in Medicine and Biology
- Physiological Measurement
- Scientific Reports
- Scientific Data
- The Lancet Digital Health
- Ultrasonic Imaging
- Ultrasonics
- Ultrasound in Medicine and Biology
- IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)