Michal Byra

Curriculum Vitæ

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Profiles Scholar, Scopus

Research interests

neural networks, biomedical image analysis, computational ultrasound imaging

Education

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

Positions

Feb 2019 – present	**Assistant Professor** IFTR, Polish Academy of Sciences, Warsaw, Poland
Jul 2024 – present	**Research Scientist** Samsung AI Center, Warsaw, Poland
Jan 2024 – present	**Visiting Scientist (remotely)** RIKEN Center for Brain Science, Wako, Japan
Jun 2022 – Dec 2023	**Research Fellow** RIKEN Center for Brain Science, Wako, Japan
Feb 2018 – Feb 2019	**Postdoc** Department of Radiology, University of California, San Diego, USA
Oct 2012 – Sep 2017	**PhD Student** 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

2024 Distinguished reviewer award, IEEE Transactions on Medical Imaging
2024 Edward Wrobel award for scientists conducting research in biomedical engineering and computer science
2024 Award for scientific achievements, Polish Academy of Sciences
2024 Chair, session on domain adaptation and generalization, MIUA 2024
2023 World's top 2% scientists by Stanford University (in 2022 & 2023)
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
2017 Travel grant for promising PhD students, IEEE IUS 2017

Journal papers

[30] 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

[29] 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

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

[27] C. Thomas, **M. Byra**, R. Mati, M. Yap, R. Zwiggelaar
BUS-Set: a multi-dataset benchmark for comparison of breast ultrasound segmentation networks
Medical Physics, 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 neoadjuwant 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 neoadjuvant 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

[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. Koržinek, 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

Paper reviewing

- 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 Journal of Biomedical and Health Informatics
- 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)