PERSONAL INFORMATION

Name, Surname, Degree: prof. Ing. Radek Martinek, Ph.D.

WORK EXPERIENCE

16.11.2023– present
University Coordinator for Space Research.
Technical Univeristy of Ostrava.

1.9.2021 – present
Vice Dean for Research and Development.
Technical Univeristy of Ostrava, Faculty of Electrical Engineering and Computer Science.

8.5.2021 – present
Full Professor of Cybernetics.
Technical Univeristy of Ostrava, Faculty of Electrical Engineering and Computer Science, Department of Cybernetics and Biomedical Engineering.

1.1.2021 – present
Deputy Head for Research and Development, Department of Cybernetics and Biomedical Engineering.
Technical Univeristy of Ostrava, Faculty of Electrical Engineering and Computer Science, Department of Cybernetics and Biomedical Engineering.

1.7.2017 – 30.6.2021
Editor-in-Chief in Advances in Electrical and Electronic Engineerin.
ISSN 1336-1376, Technical Univeristy of Ostrava, Faculty of Electrical Engineering and Computer Science.

1.4.2017 – 8.5.2021
Associate Professor for Technical Cybernetics.
Technical Univeristy of Ostrava, Faculty of Electrical Engineering and Computer Science, Department of Cybernetics and Biomedical Engineering.

1.7.2014 – 31.3.2017
Assistant professor for Virtual Instrumentation, Automated Measurement and Signal Processing Systems.
Technical Univeristy of Ostrava, Faculty of Electrical Engineering and Computer Science, Department of Cybernetics and Biomedical Engineering.

1.10.2012 – 30.6.2014
Junior Researcher, member of Measurement and Sensors team.
Technical Univeristy of Ostrava, Faculty of Electrical Engineering and Computer Science, Department of Cybernetics and Biomedical Engineering.

EDUCATION AND TRAINING

8.5.2021
prof.
Technical University of Ostrava, Faculty of Electrical Engineering and Computer Science, Department of Cybernetics and Biomedical Engineering, appointed in Cybernetics.
Thesis of the inaugural lecture: *„Advanced methods of digital signal processing based on virtual instrumentation for applications in technical cybernetics and biomedical engineering.“*

1.4.2017
doc.
Technical University of Ostrava, Faculty of Electrical Engineering and Computer Science, Department of Cybernetics and Biomedical Engineering, appointed in Cybernetics.

Habilitation topic: *„Design and optimization of adaptive systems based on virtual instrumentation for applications in technical cybernetics and biomedical engineering.“*

2009 – 2014 **Ph.D.**
Technical University of Ostrava, Faculty of Electrical Engineering and Computer Science, Doctoral Study Programme: Informatics, Communication Technology and Applied Mathematics; Fields of Study: Communication Technology.
Dessertation topic:*„The use of Complex Adaptive methods of Signal processing for Refining the Diagnostic Quality of the Abdominal Fetal Electrocardiogram*.“

2007 – 2009 **Ing.**
Technical University of Ostrava, Faculty of Electrical Engineering and Computer Science, Master´s degree in Information and Communication Technologies; Field of Study: Telecommunication Technology.
Diploma thesis topic: *„Linear and Adaptive Filtration for Digital Signal Processing*.“

2004 – 2017 **Bc.**
Brno University of Technology, Faculty of Electrical Engineering and Communication, Bachelor´s degree in Electrical Engineering, Electronics, Communication and Control Engineering; Field of Study: Teleinformatics
Theme of the bachelor thesis: *„The use of adaptive filtering for noise suppression in communication systems.“*

ADDITIONAL EXPERIENCE AND MEMBERSHIPS

2025 – present **SKV Evaluator,** System for Research Evaluation, Office of the Government of the Czech Republic

2025 – present **Vice-Chair, Evaluation Panel P102** (Electrical and Electronic Engineering), Grant Agency of the Czech Republic (GAČR)

2024 – present **Vice-Chairman,** Czech Society for Artificial Intelligence and Innovative Digital Technologies in Medicine.

2024 – present **Member of Scientific Board for Doctoral Studies,** Faculty of Electrical Engineering, Automatic Control and Informatics, Opole University of Technology, Poland

2023 – present **Member of Evaluation Panel P102** (Electrical and Electronic Engineering), Grant Agency of the Czech Republic (GAČR)

2023 – present **Head of Signal Lab,** Faculty of Electrical Engineering and Computer Science, VSB-TUO, within the REFRESH project, TL4 Lab.

2023 – present **University Representative in CAERPIN** (Czech Aerospace Research and Innovation Network), national platform for coordination of Czech space research.

2022 – present **Senior IEEE Membership,** New Jersey, USA.

1.9.2021 – present **Member of Scientific Council**, Technical University of Ostrava.

2017 – 1.9.2021 **Vice-Chairman of Academic Senate FEECS**, Technical University of Ostrava.

2017 – 1.9.2021 **Member of Academic Senate**, Technical University of Ostrava.

2019 – present **Member of Cybernetics Board,** Technical University of Ostrava.

2019 – present **Member of Communication Technology Board,** Technical University of Ostrava.

2016 – 2022 **IEEE Membership,** New Jersey, USA.

2019 – present **IEEE Signal Processing Society Membership,** New Jersey, USA.

2019 – present **IEEE Sensors Council,** New Jersey, USA.

2014 – present **Laboratory Manager – Signals and Systems**, Technical University of Ostrava.

2016 – present **Laboratory Manager and Chief Administrator – Broadband^{LIGHT} polygon for deployment of SMART City concept and Industry 4.0**, Technical University of Ostrava.

AUTHOR IDENTIFICATION

SCOPUS Author ID: 36537543900.

Web of Science ResearcherID: Q-3601-2017.

ORCID http://orcid.org/0000-0003-2054-143X

PROFESSIONAL FOCUS

Bioinspired algorithms; adaptive/non-adaptive digital signal processing methods; hybrid algorithms; hybrid algorithm optimization; acoustic/pneumatic/hydraulic sensors; non-invasive medicine; SMART technologies; industry 4.0; electronic fetal monitoring; sensor systems; SMART sensors; digital filtering; advanced communication systems; channel equalization; software-defined radio; visible light communication; optimization; speech processing; voice control; fetal electrocardiogram; fetal phonocardiography; ballistocardiography measurement and processing; human vital signs measurement; magnetic resonance imaging; traffic sensors; softcomputing methods; smart city; animal electrocardiography processing; Doppler ultrasound; artificial intelligence; machine learning; deep learning; explainable AI; predictive maintenance; anomaly detection; AIoT; blockchain in healthcare and industry; secure data sharing; distributed sensor networks; edge AI; wearable sensors for industry; machine monitoring; sensors for MR environments; animal vital signs monitoring; accelerometry; physiological monitoring in space; AI in space missions; sensor fusion; biomedical signal processing; real-time data analytics; drone-based sensing; drone communication systems; UAV monitoring; drones in agriculture; drone swarm intelligence.

PUBLISHING ACTIVITIES

Tab. 1: Summary of publication activity on SCOPUS and WoS (09.05.2025).

Articles indexed in SCOPUS	376
Articles indexed in WoS	366

APPLIED RESEARCH

Tab. 2: Summary of applied research activities (09.05.2025).

National Patent	11
Licensed Patent	1
Utility Model	7
Software	20
Semi-operation of technology	8

RECOGNITION OF RESULTS

Tab. 3: Summary of citation responses on Web of Sciencee and Scopus (09.05.2025)

database	Citations without self / H-index
Scopus	2916/25
Web of Science	1597/- (28)

LEADERSHIP OF STUDENTS

Tab 4.: Summary of successfully defended graduate theses and foreign internships (09.05.2025).

Dessertation Theses	Diploma Theses	Bachelor Theses	Foreign Internships
8	37	19	5

SELECTED SOLVED PROJECTS

- Ministry of Industry and Trade. Operational Programme Enterprise and Innovation for Competitiveness, APPLICATION – CHALLENGE VII, project name: “Development of a complex sensor system for effective control of magnetic resonance imaging”, registration number: CZ.01.1.02/0.0/0.0/19_262/0020242, Main Role: Co-Principal Investigator, Solution period: 2020–2022, Financial volume: 28 594 909 CZK.
- Contract research in signal processing, HS4501907 for BABY patron s.r.o., project name: “Development of fetal monitoring devices in the home environment”, Main Role: Principal Investigator, Solution period: 2019–2020, Financial volume: 1 800 000 CZK (including license and software).
- TAČR THÉTA, project name: “Smart energy management system for power grids”, registration number: TK02030039, Main Role: Guarantor of the Sensors Research Programme, Solution period: 2019–2023.
- OP VVV Research Projects – MŠMT, project name: “Platform for Industry 4.0 and Robotics Oriented Research in the Ostrava Agglomeration”, registration number: CZ.02.1.01/0.0/0.0/17_049/0008425, Main Role: Guarantor of the Artificial Intelligence Research Programme, Solution period: 2018–2022.
- OP VVV Research Projects, project name: “Research Centre for Advanced Mechatronics Systems”, registration number: CZ.02.1.01/0.0/0.0/16_019/0000867, Main Role: Guarantor of the Advanced Methods of Signal Processing and Analysis based on Virtual Instrumentation, Solution period: 2018–2022.
- TAČR TREND, project name: “A comprehensive system for developing the field of non-invasive fetal ECG monitoring”, registration number: FW03010392, Main Role: Co-Principal Investigator, Solution period: 2021–2024, Financial volume: 25 132 387 CZK.
- TAČR TREND, project name: “MR Relaxometry of Basal Ganglia Damage in Newborns With Hypoxic-Ischemic Encephalopathy”, registration number: FW06010498, Main Role: Co-Principal Investigator, Solution period: 2023–2027, Financial volume: 26 957 953 CZK.
- Ministry of Industry and Trade, project name: “Use of Pulse Excitation Technique for Non-Destructive Testing of Elastic Material Properties”, registration number: CZ.01.01.01/01/22_002/0000887, Main Role: Co-Principal Investigator, Solution period: 2024–2026, Financial volume: approx. 34 066 468 CZK.
- Contract research for Brose CZ spol. s r.o., project name: “Feasibility Study for Testing Seat Structures Using Acoustic Methods – Pilot Project BK6”, Main Role: Principal Investigator, Solution period: 2024, Financial volume: 300 000 CZK.
- Contract research for SOHE s.r.o., within the EDIH Ostrava initiative, project name: “Camera-based Inspection of Plants in Indoor Cultivation Conditions”, Main Role: Principal Investigator, Solution period: 2023, Financial volume: 679 011 CZK.

- Contract research for FUTTEC a.s., within the AI TEF Ostrava initiative, project name: “AI-Supported Surface Defect Detection and Analysis for Mobile Systems”, Main Role: Principal Investigator, Solution period: 2024, Financial volume: 1 061 000 CZK.
- Contract research for STAPRO s.r.o., project name: “Feasibility Study of Language Models for Diagnosis and Classification from Anonymized Electronic Health Records”, Main Role: Principal Investigator, Solution period: 2025, Financial volume: 450 000 CZK.
- European Commission, Horizon 2020 – WIDESPREAD-2018-03, project name: “GeoUS – Geothermal Energy in Special Underground Structures”, registration number: 856670, Main Role: Team Member – Researcher, Solution period: 2020–2022, Project partners: Fraunhofer Institute, University of Vaasa.
- Ministry of Industry and Trade, CORNET 22 (COllective Research NETworking), project name: “EFFICoil – Resource-efficient, flexible manufacturing and testing processes for high performance coils”, registration number: CZ.01.1.02/0.0/0.0/16_079/0008848, Main Role: Team Member – Researcher, Solution period: 2018–2020, Project partner: Fraunhofer Institute IWU Chemnitz.
- Ministry of Industry and Trade, CORNET 20 (COllective Research NETworking), project name: “SELF – Sequential electromagnetic forming for flexible production of large sheet metal parts”, registration number: CZ.01.1.02/0.0/0.0/15_007/0002298, Main Role: Team Member – Researcher, Solution period: 2016–2018, Project partner: Fraunhofer Institute IWU Chemnitz.
- Polish National Agency for Academic Exchange – ULAM NAWA, project name: “Joint Publication Initiative between VSB-TUO and Opole University”, registration number: BPN/ULM/2021/1/00108, Main Role: Beneficiary, Solution period: 2021–2022.

SELECTED SCIENTIFIC PUBLICATIONS

- Kahankova, R., Mikolasova, M., Jaros, R., Barnova, K., Ladrova, M., & Martinek, R. (2022). A review of recent advances and future developments in fetal phonocardiography. IEEE Reviews in Biomedical Engineering, 16, 653–671. (IF=17.6, Q1)
- Kahankova, R., Martinek, R., Jaros, R., Behbehani, K., Matonia, A., Jezewski, M., & Behar, J. A. (2019). A review of signal processing techniques for non-invasive fetal electrocardiography. IEEE Reviews in Biomedical Engineering, 13, 51–73. (IF=17.6, Q1)
- Ladrova, M., Martinek, R., Nedoma, J., Hanzlikova, P., Nelson, M. D., Kahankova, R., ... & Kolarik, J. (2021). Monitoring and synchronization of cardiac and respiratory traces in magnetic resonance imaging: a review. IEEE Reviews in Biomedical Engineering, 15, 200–221. (IF=17.6, Q1)
- Al-Fahdawi, S., Al-Waisy, A. S., Zeebaree, D. Q., Qahwaji, R., Natiq, H., Mohammed, M. A., ... & Deveci, M. (2024). Fundus-DeepNet: Multi-label deep learning classification system for enhanced detection of multiple ocular diseases through data fusion of fundus images. Information Fusion, 102, 102059. (IF=18.6, Q1)
- Danys, L., Zolotova, I., Romero, D., Papcun, P., Kajati, E., Jaros, R., ... & Martinek, R. (2022). Visible Light Communication and localization: A study on tracking solutions for Industry 4.0 and the Operator 4.0. Journal of Manufacturing Systems, 64, 535–545. (IF=12.1, Q1)
- Mohammed, M. A., Lakhan, A., Abdulkareem, K. H., Abd Ghani, M. K., Marhoon, H. A., Kadry, S., ... & Zapirain, B. G. (2023). Industrial Internet of Water Things architecture for data standardization based on blockchain and digital twin technology. Journal of Advanced Research. (IF=10.7, Q1)

- Jaros, R., Byrtus, R., Dohnal, J., Danys, L., Baros, J., Koziorek, J., ... & Martinek, R. (2023). Advanced signal processing methods for condition monitoring. Archives of Computational Methods in Engineering, 30(3), 1553–1577. (IF=9.7, Q1)
- Barnova, K., Martinek, R., Jaros, R., Kahankova, R., Behbehani, K., & Snasel, V. (2021). System for adaptive extraction of non-invasive fetal electrocardiogram. Applied Soft Computing, 113, 107940. (IF=8.7, Q1)
- Arshad, M., Saeed, M., Rahman, A. U., Mohammed, M. A., Abdulkareem, K. H., Nedoma, J., ... & Deveci, M. (2024). A robust framework for the selection of optimal COVID-19 mask based on aggregations of interval-valued multi-fuzzy hypersoft sets. Expert Systems with Applications, 238, 121944. (IF=8.5, Q1)
- Brablik, J., Ladrova, M., Vilimek, D., Kolarik, J., Kahankova, R., Hanzlikova, P., ... & Martinek, R. (2022). A comparison of alternative approaches to MR cardiac triggering: A pilot study at 3 Tesla. IEEE Journal of Biomedical and Health Informatics, 26(6), 2594–2605. (IF=7.7, Q1)
- Kahankova, R., Ladrova, M., Barnova, K., Jaros, R., Kolarik, J., Vilimek, D., ... & Martinek, R. (2023). AI-based classification of fetal heart signals: New insights from phonocardiography and ECG fusion. Computers in Biology and Medicine, 157, 106738. (IF=7.7, Q1)
- Mohammed, M. A., Hameed, H., Al-Waisy, A. S., Abdulkareem, K. H., Nedoma, J., & Martinek, R. (2023). Federated learning-based framework for privacy-preserving diagnosis of COVID-19 using chest X-ray images. Computers in Biology and Medicine, 145, 105482. (IF=7.7, Q1)
- Mohammed, M. A., Garcia-Zapirain, B., Nedoma, J., Martinek, R., Tiwari, P., & Kumar, N. (2022). Fully homomorphic enabled secure task offloading and scheduling system for transport applications. IEEE Transactions on Vehicular Technology, 71(11), 12140–12153. (IF=6.8, D1)
- Vanus, J., Martinek, R., Danys, L., Nedoma, J., & Bilik, P. (2022). Occupancy detection in smart home space using interoperable building automation technologies. Human-Centric Computing and Information Sciencees, 12(1), 616–632. (IF=6.6, Q1)
- Nedoma, J., Martinek, R., Danys, L., & Jaros, R. (2022). Adaptive digital filter design for biomedical signal enhancement in noisy environments. Biomedical Signal Processing and Control, 71, 103144. (IF=6.0, Q1)
- Martinek, R., Nedoma, J., Kahankova, R., & Jaros, R. (2022). Explainable AI in biomedical engineering: A review of current applications and challenges. Artificial Intelligence in Medicine, 128, 102256. (IF=5.9, Q1)
- Jaros, R., Nedoma, J., Kepak, S., & Martinek, R. (2022). Fiber-optic interferometry-based heart rate monitoring. IEEE Transactions on Instrumentation and Measurement, 71, 1–15. (IF=5.6, Q1)
- Prauzek, M., Hercik, R., Konecny, J., Mikolajek, M., Stankus, M., Koziorek, J., & Martinek, R. (2022). An optical-based sensor for automotive exhaust gas temperature measurement. IEEE Transactions on Instrumentation and Measurement, 71, 1–11. (IF=5.6, Q1)
- Hajovsky, R., Pies, M., Velicka, J., Slany, V., Rous, R., Danys, L., & Martinek, R. (2022). Design of an IoT-Based Monitoring System as a Part of Prevention of Thermal Events in Mining and Landfill Waste Disposal Sites: A Pilot Case Study. IEEE Transactions on Instrumentation and Measurement, 72, 1–14. (IF=5.6, Q1)
- Fajkus, M., Kovar, P., Skapa, J., Nedoma, J., Martinek, R., & Vasinek, V. (2021). Design of fiber Bragg grating sensor networks. IEEE Transactions on Instrumentation and Measurement, 71, 1–11. (IF=5.6, Q1)

- Raj, A., Brablik, J., Kahankova, R., Jaros, R., Barnova, K., Snasel, V., ... & Martinek, R. (2022). Nature inspired method for noninvasive fetal ECG extraction. Scientific Reports, 12(1), 20159. (IF=4.6, Q1)
- Danys, L., Nedoma, J., Martinek, R., & Jaros, R. (2021). Noninvasive fetal ECG extraction using blind source separation: evaluation on real clinical datasets. Sensors, 21(3), 1018. (IF=4.9, Q1)
- Martinek, R., Nedoma, J., Kahankova, R., & Jaros, R. (2022). Explainable AI in biomedical engineering: A review of current applications and challenges. Artificial Intelligence in Medicine, 128, 102256. (IF=5.9, Q1)
- Martinek, R., Nedoma, J., Kahankova, R., & Jaros, R. (2021). Advanced Methods for Non-Invasive Fetal ECG Extraction: From Classical Filtering to AI-based Approaches. Biomedical Signal Processing and Control, 70, 103019. (IF=6.0, Q1)
- Martinek, R., Baros, J., Nedoma, J., & Jaros, R. (2021). Fetal Heart Monitoring Using Noninvasive Sensors: Challenges and Future Directions. Sensors, 21(15), 4992. (IF=4.9, Q1)
- Martinek, R., Kahankova, R., Jaros, R., & Behbehani, K. (2020). Signal Quality Assessment of Fetal ECG Using Machine Learning and Hybrid Features. Computers in Biology and Medicine, 122, 103848. (IF=7.7, Q1)
- Martinek, R., Nedoma, J., Kahankova, R., & Jaros, R. (2023). Hybrid Feature-Based Method for Improving Detection of Fetal QRS Complexes from Noninvasive Abdominal Recordings. Computer Methods and Programs in Biomedicine, 230, 107200. (IF=6.1, Q1)

SELECTED PATENTS

- Czech Republic, patent no. 309233, project name: “System for Recognition and Classification of Flat Wheels in Railway Transport”, Inventors: Marcel Fajkus, Jan Nedoma, Pavol Partila, Jaromír Továrek, Radek Martinek, Publication date: 15.6.2022, Licensing: Yes, License date: 16.1.2024, License revenue: 423 000 CZK.
- Czech Republic, patent no. 308705, project name: “System for Monitoring Cardiopulmonary Activities of the Human Body, Including in MRI Environments, Reducing Examination Time”, Inventors: Radek Martinek et al., Publication date: 10.3.2021.
- Czech Republic, patent no. 308496, project name: “Control System for AC Charging Stations or Groups of Stations for Local Distribution Networks with Limited Reserved Capacity, and Method of Control”, Inventors: Zdeněk Slanina et al., Publication date: 23.9.2020.
- Czech Republic, patent no. 308249, project name: “Power Supply Unit”, Inventors: Petr Koudelka, Lumír Kunčický, Radek Martinek et al., Publication date: 25.3.2020.
- Czech Republic, patent no. 308261, project name: “System for Monitoring Cardiopulmonary Activities of the Human Body in MRI Environments”, Inventors: Radek Martinek et al., Publication date: 25.3.2020.
- Czech Republic, patent no. 308074, project name: “Phantom for Continuous Generation of Fetal and Maternal Electrocardiogram”, Inventors: Radek Martinek et al., Publication date: 11.12.2019, Licensing: Yes, License date: 15.1.2020, License revenue: 320 000 CZK.
- Czech Republic, patent no. 307778, project name: “Sensor for Monitoring Vital Functions of the Human Body in Electromagnetically Disturbed Environments and Method of Manufacture”, Inventors: Jan Nedoma, Marcel Fajkus, Martin Novák, Radek Martinek et al., Publication date: 24.4.2019.
- Czech Republic, patent no. 307183, project name: “Device for Monitoring Vital Functions of a Fetus in a Pregnant Woman”, Inventors: Stanislav Kepák et al., Publication date: 28.2.2018.

- Czech Republic, patent no. 306992, project name: “Method for Measuring Speed in Traffic and a Non-Destructive System for Implementing the Method”, Inventors: Vladimír Vašinek et al., Publication date: 1.11.2017.
- Czech Republic, patent no. 306857, project name: “Optical Fiber Measurement System for Monitoring Vital Functions of the Human Body”, Inventors: Vladimír Vašinek, Jan Nedoma, Marcel Fajkus, Radek Martinek, Publication date: 9.8.2017.

ACADEMIC AWARDS

- 2021: The best publishing author of 2020 at Technical University of Ostrava.
- 2020: The best researcher of 2020 under the age of 35 at Technical University of Ostrava.
- 2020, 2022, 2023, 2024: Member of Top 2% Scientists (World Ranking), List of Stanford University.
- 2018 – Best Presentation at 10th International Conference on Computer Modeling and Simulation, Sydney, Australia.
- 2018 – IFAC Young Author Award for article „Least Mean Squares Adaptive Algorithms Optimization for Fetal Phonocardiogram Extraction“ presented at 15th IFAC Conference on Programmable Devices and Embedded Systems.
- 2018 – The Best IEEE Healthcom 2018 Workshop Organization at IEEE international Conference on E-health Networking, Application and Services.
- 2017 – Best Paper Award for „Fetal ECG extraction from abdominal ECG using RLS based adaptive algorithms“ article presented at International Carpathian Control Conference.