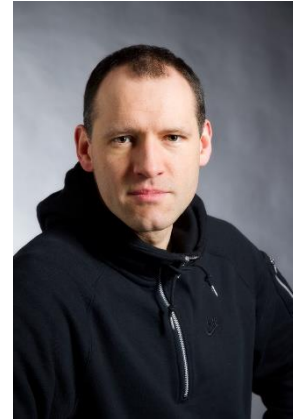


Curriculum Vitae

Name: Rafał Piotr Jastrzębski
Date of Birth: 22nd November 1978
Nationality: Polish
Gender: male
ORCID: 0000-0002-4401-5533
Scopus Author ID: 6603226323
IEEE Senior member since 2022
Date of CV 2023.6



Degrees and qualifications

2020.07.01 – 2025.6.30: Docent in the School of Energy Systems, Lappeenranta-Lahti University of Technology (LUT): *Modelling and control of electromechanical systems*

2007.12.19: Doctor of Science (Technology), Department of Electrical Engineering, LUT, Finland. Dissertation: *Design and implementation of FPGA-based LQ control of active magnetic bearings.*

2002: Master of Science (Engineering), Technical University of Łódź, Poland. MSc Project, LUT, Finland. Thesis: *Implementation of inverter control algorithms using programmable circuits*

Position

12.2022-present: Associate Professor (tenured) (Mechanical and Materials Engineering) University of Turku, Finland.

2020.07.01 – 2025.6.30: Docent in the School of Energy Systems, LUT, Finland.

Employment History

1.8.2023-present: Mechanical and Materials Engineering, University of Turku, Finland. **Duties:** Planning and implementation of curricula for Automation MSc and BSc engineering programs at UTU. Responsible for automation lab content at KTK. Implementing teaching, administrative tasks, acquisition of funding, and own research.

1.9.2019-31.7.2023: LUT, Finland. **Docent. Duties:** Research directing and planning, teaching planning (main responsible teacher for 3 courses in 2021/22). Supervision of (4) PhD students as main supervisor and (1) as second supervisor at LUT. Acquisition of funding for the research team. Project based work: design of high-power AMB supported rotors, bearingless motors, linear levitated movers, position sensors, motor and control design, overseeing prototype building and quality control, supervision, and co-supervision of own and others' students, implementing teaching, and administrative tasks.

2013-2018: LUT. **Position:** Academy Research Fellow. **Duties:** Directing 3 Academy founded research projects. Leading the magnetic levitation research team at LUT. Writing the applications and acquisition of funding for the research team, overseeing prototype building (AMB test rigs,

bearingless motors 10kW, 100kW, 160kW, linear PMFSM, position sensors for linear and rotating bearingless motor prototypes, AMBs design and control for industrial prototypes) and equipment acquisition (PCs, PLCs, sensor and control electronics, measurement equipment), related administrative tasks. Research management. Teaching (Digital Control Design, Bearingless motors) and co-supervision of the PhD, MSc, and BSc students, recruitment for related projects. In the academy projects two World's biggest bearingless machines have been designed in collaboration with Tokyo Tech and constructed at LUT.

2009-2013: LUT. Position: Researcher and (Academy) Postdoctoral Researcher. Duties: Writing applications for new research, infrastructure, and industrial projects. Academy research, project management of the AMB related activities at LUT. Teaching (Digital Control, High-speed machines, Embedded Control) and supervision of the Ph.D. and M.Sc. students, overseeing of the construction of new AMB prototypes.

2008: LUT. Position: Postdoctoral Researcher. Duties: I was responsible for research, which involved robust, and energy efficient control design for the magnetically suspended systems and application design. I have briefly contributed to project work for chatter suppression in turning machine. Teaching (Embedded Control, Digital Control) and supervision of the M.Sc. students.

2004.04-2007.12: LUT. Position: Ph.D. Student. Duties: I was responsible for design of the embedded control systems on FPGA, testing of the control electronics (including power electronics and current control), AMB-rotor system modeling, selection of electronic components (sensors, control units), testing of the complete active magnetic bearing rotor system, and model-based control methods, hardware and software debugging. Moreover, I had responsibilities in teaching (Embedded Control, Digital Control) and co-supervising work of visiting SOCRATES/ERASMUS exchange students.

2003.09-2004.04: LUT. Position: Research assistant and CIMO mobility.

I have acquired own funding for international mobility to Finland. Part-time employment by LUT. **Duties:** I was responsible for implementation of induction motor controller and frequency converter controller in FPGA. In addition, the work involved FPGA emulation for induction motor.

2002.10-2003.08: Technical University of Łódź, Poland in cooperation with Deutches Elektronen-Synchrotron (DESY), Hamburg, Germany. **Position: Researcher. Duties:** Teaching and course preparation (Microprocessor programming), development of control for linear accelerator (hadron collider) facilities at DESY.

2002.01-2002.08: LUT. **Position:** Research assistant. Visiting MSc Socrates student. Partial employment at LUT. **Duties:** I was responsible for implementation of a direct torque control (DTC) and frequency converter controller in FPGA. I was involved in teaching (VHDL programming).

2001.07: K2, Łódź, Poland. **Position:** Professional trainee. **Duties:** Perl Programmer for WWW applications.

Visiting/Exchange Researcher/Professor

- Tokio Institute of Technology, Japan, 1 week in 10.2014, 3 months in 03-05.2015,

2 weeks in 11.2016, 8 months in 2022.11-2023.6

- MIT, USA, 1 week 5.2017.
- LUT, Poland, 1 week 10.2017.
- Bialystok University of Technology, Poland, 1 week in 01.2014.
- Technical University of Lodz and Bialystok University, Poland, 1 week each in 06.2012.
- Virginia State University, United States, 2 weeks in 10.2011.
- Technical University of Lodz and Bialystok University, Poland, 2 weeks in 08.2011.
- Technical University of Krakow Poland, 1 week in 12.2010.
- Deutches Elektronen-Synchrotron (DESY), Hamburg, Germany, 2 months in 06-07.2003.

Served as Reviewer for

- IEEE Transactions on Industrial Electronics (2019,2020,2021,2022,2023)
- IEEE Transactions on Mechatronics (2019,2022,2023)
- IEEE Transactions on Industry Applications (2020,2021,2022,2023)
- IEEE PES Transactions on Energy Conversion (2019,2021,2023)
- IEEE Power Engineering Letters (2023)
- IEEE-IAS Electric Machines Committee (2023)
- Energies (2014,2017,2022)
- MED Mediterranean Conference on Control and Automation (2021)
- Journal of Mechanical Engineering Science (2019)
- IEEE IMDC (2019)
- IET Electric Power Applications (2018)
- IEEE ICEM, ICEMS, MSM (2016)
- IEEE Energy Conversion Systems (2015)
- Acta Mechanica et Automatica (2012,2014,2015)
- Sensors (2014)
- Journal of Mechanical Science and Technology (2011,2010,2013,2014)
- Solid State Phenomena (2012)
- International Journal of Robust and Nonlinear Control (2010)
- Mechatronics (2009)

Co/organization of 1 IEEE EPE conference, several IEEE tutorial sessions at various conferences.

Courses Taught

- Basics of AMBs and bearingless motors (summer school: 2022,2023)
- Basics of Robust Control (summer school: 2022,2023)
- Digital Control Design (2007-2023)
- Diploma Work Project 2008-2022 (as MSc supervisor)
- Bearingless motors and AMBs (2016,2018,2019)
- High Speed Machines (2010)
- Embedded Control (2004-2009)
- Programming in VHDL (2002)

Funded Research as Principal Investigator (being main proposal writer and execution director\recipient)

- “Linear Precision Motion Platform”, 1803/31/2022 BF TUTL, 01.09.2022 - 01.09.2024, 773662 € (combined budget LUT-LAB).
- Mobility grant from Finland to Japan, Academy of Finland, 16.02.2022 - 31.12.2023, no 350880, 31000 €.
- “Direct force control for high-speed AMB rotor and bearingless motor systems”, LUT Doctoral School: Funding for a jointly supervised doctoral student in 2021-2024, 160000€.
- “EMBER High temperature high-efficiency oil-free heat pump”, 1745/31/2020, BF TUTL, 01.06.2020 - 31.12.2022, 936108 € (combined budget LUT-LAB).
- “Utilization of linear and rotating bearingless motor technologies for industrial motion control applications - pilot projects and experimentation”, Academy of Finland, no. 304784, 01.10.2016 - 30.09.2018, 300000 €.
- “Centralized Model-based Solutions for control of high-speed rotors in Cost-Efficient Energy Applications”, 270012, Academy of Finland, 01.09.2013 - 31.08.2018, 425000 €
- Academy of Finland research team funding, 304071, 01.09.2013 - 31.08.2016, 300000 €.
- Academy of Finland investment funding, 304784, 01.09.2016 - 31.08.2018, 140000 €.
- “Design and implementation of model-based robust control of active magnetic bearings for high performance electrical machines”, Academy of Finland, 01.01.2009 - 31.12.2011, 195420 €.
- CIMO Scholarship Program for Students in Finland, 8 months 2004.

Successful Drafting and Co-drafting Research Applications for Realized Projects under various professor names (claimed near or 100% contribution to the application/idea/topics)

- Industrial project “AMBs for High-Speed Compressor”, 2.5.2020-30.4.2021, 188000 €.
- “Commercialization of twin bearingless high-power high-speed electrical machine”, TUTL Business Finland, 01.09.2016 - 30.06.2018 (extended to 31.12.2018), 714280 €.
- “Laboratory facility (bunker) for safe high-speed rotor testing”, 2015, 280000 €.
- “Reconfigurable laboratory rig for testing various strategic components of high-speed applications”, Faculty of Technology Investment proposal, 2014, 227000 €.
- 2 Industrial projects, 1.5.2012 - 31.12.2013, 293000 €.
- **Served as main application writer for numerous not funded applications not mentioned including EU Horizon applications, Finnish Academy Projects, and Business Finland Projects.**

Served as assisting application writer for numerous other funded applications not mentioned above including Research Platforms.

Project Management

- Industrial project “AMBs for High-Speed Compressor”, 2.5.2020-15.9.2020, 188000 €.
- “Commercialization of twin bearingless high-power high-speed electrical machine”, TUTL TEKES, 01.09.2016 - 31.12.2018, 714280 €.

- “Reconfigurable laboratory rig for testing various strategic components of high-speed applications”, 2014, 227000 €.
- Industrial Project, Private Company, 1.6.2012 - 31.12.2013, 112000 €.
- Industrial Project, Private Company, 1.5.2012 - 30.4.2013, 181000 €.
- “SaLUT-FCB to Business”, TEKES, 1.9.2011 - 31.8.2013, 101160 €.

Research output

- Co/developed comprehensive methods and design tools for control, modelling and design of active magnetic bearing (AMB)-rotors/bearingless motors (BMs), rotor dynamics, friction computation, electromagnetic modelling at LUT. Co/developed 4 different position sensors (eddy current, inductive, capacitive, for rotating and linear machines) in use at various labs, research teams at LUT, and LUT startups and companies.
- Co/developed/built lab infrastructure including table stands, ID rig, several small and medium research rigs (as main designer and project PI) including bearingless machines from 10 to 160 kW and up to 30000 r/min. The built machines include:
 - **the 2nd World Biggest Bearingless motor 100kW designed for water treatment aeration compressor (2015).**
 - **the 1st World Biggest Bearingless motor 160kW designed for 500kW high temperature industrial heat pump (2021/2022).**
- Patents and inventions (23 IPRs and disclosures) in high-speed machines, bearingless motors, AMBs, sensors, and control methods: 276/5161/2011 (FI20126506), 373/5161/2011 (FI20126241), 206/5161/2012 (FI20145520), 236/5161/2012, combined to 206/5161/2012, 269/5161/2013 (FI201308501), 268/5161/2013 (FI20145520, FI127524), 621/5161/2014 (FI20155503, FI126506), 679/5161/2014 (FI20155507), US9784596B2 (EP14159872), 325/5161/2015, not patented, 399/5161/2015 (FI20165628, US20190214179A1), 81/5161/2016, (FI20165629, WO2018037158A1), 84/5161/2016 (FI20165494, WO2017216421A2), 206/5161/2016 (FI20175261, WO2018172606A1), 401/5161/2018 (FI20195476, FP300090FI), 419/5161/2018 (FI20195489), 58/5161/2020 (FI20205597), 59/5161/2020 (FI20215942, FI130001B), 60/5161/2020 (FI20210830), FI20215679, IPID 1249, US11289970B2, US11286983B2.

Graduate (PhD) Students: Supervised / Co-supervised / Co-advised (10 PhD students)

- **Main supervisor of** M.Sc. Sadjad Madanzadeh (2025), M.Sc. Andrei Zhuravlev (2024), M.Sc. Atte Putkonen (2024), PhD Daria Kepsu (2022)
- **Co-supervised / Co-advised** PhD Jouni Vuojolainen (2020), M.Sc. Teemu Sillanpää (moved to industry, not graduated as of 2022), PhD Pekko Jaatinen (2019), / PhD Eerik Sikanen (2019), PhD Alexander Smirnov (2012), PhD Katja Hynynen (2011).

Undergraduate Students Examined/Supervised/Co-supervised (23 MSc and 1 BSc)

M.Sc. Alex Rossu (2021), M.Sc. Emil Lakupov (2020), M.Sc. Jonas Boogaerts (2020), M.Sc. Atte Putkonen (2018), M.Sc. Rostislav Teryaev (2018), M.Sc. Andrei Zhuravlev (2018), M.Sc. Subhadyuti Sahoo (2018), M.Sc. Devika Ushakumari (2017), M.Sc. Pavel Mirilenko (2017), M.Sc. Michal Micor (2016), M.Sc. Maxim Sokolov (2014), M.Sc. Eerik Sikanen (2014), M.Sc. Aleksei Romanenko (2013), M.Sc. Teemu Sillanpää (2013), M.Sc. Pekko Jaatinen (2013), M.Sc. Alireza Fakhrizadeh Esfahani (2013), M.Sc. Maciej Kedzia (2011), M.Sc. Agata Gasinska (2011), M.Sc. Nikolay Shapovalov (2011), M.Sc. Kirill Rykov (2011), M.Sc. Armen Madoyan (2009), M.Sc. Maciej Patucha (2009), M.Sc. Maciej Mrowiec (2009), M.Sc. Jakub Nowacki (2008).

Publications

Peer-reviewed scientific articles including: 24 scientific international journals, 1 book chapter, 76 scientific papers in conference proceedings.

Present Non-Work-Related Interests

Tennis, cycling, badminton, floor ball, swimming, motorcycles, various other sports, and keyboard music