DEPARTMENT OF ELECTRICAL ENGINEERING AND MECHATRONICS

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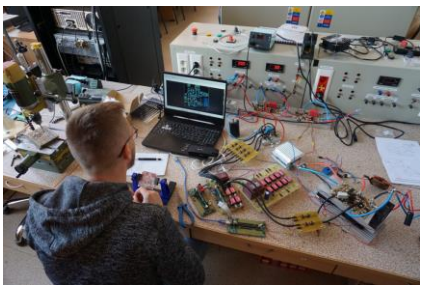
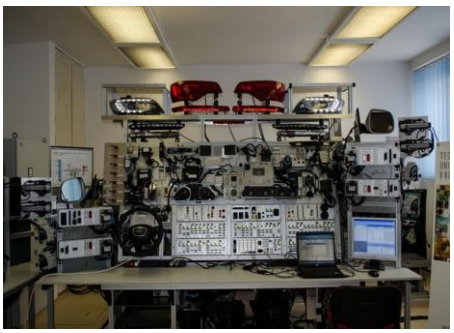
1 DEPARTMENT'S PROFILE

The Department was founded in 1969, coinciding with the establishment of the Faculty of Electrical Engineering. Originally known as the Department of Electrical Drives, it traces its roots back to the Department of Electrical Engineering, which was established in 1953, alongside the founding of the Technical University of Košice. Over the years, the department's name evolved to better reflect its expanding activities and areas of expertise.

The department's faculty members possess extensive experience across diverse domains within electrical engineering, including automotive electrical engineering, mechatronics, and robotics, which they leverage in both teaching and research endeavors. Currently, the department oversees education and research in various aspects of electrical engineering, with specific focus on power and industrial electronics, electrical machines and apparatuses, sensors, electromechanical systems, controlled drives, multi-motor drives, control systems, and industrial and automotive mechatronic systems, extending to robotic drives.

The Department offers a comprehensive range of academic programs, encompassing bachelor's, master's, and Ph.D. courses.





2 STAFF

Professors:	prof. Ing. Pavol Fedor, PhD. prof. Ing. Daniela Perduková, PhD.
Associate Professors:	doc. Ing. František Ďurovský, PhD. doc. Ing. Želmíra Ferková, PhD. doc. Ing. Peter Girovský, PhD. doc. Ing. Ján Kaňuch, PhD. doc. Ing. Karol Kyslan, PhD. doc. Ing. Milan Lacko, PhD. doc. Ing. Marek Pástor, PhD. doc. Ing. Jaroslava Žilková, PhD.
Assistant Professors:	Ing. Ján Bačík, PhD. Ing. Peter Bober, PhD. Ing. Viktor Šlapák, PhD. Ing. Viktor Petro, PhD.
Senior Scientists:	Ing. Peter Hajsák doc. Ing. Viliam Fedák, PhD. doc. Ing. Michal Kostelný, CSc. prof. Ing. Pavel Záskalický, PhD.
Technical Staff:	Zuzana Olexová
Full time Ph.D. Students:	Ing. Tomáš Basarik Ing. Dávid Bodnár (till August 2024) Ing. Daniel Gordan Ing. Ladislav Hric (since September 2024) Ing. Matej Hric (since September 2024) Ing. Tadeáš Kmecik Ing. Daniel Marcin Ing. Lukáš Pancurák

3 LABORATORIES

- Power Electronics Laboratory
- Simulation Systems Laboratory (COSMOS, ProEngineer, MATLAB, PSpice, and applied SW, ABBRobotStudio, EPLAN, AVL)
- Laboratory of Industrial Automation
- Laboratory of Electrical Machines and Electrical Drives
- Laboratory of Controlled Electrical Drives
- Automotive Electrical Engineering Laboratory
- Laboratory of Electrical Devices and Applied Electronics
- Laboratory of Electric Drives Applications
- BSH Motor Control Laboratory

4 TEACHING

4.1. Undergraduate Study (Bc.)

a) Bachelor study programme in Automated Electrical Systems (title: Bc.)

Subject	Semester	Lectures/exercises (hours per week)	Lecturer
Fundamentals of Electrical Engineering	1st	2/2	Kaňuch
Computer Applications	2nd	2/2	Perduková
Electrical Machines Fundamentals	3rd	2/2	Záskalický
Automotive Electrical Systems	3rd	2/2	Ďurovský
Industrial Electronics	3rd	2/2	Kaňuch
Sensors and Measurement in Electrical Engineering	3rd	2/2	Girovský
Electrical Drives	4th	2/2	Žilková
Fundamentals of Microcomputer programming	4th	2/2	Lacko
Modelling and Simulation in Electrical Engineering	4th	2/2	Fedák
Power Electronics	4th	3/3	Pástor
Industrial Control Systems	4th	2/2	Fedor
Pneumatic and Hydraulics Systems	4th	2/2	Bober
Controlled Drives	5th	2/2	Ďurovský
Fundamentals of Robotics	5th	2/2	Žilková
ManMachine Interface	5th	2/2	Perduková
Bachelor Project	5th	0/8	Supervisor
Modelling of Electromechanical Systems	5th	2/2	Fedák
Bachelor Thesis	6th	3/9	Supervisor
Simulation of Production Systems	6th	2/2	Bober
Design of Electrotechnical Equipment	6th	2/2	Lacko
Electrical Apparatus	6th	2/2	Ferková

4.2. Graduate Study (Ing.)

a) Master study programme in Electrical Systems (title: Ing.)

Subject	Semester	Lectures/exercises (hours per week)	Lecturer
Power Semiconductor Systems	1st	2/2	Pástor
Non-linear Electro-Mechanical Systems	1st	2/2	Fedor
Servosystems	1st	2/3	Kyslan
Dynamic Phenomena of Electrical Machines	1st	2/2	Záskalický

Electrical Machines for Automation	1st	2/2	Ferková
Technology of Production in Electronics	1st	2/2	Slosarčík
Signal Processors	1st	2/3	Lacko/Šlapák
Applications of Digital Signal Microcontrollers	2nd	2/3	Šlapák
Vehicle Mechatronics	2nd	2/2	Ďurovský
Construction and Design of Converters	2nd	2/2	Pástor
Control of Assembly Lines with Programming Controllers	2nd	2/2	Fedor
Diploma Project 1	2nd	0/4	Supervisor
Diploma Project 2	3rd	2/6	Supervisor
Mechatronic Production Systems	3rd	2/2	Ďurovský
Intelligent Control of Electrical Systems	3rd	2/2	Žilková
Three-Dimensional Modelling and Simulation	3rd	2/2	Ferková
Technology of Production in Electrotechnics	3rd	2/2	Girman
Design of Documentation in Electrical Engineering	3rd	1/3	Lacko
Diploma Thesis	4th	9/9	Supervisor

4.3. Undergraduate and Graduate Study for Foreign Students (in English)

All subjects listed above are offered in English language for foreign students.

4.4. Ph. D Postgraduate Course on Electrical Systems

Subject	Semester	Lectures/exercises (hours per week)	Lecturer
Power Electronics	1st	2/0	Pástor
Ph.D. Project I	1st	0/2	Supervisor
Foreign Language I	1st	2/0	Dept. of Foreign Languages
Servosystems	2nd	2/0	Fedor
Ph.D. Project II	2nd	0/2	Supervisor
Foreign Language II	2nd	2/0	Dept. of Foreign Languages
Ph.D. Project III	3rd	0/4	Supervisor
Subject of Specialization	3rd	2/0	According to the subject
Scientific Activity	3rd	0/8	Supervisor
Ph.D. Project IV	4th	0/2	Supervisor
Scientific Activity	4th	0/8	Supervisor
Ph.D. Project IV	5th	0/2	Supervisor
Scientific Activity	5th	0/8	Supervisor
Ph.D. Thesis	5th	0/9	Supervisor

5 RESEARCH PROJECTS

- *Research on High-efficiency Electromechanical Systems with Applications for Electromobility*, Project VEGA 1/0363/23, Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovac Republic and the Slovak Academy of Sciences, Principal investigator: KYSLAN, K. (2023-2025).
- *PAEPEDE: Pathways to Excellence in Power Electronics and Electrical Drives Education*, Project ID 22420041, International Visegrad Fund, Principal investigator: KYSLAN, K.
- *Digital twins of industrial systems driven by electric drives with the use of dynamic load emulation*, Project 09I05-03-V02-00018 Call to support research projects focused on digitalization of the economy in TRL levels 1-3, Principal investigator: PERDUKOVÁ, D. (2025-2026).

- *Support for the development of practical skills in the field of measurement and processing of quantities for autonomous systems.* KEGA 032TUKE-4/2024 Project Cultural and Educational Grant Agency Ministry of Education, Research, Development and Youth of the Slovak Republic. Principal investigator: GIROVSKÝ, P. (2024-2025).
- *The Improvement of Students' Professional and Team Skills in the Study Program Industrial Electrotechnics*, Project KEGA 059TUKE-4/2024, Cultural and Education Grant Agency of the Ministry of Education, Research, Development and Youth of the Slovak Republic, Principal investigator: ŠLAPÁK, V. (2024-2026)
- *Isolated DC/DC Converters with Unidirectional and Bidirectional Power Flow*, Project supported by the Slovak Research and Development Agency under *contract No. APVV-23-0521. Principal investigator: PÁSTOR, D. (2024-2027).*
- *Isolated DC/DC Converters with High efficiency of Electrical Energy Conversion*, Project VEGA 1/0584/24, Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences, Principal investigator: PÁSTOR, M. (2024-2026).

6 CO-OPERATION

6.1. Co-operation in Slovakia

The Department co-operates with many industrial enterprises in Slovakia having joint projects at modernising of the electrical drive systems, control and mechatronic applications: U.S.STEEL Košice, SIEMENS, ABB, BSH Drives and Pumps Michalovce, Redox Prešov, Křižík Prešov, Schneider Electric Slovakia, Spell Procont Prešov, Spinea Prešov, Vonsch Brezno, Kybernetika Košice, TEKO Košice, ENERGO CONTROL Košice, ŽP Podbrezová, Bukóza Hencovce, Embraco Slovakia Spišská Nová Ves, Slovak Union for Quality, Innovation and Design Q-IMPULZ, Košice, SEZ Krompachy, DATAKON Košice, STATON Turany, ROŠERO-P, Spišská Nová Ves, ComAp, s.r.o. Košice, Siemens Healthcare Košice, Mitsubishi Electric, s.r.o. Košice, SOLUTIONS JMD s.r.o., Košice.

6.2. International Co-operation

- University of Zagreb, Croatia
- Brno University of Technology, Czech Republic
- Technical University of Liberec, Czech Republic
- VŠB -Technical University of Ostrava, Czech Republic
- West Bohemian University, Pilsen, Czech Republic
- University of Technology and Economy, Budapest, Hungary
- University of Miskolc, Hungary
- Silesian University of Technology, Gliwice, Poland
- Széchenyi István University, Győr, Hungary
- Delft University of Technology, The Netherlands
- Czech Academy of Science, Prague, Czech Republic.
- University of Oradea, Romania
- University of Maribor, Slovenia
- University of Zagreb, Croatia

- University of Novi Sad, Serbia
- CAG Electric Machinery, Český Brod, Czech Republic
- Wroclaw University of Technology, Wroclaw, Poland

6.2.1. Visits of Staff Members to Foreign Institutions

- ĎUROVSKÝ, F.: ŠKODA AUTO Mladá Boleslav (CZ), April 2024.
- FERKOVÁ, Ž.: VSB - Technical University of Ostrava (CZ), January and November 2024
- FERKOVÁ, Ž.: Conference Ansys 2024, TechSoft Engineering Praha (CZ). May 2024
- FERKOVÁ, Ž.: TechSoft Engineering Praha (CZ). September 2024
- FERKOVÁ, Ž., PÁSTOR, M.: IEEE-PEMC 2024 International Power Electronics and Motion Control Conference, Pilsen (CZ), October 2024
- FERKOVÁ, Ž.: Technical University of Liberec (CZ), October 2024
- PÁSTOR, M.; KYSLAN, K.: Széchenyi István University, Győr, Hungary, CEEPUS mobility, 4. - 9. February 2024.

6.3. Membership in International Organizations, Societies and Committees

- FERKOVÁ, Ž, KYSLAN, K., PÁSTOR, M.: IEEE members.
- FEDÁK, V.: Power Electronics and Motion Control Council (PEMC). Vice chairman and AwardCom chair. The 21st conference was held in Pilsen (CZ) on September 30 – October 3 2024.
- FEDÁK, V.: Member of the Expert evaluation jury for awarding products within the ZLATÝ AMPER competition for the most beneficial exhibit at the 30th International trade fair on electrical engineering, electronics, automation, communication and safety technology AMPER 2024. Brno (CZ). May 19-21, 2024.
- PÁSTOR, M.: Power Electronics and Motion Control Council (PEMC), member.
- PERDUKOVÁ, D.: Member of Programme Committee: 19th International Conference on Soft Computing Models in Industrial and Environmental Applications – SOCO 2024, Salamanca, Spain, 9 -10 October 2024.

6.4. Membership in Slovak Professional Bodies

- FEDÁK, V.; KAŇUCH, J.; ZÁSKALICKÝ, P.; FEDOR, P.; FERKOVÁ, Ž.; GIROVSKÝ, P.; HAJSÁK, P.; LACKO, M.; PERDUKOVÁ, D.: members of The SES (Slovak Electrotechnical Society), Branch at FEI TU Košice.
- FERKOVÁ, Ž.: Member of Technical Standards Commission on Electrical Machines in Slovak Republic.
- PERDUKOVÁ, D.: Council of the Secondary Technical School for EE, Košice (delegate of the FEI TU Košice).
- PERDUKOVÁ, D.: Member of board for the PhD. Study in Electrical Engineering at FEI TU Košice.

6.5. National Educational Projects

6.6. Editorial Boards

- BOBER, P.: Editorial board of journal “Quality Innovation Prosperity” (Kvalita, Inovácia, Prosperita), ISSN 1335-1745 (print), ISSN 1338-984X

(online).

- FEDOR, P: Editorial board of Acta Electrotechnica et Informatica – AEI. Journal of the Faculty of Electrical Engineering and Informatics. ISSN 1335-8243.
- KYSLAN, K.: Associate Editor of journal „Power Electronics and Drives“, Wroclaw, Poland, ISSN 2543-4292.
- PERDUKOVÁ, D.: Editorial board of Elektroenergetika journal, ISSN 1337-6756.
- ZÁSKALICKÝ, P.: Editorial board of Acta Technica CSAV. Journal of Czech Academy of Sience, Praque. Czech Republic. ISSN 0001-7043.
- ZÁSKALICKÝ, P.: Editorial board of KOMEL, Branzowy osrodek badavczo-rozwojovy Maszyn elektrycznych, Katowice, Poland. ISSN 0239-3646.

7. THESES Defended Theses in 2024

- BODNÁR, D.: *Power management of electric vehicles*. Supervisor: Ďurovský, F.

Thesis type	Bachelor	Master	Doctoral
Number	34	25	1

8 OTHER ACTIVITIES

8.1. Symposia, Workshops, Conferences

8.2. Projects for Industry

- *Analysis of the skip drive for U.S. Steel Košice.* For Innomotics s.r.o., Košice. Co-ordinator: Ďurovský, F., 2024.
- *Adaptation of control for rotary shear drive.* For Datamont, Košice. Co-ordinator: Šlapák, V., 2024

8.3. Student Competitions and Rewards

- GORDAN, D.: SCYR 2024. SES Prize, Electrical & Electronics Engineering Section, 1st year PhD students.

8.4. Compositions for Dissertation Examinations

- MARCIN, D.: *Research of balancing methods for electro mobile battery systems.* Supervisor: Lacko, M.
- PANCURÁK, L.: *Predictive Control of Synchronous Machine*. Supervisor: Kyslan, K.

9 PUBLICATIONS

9.1. Books and book chapters

9.2. Textbooks

[1] PERDUKOVÁ, Daniela: **Modelovanie a riadenie nelineárnych mechatronických systémov**. 1. vyd. Košice: Technická univerzita v Košiciach. 2024.p. 72. ISBN 978-80-553-4680-9.

[2] PERDUKOVÁ, Daniela: **Control Web 7 Programovanie nespojitých a spojitých prístrojov.** 1. vyd. Košice: Technická univerzita v Košiciach. 2024. p.69. ISBN 978-80-553-4681-6.
[3] FEDOR, Pavol: **Úvod do priemyselnej automatizácie a PLC systémov.** 1. vyd. Košice: Technická univerzita v Košiciach. 2024. p. 75. ISBN 978-80-553-4688-5.

9.3. Scientific Journals

Journals indexed in Thomson Reuters "Current Contents" database

[1] BOBER, Peter - ZGODAVOVÁ, Kristína - ČIČKA, Miroslav - MIHALIKOVÁ, Mária - BRINDZA, Jozef: **Predictive Quality Analytics of Surface Roughness in Turning Operation Using Polynomial and Artificial Neural Network Models.** 2024. In: Processes. - Basel (Switzerland): Multidisciplinary Digital Publishing Institute Roč. 12, č. 1 (2024), p. [1-14] [online]. - ISSN 2227-9717 (online). Access: *http://dx.doi.org/10.3390/pr12010206*.
[2] BODNÁR, Dávid - MARCIN, Daniel - ĎUROVSKÝ, František: **Temperature-dependent hysteresis model for Li-ion batteries.** 2024. In: Automatika: journal for control, measurement, electronics, computing and communications. London (Great Britain): Taylor & Francis Group. Roč. 65, č. 3 (2024), p. 1315-1324 [print, online]. ISSN 0005-1144.
Access: *https://doi.org/10.1080/00051144.2024.2368365*.
[3] MAXWELL, Chiemeka Loveth - WANG, Zixiang - YU, Dongsheng - PÁSTOR, Marek - YU, Samson S - ALKAHTANI, Mohammed: **A memristor-sourced key for encrypted power and data synchronous transmission in switched mode power supplies.** 2024. In: IET Power Electronics. - Hertford (Great Britain): Institution of Engineering and Technology Roč. 17, č. 16 (2024), p. 3093-3108 [online]. ISSN 1755-4535.
Access: *https://doi.org/10.1049/pel2.12827*.
[4] PERDUKOVÁ, Daniela - FEDOR, Pavol - SOBEK, Martin - BAČÍK, Ján ml.: **A Simple Linearization Method of Nonlinear Systems Based on Fuzzy Logic.** 2024. In: IEEE access: practical innovations, open solutions. - Piscataway (USA): Institute of Electrical and Electronics Engineers, 2013. Roč. 12 (2024), p. 165441-165457 [online]. ISSN 2169-3536 (online).
Access: *https://doi.org/10.1109/access.2024.3493251*
[5] PÁSTOR, Marek - GORDAN, Daniel - BASARIK, Tomáš - MAXWELL, Chiemeka Loveth: **Inverter optimization of soft-switching dc-dc converter.** 2024. In: Automatika: journal for control, measurement, electronics, computing and communications. London (Great Britain): Taylor & Francis Group Roč. 65, č. 4 (2024), p. 1391-1401 [print, online]. ISSN 0005-1144.
Access: *http://dx.doi.org/10.1080/00051144.2024.2388442*

Foreign Journals

[1] PERDUKOVÁ, Daniela - FEDOR, Pavol: **Development of a small hydropower plant model verified on real parameters.** 2024. In: Mathematical modeling: international scientific journal. Sofia (Bulharsko): Scientific-technical union of mechanical engineering industry 4.0 Roč. 8, č. 1 (2024), p. 3-6 [print, online]. ISSN 2535-0986. Access: *https://stumejournals.com/journals/mm/2024/1/3*.

Journals indexed in Web of Science or Scopus databases

[1] MARCIN, Daniel - LACKO, Milan - BODNÁR, Dávid - PANCURÁK, Lukáš: **Capacitor-based active cell balancing for electric vehicle battery systems: insights from simulations.** 2024. In: Power Electronics and Drives. Warsaw (Poland): SCIENDO. Roč. 9, č. 1 (2024), p. 317-330. ISSN 2543-4292 (online). Access: *http://dx.doi.org/10.2478/pead-2024-0020*.

[2] ŠLAPÁK, Viktor - ĎUROVSKÝ, František - KYSLAN, Karol - SMOLEŇ, Pavol: **Shearing work analysis and control design of rotary shears in material processing lines.** 2024. In: Power Electronics and Drives. Warsaw (Poland): SCIENDO. Roč. 9, č. 1 (2024), p. 482-501. ISSN 2543-4292 (online). Access: *http://dx.doi.org/10.2478/pead-2024-0030*.

[3] GUTTEN, Miroslav - KORENČIAK, Daniel - KAŇUCH, Ján: **Analysis of Temperature Dependences of the Loss Factor of Transformer by Method FDS.** 2024. In: 2024 9th International Youth Conference on Energy. Danvers (USA): Institute of Electrical and Electronics Engineers p. [1-4] [online]. ISBN 979-8-3503-7239-7. ISSN 2770-8500. Access: *https://doi.org/10.1109/IYCE60333.2024.10634933*.

[4] GUTTEN, Miroslav - KORENČIAK, Daniel - KAŇUCH, Ján: **Analysis of Distribution Transformers at Various Insulating Conditions by Frequency Method.** 2024. In: 8th International Symposium on Multidisciplinary Studies and Innovative Technologies (ISMSIT): proceedings. Danvers (USA): Institute of Electrical and Electronics Engineers p. [1-5] [online]. ISBN 979-8-3503-5442-3 (online). Access: *https://ieeexplore.ieee.org/document/10757204*.

[5] KORENČIAK, Daniel - GUTTEN, Miroslav - KAŇUCH, Ján: **Acoustic Emission Analysis of Dry Distribution Transformers.** 2024. In: 8th International Symposium on Multidisciplinary Studies and Innovative Technologies (ISMSIT): proceedings. Danvers (USA): Institute of Electrical and Electronics Engineers p. [1-4] [online]. ISBN 979-8-3503-5442-3 (online). Access: *https://ieeexplore.ieee.org/document/10757226*.

[6] PERDUKOVÁ, Daniela - FEDOR, Pavol: **Non-analytical design of the pi controller optimal parameters for a continuous line.** 2024. In: MM Science Journal. Praha (Czech Republic): MM Publishing No. June (2024), p. [1-7] [print, online]. ISSN 1803-1269. Access: *http://dx.doi.org/10.17973/mmsj.2024_06_2023151*.

National Journals

Patents and Utility Models

9.4. Other publications (papers in conference proceedings, etc.)

Publication Type	Conferences		Other
	Foreign	Home	
Number	4	23	2