DEPARTMENT OF ELECTRICAL ENGINEERING AND MECHATRONICS

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Head of Department
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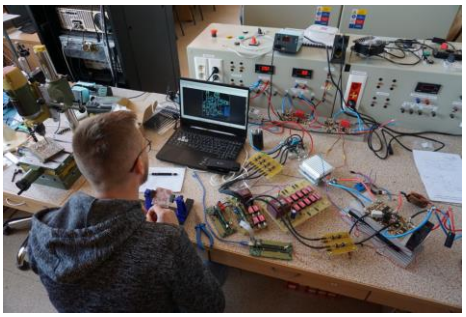
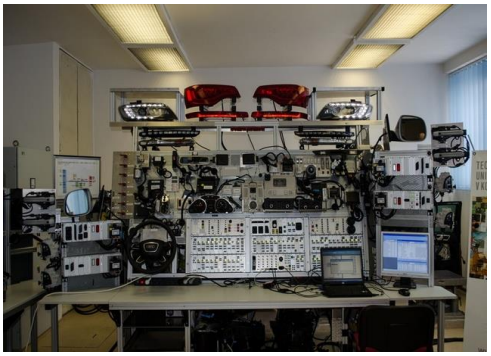
1 DEPARTMENT'S PROFILE

The Department was established at foundation of the Faculty of Electrical Engineering in 1969 as the Department of Electrical Drives but originally it presents a continuation of the Department of Electrical Egineering established at foundation of the Technical University of Kosice (1953). Through the years the name of the department was changed in order to express closier its activities and development.

Staff members of the department are experienced in wide areas of electrical engineering, incl. automotive electrical engineering, mechatronics, and robotics what they utilise in teaching and research. Currently, the department is responsible for education and research in area of electrical engineering, namely in fields of power and industrial electronics, electrical machines and apparatuses, sensors, electromechanical systems, controlled drives, multi-motor drives, control systems, and industrial and automotive mechatronic systems up to drives of robots.

The Department offers all types of university courses: bachelor, master and Ph.D. courses.





2 STAFF

Professors:	prof. Ing. Jaroslav Dudrik, PhD. prof. Ing. Pavol Fedor, PhD. prof. Ing. Daniela Perduková, PhD. prof. Ing. Pavel Záskalický, PhD. (till August 2021)
Associate Professors:	doc. Ing. František Ďurovský, PhD. doc. Ing. Viliam Fedák, PhD. (till June 2021) doc. Ing. Želmíra Ferková, PhD. doc. Ing. Michal Girman, PhD. (till June 2021) doc. Ing. Peter Girovský, PhD. (since August 2021) doc. Ing. Ján Kaňuch, PhD. doc. Ing. Karol Kyslan, PhD. doc. Ing. Milan Lacko, PhD. doc. Ing. Marek Pástor, PhD. (since November 2021) doc. Ing. Jaroslava Žilková, PhD.
Assistant Professors:	Ing. Ján Bačík, PhD. Ing. Peter Bober, PhD. Ing. Peter Girovský, PhD. (till July 2021) Ing. Marek Pástor, PhD. (till October 2021) Ing. Viktor Šlapák, PhD.
Senior Scientists:	Ing. Peter Hajsák doc. Ing. Viliam Fedák, PhD. (since July 2021) doc. Ing. Michal Girman, PhD. (since July 2021) doc. Ing. Michal Kostelný, CSc. Ing. Tomáš Merva (till September 2021) prof. Ing. Jaroslav Timko, CSc. prof. Ing. Pavel Záskalický, PhD.(since Sept. 2021)
Technical Staff:	Zuzana Olexová
Full time Ph.D. Students:	Ing. Stanislav Alexovič Ing. Juraj Biľanský Ing. Dávid Bodnár (since September 2021) Ing. Jozef Ivan Ing. Adrián Marcinek Ing. Viktor Petro Ing. Richard Olexa

3 LABORATORIES

- Laboratory of Electrical Engineering
- Power Electronics Laboratory
- Laboratory for CAD (COSMOS, ProEngineer, MATLAB, PSpice, and applied SW, ABBRobotStudio, EPLAN)
- Laboratory of Industrial Automation
- Laboratory of Electrical Machines
- Laboratory of Electrical Drives
- Laboratory of Controlled Electrical Drives and Mechatronics
- Laboratory of Automotive Mechatronics
- Laboratory of Pneumatic and Hydraulic Systems
- Virtual Laboratory of Mechatronic Systems Control: http://andromeda.fei.tuke.sk

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	3th	2/2	Perduková
Electrical Machines	3rd	2/2	Záskalický
Automotive Electrical Systems	3th	2/2	Ďurovský
Industrial Electronics	3th	2/2	Kaňuch
Electrical Drives	4th	2/2	Žilková
Fundamentals of Microcomputer programming	4rd	2/2	Lacko
Modeling and Simulation in Electrical Engineering	4th	2/2	Fedák
Power Electronics	4th	3/3	Dudrik
Sensors and Measurement of Nonelectrical Quantities	4th	2/2	Girovský
Industrial Control Systems	4th	2/2	Fedor
Bachelor Thesis I.	5th	0/8	Supervisor
Simulation of Production Systems	6th	2/2	Bober
Controlled Electrical Drives	5th	2/2	Ďurovský
ManMachine Interface	5th	2/2	Perduková
Bachelor Project	5th	0/8	Supervisor
Bachelor Thesis II.	6th	0/8	Supervisor
Modeling of Electromechanical Systems	6th	2/2	Fedák
Projecting of Electrical Systems	6th	2/2	Lacko
Pneumatic and Hydraulics Systems	4th	2/2	Bober

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	7th	2/2	Dudrik
Non-linear Electro-Mechanical Systems	7th	2/2	Fedor

Servosystems	7th	2/2	Kyslan
Dynamic Phenomena of Electrical Machines	7th	2/2	Záskalický
Electrical Machines for Automation	7th	2/2	Ferková
Technology of Production in Electronics	7th	2/2	Slosarčík
Vehicle Mechatronics	8th	2/2	Ďurovský
Construction and Design of Converters	8th	2/2	Dudrik
Control of Assembly Lines with Programming Controllers	8th	2/2	Fedor
Statistical Process Control	8th	2/2	Bober
Diploma Project	8th	0/4	Supervisor
Fundamentals of Robotics	8th	2/2	Žilková
Diploma Project II	9th	0/6	Supervisor
Mechatronic Production Systems	9th	2/2	Ďurovský
Intelligent Control of Electrical Systems	9th	2/2	Žilková
Three-Dimensional Modelling and Simulation	9th	2/2	Ferková
Signal Processors	7th	2/3	Lacko
Technology of Production in Electrotechnics	9th	2/2	Girman
Design of Documentation in Electrical Engineering	9th	1/3	Lacko
Diploma Thesis	10th	0/18	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	Dudrik
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

- *Smart Drive with Five-Phase Asynchronous Motor.* Project supported by the Slovak Research and Development Agency under the contract No. APVV-16-0270. Principal investigator: ZASKALICKÝ, P. (2017-2021).
- *Development of Modular Traction Battery and Optimization of Electrical Power Consumption in Electric Midibus.* Project supported by the Slovak Research and Development Agency under the contract No. APVV-18-0436. Principal investigator: LACKO, M. (2019-2023)

- *HIL Emulator for Small Hydropower Plant Control. Project supported by the Slovak Research and Development Agency under the contract No. APVV-19-0210. Principal investigator: PERDUKOVÁ, D. (2020-2023).*
- *Dynamic Emulation of Mechanical Loads,* Project VEGA 1/0493/19, Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences. Principal investigator: KYSLAN, K. (2019 – 2022).
- *Dynamic torque emulation by applying of intergated power converter.* Project supported by the Faculty of Electrical Engineering and Informatics, Technical University of Kosice, Slovakia, under the Grant FEI- 2021-73. Principal investigator: IVAN, J. (2021).
- *Multiport power converter with active bridges for use in electric and hybrid vehicles.* Research grants for young researchers under 30 and PhD students at TUKE. No. 07/TUKE/2021. Principal investigator:-MARCINEK, A. (2021).

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, BWG Prešov, Křižík Prešov, Schneider Electric Slovakia, Spell Procont Prešov, Spinea Prešov, Vonsch Brezno, Kybernetika Košice, TEKO Košice, ENERGO CONTROL Košice, ZŤS VVU Košice, ŽP Podbrezová, Bukóza Hencovce, Embraco Slovakia Spišská Nová Ves, Slovak Union for Quality, Innovation and Design Q-IMPULZ, Košice, SEZ Krompachy, DATAKON Košice, SLOVRES Košice, STATON Turany, ROŠERO-P, Sp.N.Ves.

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
- Széchenyi István University, Győr, Hungary
- Delft University of Technology, The Netherlands
- Czech Academy of Science, Prague.
- University of Oradea, Romania
- University of Maribor, Slovenia
- University of Zagreb, Croatia
- University of Novi Sad, Serbia
- CAG Electric Machinery, Český Brod, Czech Republic

6.2.1. Visits of Staff Members to Foreign Institutions

- Ferková, Ž.: Technical University of Liberec, Conference ECMSM, June 2021.
- Ferková, Ž.: University of West Bohemia. Pilsen (CZ), September 2021.
- KAŇUCH, J., ZÁSKALICKÝ, P.: SEKEL 2021, ČVUT Praha (CZ), September 2021.
- KAŇUCH, J.: KOMEL 2021, Katowice (PL), September 2021.
- KYSLAN, K.: Wroclaw University of Science and Technology (PL), November, 2021.

6.3. Membership in International Organizations, Societies and Committees

- FEDÁK, V.: Power Electronics and Motion Control Council (PEMC). Vice chairman and Special session chair of the 19th IEEE-PEMC Power Electronics and Motion Control Conference), Gliwice (PL) 25 - 29 April 2021.
- DUDRIK, J; FERKOVÁ, Ž, KYSLAN: IEEE members.
- PERDUKOVÁ, D.: Member of Programme Committee: 16th International Conference on Soft Computing Models in Industrial and Environmental Applications – SOCO 2021, Bilbao, Spain, 22-24 September 2021.
- ZÁSKALICKÝ, P.: Member of International Scientific Committee: KOMEL, Rytro, Poland, May 2021.

6.4. Membership in Slovak Professional Bodies

- FEDÁK, V.; KAŇUCH, J.; TIMKO, 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.: Program Committee of 20th Scientific Conference of Young Researchers of the Faculty of Electrical Engineering and Informatics, Technical University of Košice – SCYR 2021.
- 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).
- DUDRIK, J.: Member of the Series Editorial Board of Annals of the Academy of Romanian Scientists.
- DUDRIK, J.: Editorial board of Transactions on Electrical Engineering, Czech Republic, ISSN 1805-3386.
- DUDRIK, J.: International Editorial Board of Power Electronics and Drives, Wroclaw, Poland, ISSN: 2451-0262, eISSN: 2543-4292.
- FEDÁK, V.: Editorial board of the Journal “Przeglad Elektrotechniczny” (Polish Academy of Sciences, Warszaw, http://www.red.pe.org.pl/), ISSN

0033-2097, e-ISSN 2449-9544.

- 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.
- GIROVSKÝ, P: Topic Editor of journal „Electronics“, MDPI, 2079-9292
- 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. THESESDefened Theses in 2021

Thesis type	Bachelor	Master	Doctoral
Number	33	20	-

8 OTHER ACTIVITIES

8.1. Symposia, Workshops, Conferences

8.2. Projects for Industry

- *Testing of synchronous reluctance motor prototype.* For CAG Electric Machinery, Český Brod. Co-ordinator: FERKOVÁ, Ž., 2021.

8.3. Student Competitions and Rewards

- ALEXOVIČ, S.: SCYR 2021. ELFA Prize, the EEE section, 1st year PhD students.

8.4. Compositions for Dissertation Examinations

- BIĽANSKÝ, J.: *Models of electric vehicle battery systems*. Supervisor: Lacko, M.
- IVAN, J.: *Dynamic torque emulator*. Supervisor: Ďurovský, F.
- OLEXA, R.: *Modeling and Control of Small Hydro Power Plant*. Supervisor Fedor, P.

9 PUBLICATIONS

9.1. Books

9.2. Textbooks

[1] PÁSTOR, Marek - DUDRIK, Jaroslav: **Konštrukcia a dimenzovanie meničov** Zbierka riešených príkladov. 1. vyd., Košice: Technická univerzita v Košiciach, 2021. 63 s. [CD-ROM]. ISBN 978-80-553-3916-0.

9.3. Scientific Journals

Journals indexed in Thomson Reuters "Current Contents" database

[1] MIHALIKOVÁ, Mária - ZGODAVOVÁ, Kristína - BOBER, Peter - ŠPEGÁROVÁ, Anna: **The Performance of CR180IF and DP600 Laser Welded Steel Sheets under Different Strain Rates.** 2021. In: Materials. Bazilej (Švajčiarsko): Multidisciplinary Digital Publishing Institute, 2008 Vol: 14, No. 6 (2021), pp. [1-13] [online]. ISSN 1996-1944 (online). Access: *https://doi.org/10.3390/ma14061553*.

[2] POROBIC, Vlado - TODOROVIC, Ivan - ISAKOV, Ivana - KYSLAN, Karol - JERKAN, Dejan: **Integrated Framework for Development, Emulation, and Testing of High-level Converter Control Functions for Distributed Generation Sources.** 2021. In: IEEE Access: practical innovations, open solutions. Piscataway (USA): Institute of Electrical and Electronics Engineers Vol. 9 (2021), pp. 145852-145865 [online]. ISSN 2169-3536 (online).

[3] ZGODAVOVÁ, Kristína - LENGYELOVÁ, Kristína - BOBER, Peter - EGUREN, Alberto, José - MORENO, Amaia: **3d printing optimization for environmental sustainability: experimenting with materials of protective face shield frames.** 2021. In: Materials. Bazilej (Švajčiarsko): Multidisciplinary Digital Publishing Institute Vol. 14, No. 21 (2021), pp. [1-19] [online]. ISSN 1996-1944 (online).

[4] FEDOR, Pavol - PERDUKOVÁ, Daniela - BOBER, Peter - FEDOR, Marek: **New stable non-vector control structure for induction motor drive.** 2021. In: Applied sciences. - Bazilej (Švajčiarsko): Multidisciplinary Digital Publishing Institute Vol. 11, No.14 (2021), pp. [1-20] [online]. ISSN 2076-3417 (online).

[5] ANTUNES, L.H.M. - HOYOS, J. J. - ANDRADE, , T. C. - SARVEZUK, P.W.C. - WU, L. - ÁVILA, J.A. - OLIVEIRA, J. P. - SCHELL, N. - JARDINI, A. L. - ŽILKOVÁ, Jaroslava - DA SILVA FARINA, P. F. - ABREU, H.F.G. - BÉREŠ, M.: **Deformation-induced martensitic transformation in Co-28Cr-6Mo alloy produced by laser powder bed fusion: Comparison surface vs. bulk.** 2021. In: Additive Manufacturing. Amsterdam (Holandsko): Elsevier Science No.46 (2021), pp. [1-10] [online, print]. ISSN 2214-8604. Access: *https://doi.org/10.1016/j.addma.2021.102100*.

Foreign Journals

[1] KAŇUCH, Ján: **The Analysis, Advantages and Uses of Five-Phase Induction Motor Drives.** 2021. In: Maszyny Elektryczne: Zeszyty Problemowe. Vol. 125, No.1 (2021), pp. 1-7 [print]. ISSN 0239-3646.

Journals indexed in Web of Science or Scopus databases

[1] PERDUKOVÁ, Daniela - FEDOR, Pavol - LACKO, Milan: **DC motor fuzzy model based optimal controller.** 2021. In: MM Science Journal. Praha (Česko): MM Publishing 2021, No. October (2021), pp. 4879-4885 [print, online]. ISSN 1803-1269. Access: *http://dx.doi.org/10.17973/mmsj.2021_10_2021033*.

National Journals

[1] KAŇUCH, Ján – ĎUROVSKÝ, František – FERKOVÁ, Želmíra – GIROVSKÝ, Peter – PÁSTOR, Marek: Asynchrónne motory v priemyselnej praxi (1). 2021. In: AT&P Journal. Vol. 28, No.12 (2021), pp. 16-17. ISSN 1335-2237.

Patents and Utility Models

[1] BOBER, Peter: **Mechanické počítadlo s integrovaným pohonom kotúčov krokovými motormi.** (Mechanical counter with integrated disc drive with stepper motors). Utility model No Úžitkový vzor č. 9338. Banská Bystrica: ÚPV SR 2021. 4 pp. Access: *https://wbr.indprop.gov.sk/WebRegistre/UzitkovyVzor/Detail/50032-2021*.

[2] DUDRIK, J.: **Snubber for Decreasing Turn-off Losses and Overvoltages on Secondary Switches in PWM DC-DC Converters.** Patent submitted on 19 Jun 2015, granted on 19 Aug 2021, no. of application: PP 00046-2015.

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

Publication Type	Confereces		Other
	Foreign	Home	
Number	11	7	