

DEPARTMENT OF MECHATRONICS AND ELECTRONICS

General Information

Department of Mechatronics and Electronics (DME) is a part of the Faculty of Electrical Engineering (FEE) at the University of Žilina. It is a workplace whose primary task is to train experts in the area of electronics, industry automation, power-electronic and mechatronic systems on all levels of university education. Great importance is scientific-research activity of the department which is realized by variety of projects funded from international and national grants.

Department team is led by group of internationally recognized professors and associated professors with high scientific and educational erudition. Part of this group is also younger researchers and post-doctorate students. Strong part of the team is represented by full-time doctoral students with significant participation in scientific-research activity.

The department supports wide variety of activities in addition to already mentioned. Department supports research for industrial, national and foreign subjects and variety of student's activities and projects.

Within the year the updating of laboratory equipment was completed. Significant progress has been made in building of educational-research laboratories.

In the last year the research activity of the Department has achieved a significant increasing implemented by means of grant projects. Department staff participated in several international and national projects within the frame of which the department has cooperated with several prestigious Slovak institutions (The Technical University of Košice, Slovak Technical University in Bratislava and Jesenius Faculty of Medicine of the Comenius University in Martin). These projects represent a very significant support to research which has been done at our department.

In the year 2016 the department involved sixteen members of educational staff, five research workers, twenty full-time PhD students and three part-time PhD students. From the point of view of internal structure it has been divided into three sections. The first one is focused on power- and applied electronics, the second one is operating in the field of mechatronics, autotronics, and industry automation. The third section deals with special electronics focused on applications in medicine and mechatronic systems.

The department provides educational process at all three levels of the university study. The bachelor degree is covered by the accredited study program Electrical Engineering (specialization in Mechatronic Systems and Autotronics). Master degree includes the accredited study program Power Electronic Systems (in specializations Power Electronics, Mechatronic and Automotive Systems, and Autotronics and electro-mobility). In doctoral study the department staff participated in providing training courses in Power Electronics and Telecommunications and Automation.

Within the frame of pedagogical activities the department has been providing education of electronics, mechatronics, micro-computer systems involving industrial controllers and power electronics at the Faculty of Electrical Engineering, and also at other faculties of the University of Žilina. Such education has been dedicated for different study branches and specializations in the bachelor, master and doctoral studies, both in internal and external ones.

The department realised and provided research and development, expertises and contracts, and develops publication activity in the field of electronics, control systems, mechatronics and power electronics mainly. Further education is provided by the department in the field of power electronic systems, microcomputer control systems, industrial controllers and programmable logic systems.

Professional activities of the department have been applied and disseminated on creation and operation of quality and reliable electronic devices and systems, application of programmable logic areas in design of electronic systems, reconfigurable circuits study as well as diagnostics and analysing of the failures using image analysis. Topology optimizing for power semiconductor converters and their electro-magnetic compatibility belongs to main activities of the department.

In the present time the department operates with eight laboratories dedicated for pedagogical operation, including final projects, final and master thesis. Beside above mentioned labs the department offers for utilizing three high-tech workplaces dedicated for research and development activities and to experimental part of PhD study. These are the laboratory of power electronics, the laboratory of digital image processing and laboratories of digital signal processors and industrial programmable logic controllers.

Staff of the Department

Head of the Department:	Michal Frivaldský
Vice-head of the Department:	Dušan Koniar
Secretary:	Anna Kondelová
Administrative Support:	Andrea Prandová

Sections of the Department

Section of Electronics

Head of the Section:	Michal Frivaldský
Professors:	Pavol Špánik
Associate Professors:	Michal Frivaldský
Research Fellows:	Anna Kondelová, Peter Čuboň, Boris Kozáček, Viliam Jaroš
Senior Lecturers (with PhD):	Michal Praženica, Slavomír Kaščák
Lectors:	Jozef Lakatoš

Section of Mechatronic Systems and Autotronics

Head of the Section:	Peter Drgoňa
Professors:	Branislav Dobrucký
Associate Professors:	Pavel Pavlásek, Peter Drgoňa
Research Fellows:	Marek Paškala
Senior Lecturers (with PhD):	Ondrej Hock, Jozef Šedo
Lectors:	Peter Šindler

Section of Special Electronics

Head of the Section:	Libor Hargaš
Associate Professors:	Libor Hargaš, Miroslav Hrianka, Anna Simonová, Dušan Koniar
Senior Lecturers (with PhD):	Rastislav Pavlanin

Postgraduate Students

Internal (full-time):	Martin Galád (until August, 2017), Zuzana Loncová (until August, 2017),
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	Pavol Štefanec (until August, 2017), Marek Píri (until August, 2017), Boris Kozáček (until August, 2017), Viliam Jaroš, Michal Prídala, Roman Koňarik, Michal Taraba, Miroslav Pavelek, Matúš Danko, Tomáš Uriča, Juraj Adamec, Miriam Jarabíková, Branislav Hanko (from September, 2017), Michal Pipíška (from September, 2017), Ján Morgoš (from September, 2017), František Jablončík (from September, 2017), Jozef Volák (from September, 2017), Rastislav Štefún (from September, 2017)
External (part-time):	Marek Kováč, Andrej Kaňovský, Jaroslav Ilončíak (until August 2017)

Education

Courses in Bachelor, Master and Doctoral Degree Programmes

Bachelor Degree Programmes

Code	Title	Sem.	Hours/Week
			L-S-LE*
Courses at the Faculty of Electrical Engineering			
3B0302	Electronics I	3	2 - 0 - 3
3B0312	Power Supplies	3	2 - 0 - 1
3B0314	Logical Circuits	3	2 - 0 - 2
3B2300	Autotronics	3	3 - 0 - 3
3B5300	Introduction to Industry Automation and Mechatronics	3	1 - 0 - 3
3B0400	Electronics II	4	2 - 0 - 3
3B0406	Microprocessor Technology	4	3 - 0 - 2
3B0407	Mechatronics	4	2 - 0 - 2
3B2400	Automotive Engines	4	3 - 2 - 0
3B5400	Automatic Regulation 1	4	2 - 2 - 0
3B5403	Sensors in Mechatronics and Autotronics	4	2 - 0 - 2
3B0504	Power Electronics	5	3 - 0 - 2
3B2500	Embedded Processor Systems for Automotive Applications	5	3 - 0 - 3
3B2500	Automatic Regulation in Autotronics	5	2 - 1 - 1
3B3501	Logical Circuits	5	2 - 0 - 2
3B3503	Image Processing and Analysis	5	2 - 0 - 2
3B5503	Automatic Regulation 2	5	2 - 1 - 1
3B5505	Computers in Industrial Automation	5	2 - 0 - 2
31563	Design of Electronic Devices	6	2 - 2 - 6
31600	Bachelor Thesis and its Defense	6	0 - 2 - 0
31628	Power Semiconductor Systems	6	6 - 0 - 4
31630	Bachelor Project in Power Electronic Systems	6	0 - 0 - 6
31634	Bachelor Project in Mechatronic Systems	6	0 - 0 - 6
Courses at the Faculty of Mechanical Engineering			
2B127	Electronics	6	2 - 0 - 2

*(L) lessons - (S) seminars - (LE) laboratory exercises

Master Degree Programmes

Code	Title	Sem.	Hours/Week
			L-S-LE*
Courses at the Faculty of Electrical Engineering			
3I0108	Microprocessors, Microcomputers and DSP	1	2 - 0 - 3
3I0109	Theory of Automatic Control 1	1	3 - 0 - 2
3I9100	Electromagnetic Compatibility in Electronics	1	3 - 1 - 1
3I9102	Computers in Industrial Automation 2	1	2 - 0 - 2
3I9103	Dynamics of Vehicle Movement	1	2 - 2 - 0
3I9105	Simulation Languages in Power Electronics	1	2 - 0 - 2

3I0110	Power Semiconductor Converters	2	3 - 1 - 2
3I0212	Traction Batteries and Recharging Infrastructure	2	2 - 0 - 2
3I0217	Design of ASIC	2	2 - 0 - 3
3I0219	Virtual Instrumentation	2	2 - 0 - 2
3I3202	Theory of Automatic Control 2	2	2 - 1 - 1
3I5206	Microprocessors and DSP	2	2 - 0 - 3
3I9200	Analysis and Synthesis of Power Electronic Circuits	2	2 - 3 - 0
3I9201	Mechatronic Systems	2	2 - 1 - 2
3I0307	Electromagnetic Compatibility	3	2 - 1 - 0
3I0310	Electromagnetic Compatibility in Electronics	3	3 - 1 - 1
3I2300	Processing of Biomedical Images	3	2 - 0 - 2
3I3015	Power Electronics Applications	3	3 - 0 - 1
3I9300	Design and Construction of Power Semiconductor Systems	3	2 - 3 - 1
3I9302	Diploma Project in Power Electronics 1	3	0 - 5 - 0
3I9303	Electric transfer of HEV and EV vehicles power	3	2 - 2 - 0
3I9304	Power Electronics Applications	3	3 - 0 - 1
3I9305	Logical Circuits	3	2 - 0 - 2
3I9306	Control systems of EV and HEV vehicles	3	2 - 0 - 3
3I0407	Discrete Control of Power Systems	4	4 - 2 - 2
3I9400	Diploma Project in Power Electronics 2	4	0 - 3 - 0
3I9401	Diploma Thesis Elaboration and Master Thesis Defense	4	0 - 10 - 0
3I9402	Subject of Final State Examination	4	0 - 2 - 0
3I9403	Electromobility Economic Aspects	4	2 - 3 - 0
Courses at the Faculty of Mechanical Engineering			
221186	Artificial Lighting	4	2 - 2 - 0

*(L) lessons - (S) seminars - (LE) laboratory exercises

Doctoral Degree Programmes

Code	Title	Sem.	Hours/Week
			L-S-LE*
Courses at the Faculty of Electrical Engineering			
3D4100	Foreign Language	1	2 - 0 - 0
3D4103	Electromagnetic Compatibility	1	2 - 0 - 0
3D4105	Programming	1	2 - 0 - 0
3D4106	Theory of Automatic Control	1	2 - 0 - 0
3D4107	Chosen Chapters from Mathematics	1	2 - 0 - 0
3D4108	Power Electronics	1	2 - 0 - 0
3D4109	Power Semiconductor Systems	1	2 - 0 - 0
3D4110	Essay to Dissertation Examination and Defence of Written Project for Dissertation Examination	4	2 - 0 - 0
3D4111	The Thesis and Dissertation Defence	6	0 - 0 - 0

*(L) lessons - (S) seminars - (LE) laboratory exercises

Research & Development

The department have realised and provided research and development, expertise and contracts, and develops publication activity in the field of electronics, control systems, mechatronics and power electronics mainly.

Professional activities of the department have been applied and disseminated on creation and operation of quality and reliable electronic devices and systems, application of programmable logic areas in design of electronic systems, reconfigurable circuits study as well as diagnostics and analysing of the failures using image analysis. Topology optimizing for power semiconductor converters and their electro-magnetic compatibility belongs to main activities of the department.

Laboratory of Electromagnetic Compatibility

The laboratory is built nowadays. In laboratory, there will be realized research in emission a resistance of convertors with high switching frequency.

Laboratory of Physical Models

The laboratory of physical models offers base for development of physical models. Laboratory contains basic mechanical and electronic tools and measurement devices for electronic circuits. Laboratory is accessible for both employees and students which are supervised.

Laboratory of Doctoral Research

Employees of the department are dealing with science-research activity in analysis and design of power convertor systems, electromagnetic compatibility and image analysis in biomedicine. There are realized also computer simulations and verifications.

Laboratory of Low Power Drives Research

Laboratory is focused on research, design and testing of two-phase low power drives and perspective control structures for low power drives. Development of converters for two-phase drives and experiments in the field of sensor-less motor position determination is realized.

Equipment of laboratory includes dSpace work station, measurement devices, oscilloscopes, function generators, power analyser, power supplies, converters and electrical motors.

Educational and research laboratories

Laboratory of Power Electronics

Lessons of Power Electronics Systems.

Laboratory of Industrial Automation

Lessons of Industrial Automation application.

Laboratory of microprocessors and DSP

Lessons of Control Systems and DSP programming.

Laboratory of Logic Circuits

Lessons of the Logic Systems and research in area of digital image processing.

Laboratory of Microelectronics

Lessons of ASIC design and methods of control, analysis and synthesis of power systems.

Laboratory of Autotronics and Electromobility

Lessons of electronic systems in vehicles with combustion engines and lessons of drive and control systems in electric vehicles.

Laboratory of Electronic Devices

Lessons of analog and digital electronic circuits.

Laboratory for Simulation Languages in Electrical Engineering

Lessons of simulation languages for electrical engineering.

Projects of International Programmes

International Scientific and Technological Co-operation Projects (MVTs)

RSF 14-49-00079: New methods and algorithms of combined signal and image processing with unknown parameters in promising radars and communication systems	
Summary:	The project solves the issue at the Moscow Energy Institute at the National Research University within the Department of Radio Equipment and Antenna systems.
Realization:	09/2014 – 12/2018
Coordinator:	Yurij Kutojans, Univerzita Le Mans, France
Co-operators:	Branislav Dobrucký

Projects of National Programmes

Research Projects Funded by the Scientific Grant Agency of the Slovak Republic (VEGA)

VEGA 1/0928/15: Research of electronic control of power transmission and motion of road ICE- hybrid HEV and EV vehicles	
Summary:	The project deals with research in the area automotive electronics - Autotronics - identifying structures and advanced management methods of power transmission and motion ICE internal combustion vehicles, hybrid HEV and EV using their controllers and fieldbus (CAN) communication with them. Then there is the research of embedded processor systems for the electronic transmission control of performance of HEV and EV vehicles with central and distributed electric propulsion systems, as well as research into the power structure for optimal energy management and vehicle research and development environment for programming autotronics systems. The research results will be used for the education of specialists for the automotive industry, where it appears at present scarcity.
Realization:	01/2015 – 12/2017
Coordinator:	Branislav Dobrucký
Co-operators:	Pavel Pavlásek, Ondrej Hock, Martin Galád, Pavol Štefanec, Viliam Jaroš, Boris Kozáček, Roman Koňarik

VEGA 1/0479/17: Research on optimal approaches to managing energy transfer in systems with accumulation elements	
Summary:	The core of this project is research of relevant phenomena which influence the effectivity of energy management process in systems with accumulation elements. Such systems are represented mainly by dashboard network of electric cars and accumulation nodes of energetic systems. Starting point for the project will be the analysis of characteristic properties of each individual way how to accumulate energy with subsequent selection of optimal accumulation system for transfer process, with acceptance of allowed environmental impact. Another important aspect will be the research of possibilities how to improve the effectiveness of mentioned process using optimal energy flow into accumulation node, and implementation of obtained results through sophisticated converter technologies with ultrahigh switching frequencies. During the project solution, proven scientific methods based on computer simulations will be used, both for analysis in

	temporal domain as well as in 3D analysis of processes in electrochemical system.
Realization:	01/2017 – 12/2019
Coordinator:	Prof. Ing. Pavol Špánik, PhD.
Co-operators:	Michal Frivaldský, Pavel Pavlásek, Peter Drgoňa, Anna Kondelová, Peter Šindler, Michal Prídala, Michal Taraba, Juraj Adamec, Ján Morgoš, Rastislav Štefúň

VEGA 1/0160/17: Pharmacological Influence of defense mechanisms of the airways, inflammation and remodeling by flavonol derivatives in conditions of experimental allergic asthma	
Summary:	<p>The project is linked to projects VEGA 1/0073/08 a VEGA 1/0020/11. Their solution has shown the benefit of administering flavonoid mixtures on sensitivity of cough, bronchoconstriction and inflammation in conditions of experimentally induced allergic asthma.</p> <p>Solution of the current project will bring new knowledge about the effect of other derivatives of polyphenols from the flavonol group, in which an antiasthmatic action is expected. Searching for new sources of substances with complex anti-asthmatic action, substances that act as bronchodilatories, anti-inflammatories and anti-remodeling is trend of current experimental research on allergic asthma. The project solution will provide a comprehensive view of the activity of the monitored substances: examination of all basic defense mechanisms of the airways (cough, bronchoconstriction, mucociliary clearance), allergic inflammation (using the determination of inflammatory, immune cells, inflammatory cytokines and chemokines, etc.), and the degree of airway remodeling.</p>
Realization:	01/2017 – 12/2020
Coordinator:	Soňa Fraňová (Institute of Pharmacology JLF UK Martin)
Co-operators:	Libor Hargaš, Dušan Koniar, Anna Simonová

Projects Funded by the Cultural & Education Grant Agency (KEGA)

KEGA 071ŽU-4/2017: Key Competences Formation and Effective Support of Students Mobility at Technology Faculties: Modelling, Design and Assessment of Flexible Education Concept	
Summary:	<p>The project is aimed at effective flexible digital educational environment for technical and technological education at technical faculties concentrated on the support of development of key competencies of graduates of technical faculties by means of massive technological support directed at synergy of components of knowledge base and its integration with competences of graduates of technical study fields in an actual working environment. To the main aims of the project is related the setting up of educational environment, the integration of the content of education and the support of effective transfer of knowledge into the actual environment of „the European working market“. The solution of the project is directed at the main component of the educational process – the content of education and its compatibility with the technological trends in the actual working environment where digitization of the content of education and flexibility of design of educational modules with multimedia components is dominant and is compatible with the trends of flexible educational environment (eContent, eLearning, eMobile, Blended Learning, Connected Learning). The project responds to the outputs of the National Project "Universities as engines of development of</p>

	<p>the knowledge society" in the context of massive amount of active researchers who work and use knowledge and technology base for this project.</p> <p>The main contribution is the conceptual solution of flexible education, i.e. the proposal, the design and the verification of the open „online“ educational modules to support the development of key competences of students in the specific field of technical science. The project will contribute to diversification of university education, mobility of graduates of technical universities that will contribute to increase of educational efficiency and will encourage arrival of foreign investment to Slovakia and, mainly, will help Slovak firms to succeed at world market by strengthening of the dominant subject which produces values – the technical field graduate with the key competences for the 21st century needs.</p>
Realization:	01/2017 – 12/2019
Coordinator:	Pavel Pavlásek
Co-operators:	Anna Simonová, Pavol Špánik, Dušan Koniar, Libor Hargaš, Zuzana Loncová, Tomáš Uriča

KEGA 073ŽU-4/2017: Implementation of modern education tools for automotive electronics and electromobility education

Summary:	<p>This project is focused on utilization of modern research and educational methods for improvement of new study programme Automotive electronics at the University of Zilina. Since the study programme Autotronics emerged from discussion between experts from the academic and scientific sector and from industry sector, this project is focused on combination of modern technologies in practise and teaching process. In our department (mechatronics and electronics) we see the trend of increasing requirements for number of graduates of first and second degree with knowledge involving not only the area of mechatronics and electronics but also automotive electronics. In addition, the cooperating companies in automotive industry require students with knowledge of the car (either with internal combustion engine ICE and electric cars) in a broader context and deeper understanding. It is clear, that the new study programme Autotronics must include the most modern technical means not only at the hardware level (real vehicle systems of ICE and EV), but also at the software level (freely programmable ECUs, embedded processor systems). The educational process will be used by means of e-learning, online lab and multimedia access. Students will be using modern tools of learning, will acquire the knowledge needed for success in practice or in the higher levels of study. The project builds on previously successfully investigated projects at the Department of mechatronics and electronics. Main focus is to complete laboratory of Autotronics and electromobility with comprehensive applications and samples of automotive electronic and control systems for cars with internal combustion engine and electric cars. Another objective includes the release of two university textbooks focused on automotive electronic systems and control systems for automotive and industrial applications. Finally, a new educational website with course materials, practical guides and tutorials will be created. The educational portal will be designed not only for students of study programme Autotronics, but also for all students of the Electrical engineering.</p>
Realization:	01/2017 – 12/2019
Coordinator:	Pavol Špánik
Co-operators:	Peter Drgoňa, Pavel Pavlásek, Michal Frivaldský, Anna Kondelová, Ondrej Hock,

Slavomír Kaščák, Jozef Lakatoš, Marek Paškala, Roman Koňarik
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Research Projects Funded by the Slovak Research and Development Agency (APVV)

APVV-0314-12: Research and Development of New Generation of Power Supplies Based on Converters with High Power Density, High Efficiency, Low EMI and Circular Energy

Summary:	Project is focused on research and development of new generation of switched mode power supplies, which are based on LLC, LLCLC and LCTL topology with high power density and multifunction output and with double half-bridge DC/DC converter characterized by low circulating energy and low EMI. Co-operation with Elteco.
Realization:	10/2013 – 09/2017
Coordinator:	Branislav Dobrucký
Co-operators:	Pavol Špánik, Peter Šindler, Peter Drgoňa, Michal Frivaldský, Michal Praženica, Tomáš Laškody, Pavol Štefanec, Boris Kozáček, Ondrej Hock, Anna Simonová, Slavomír Kaščák, Anna Kondelová

APVV-0433-12: Research and Development of Intelligent System for Wireless Energy Transfer in Electromobility Application

Summary:	The project is focused on problem of systems for wireless energy transfer, representing progressive solution for supplying of mobile and industrial devices. Task of this project is research of major effects on efficiency of systems for wireless energy transfer, usable for realization of charging points in the area of electromobility.
Realization:	10/2013 – 09/2017
Coordinator:	Pavol Špánik
Co-operators:	Libor Hargaš, Peter Drgoňa, Michal Frivaldský, Dušan Koniar, Michal Praženica, Ondrej Hock, Roman Mažgút, Martin Galád, Viliam Jaroš, Marek Píri

APVV-15-0571: Research of the Optimum Energy Flow Control in the Electric Vehicle System

Summary:	The project encompasses research into the multi energy storage system for a new generation of electric mobility applications focused on optimal use of energy stored in the primary electrochemical battery. The main criterion is thereby ensuring maximum range of the electric vehicle, at a given stored energy, which will be ensured by utilization of the recovery energy processes in changing the driving dynamics of the vehicles and optimum management of the bidirectional energy flow between the storages (batteries, supercapacitors) and traction drives. The main output of the project will be the simulator traction drive based on two-energy storage system designed to practical testing and optimization algorithms of the flow control and distribution of the power within the on-board network. Another output will be the software packets to manage and monitor on-board power system, including fault conditions and measurements of the relevant traction and energy quantities. The obtained results will be practically utilized in the design of the on-board power systems with optimal use of energy in the newly built university laboratory to teaching specialists in the field of electromobility.
Realization:	10/2016 – 09/2020
Coordinator:	Peter Drgoňa
Co-operators:	Branislav Dobrucký, Slavomír Kaščák, Michal Praženica, Michal Frivaldský, Roman Koňarik, Marek Paškala

APVV-15-0396: Research of Perspective High Frequency Converter Systems with GaN Technology	
Summary:	The project is focused on the issue of increasing the efficiency and power density of power semiconductor systems, while reducing the electromagnetic interference, which ultimately reduces negative environmental aspects of their application. Its main task is to research the phenomena related to applications of advanced semiconductor structures based on GaN transistors in power electronic systems, including research of commutation techniques applied in the switching frequency range of MHz units. Investigators will be outgoing from the results of the projects addressed at the national (ELTECO Ltd.), respectively international level (Panasonic Gmhb Lueneburg SNR). Another task of the project is to research phenomena affecting the efficiency of the practical application of those facilities. Specifically, the economic burden of production, reduction of CO2 and return on investment. The project also highlighted the issue of the reliability analysis and research methodology for the estimation of mean lifetime of power electronic systems based on GaN technology. At the same time, the project deals with draft measures on the possibility of extending the operation of such systems through multi-level multi-physics simulations. The main outcome of the project will be functional sample of the system meeting the declared goals, intended for direct use in industrial applications of electromobility application or respectively of wireless transmission of electricity. Another output will be a set of knowledge and measures for the optimal design of these systems, reducing the failure rate and lifetime extensions. Based on preliminary discussions with companies ELTECO Ltd. and Delta Electronics, it can be assumed rapid utilization of the results obtained in industrial practice.
Realization:	10/2016 – 09/2020
Coordinator:	Michal Frivaldský
Co-operators:	Pavol Špánik, Anna Kondelová, Anna Simonová, Ondrej Hock, Jozef Šedo, Peter Čuboň, Boris Kozáček, Michal Prídala

APVV-15-0462: Research on Sophisticated Methods for Analysing the Dynamic Properties of Respiratory Epithelium's Microscopic Elements	
Summary:	The project is focused on research of sophisticated methods based on image analysis, intended to improve the objectivity, efficiency and automation of diagnostic processes in medicine. Its main objective is to identify the dynamic properties of biological objects of interest, which are the cilia of respiratory epithelium. Movement of such objects will be captured using high-speed video microscopy, while recording and data analysis will be carried out by high-power computer system. The recorded data will be then processed by our software system designed for segmentation of the objects of interest. The main criterion for segmentation will be the identification of pathological structures that are, due to disease or structural changes, static and do not contribute to cilia's primary function in vivo. Identification and subsequent analysis of segmented regions will notably contribute to an accurate specification of patient's diagnosis, and thus to determination of early and effective therapy. Although the results of the project are intended to be applied in the medical field, the project is mainly about the research of optimal technical solutions for modern diagnostic methods in medicine also in terms of international research in this area. The dominant project outcome will be the device enabling the analysis of high-speed videos.
Realization:	10/2016 – 09/2020

Coordinator:	Libor Hargaš
Co-operators:	Dušan Koniar, Miroslav Hrianka, Anna Simonová, Pavel Pavlásek, Peter Čuboň, Zuzana Loncová, Tomáš Uriča, Michal Taraba

Other National Research Projects

314/17_RT: Universal balancing system for traction batteries of electric vehicles	
Summary:	Creation of a universal balancer of traction lithium batteries of all types is a project goal. The balancer system includes an active-passive balancer with intelligent control system that ensures increased cyclability and safety of different battery types.
Realization:	09/2017 – 04/2018
Coordinator:	Peter Drgoňa
Co-operators:	Matúš Danko, Juraj Adamec, Michal Taraba

Research for Practice; the Most Important Realized Outputs

Project number: APVV–0433–12

Name of the project: Research and Development of Intelligent System for Wireless Energy Transfer in Electromobility Application

Coordinator: Pavol Špánik

Summary / Achievement:

A physical model of the WET system with a resonant bond was constructed within the project solution. Measured operating parameters of the model are: input voltage 400Vdc, power output 3300W, working distance between coils 10-20cm, main resonant frequency 295 kHz (working band 300 kHz - approx. 400 kHz). The WET design process has been modified in accordance with the TIR J2954 standard. The impact of the WET system on technical and biological objects was analyzed. Also, a large SW library was created both in the research and in the pedagogical process usable. The acquired knowledge will be applied in the construction of a WET system prototype, which will be used in the electric vehicle charging station realized in cooperation with the industrial partner.

Project number: APVV–0314–12

Name of the project: Research and Development of New Generation of Power Supplies Based on Converters with High Power Density, High Efficiency, Low EMI and Circular Energy

Coordinator: Branislav Dobrucký

Summary / Achievement:

From the point of view of the quality indicators priorities, a double semi-bridge DC / AC / DC converter integrated with the DC output module was chosen as output of the project. The converter has excellent efficiency (98% at switching frequency 100 kHz and ZVS switching) and zero circulating energy. As a switched power supply, it meets all required parameters according to EN, but its modulus power density does not reach the target parameters. The second developed and tested type was the multi-resonant LCL2C2 converter, which generates nearly harmonic output AC voltage with less than 5% distortion and minimized deformation power (also <5%). Such a resonant LCLC converter with direct AC output is suitable for hardening and demagnetizing of materials with frequencies ranging from 400 Hz to 40 kHz.

Outputs from Solved Research Tasks

Publication activities at the FEE (based on registration at the University Library up to February 2018)

Kategória	Názov kategórie (podľa UK)	Počet
AAA		
AAB		
ACA		
ACB		
ADC	Scientific papers in international current content journals	11
ADD		
ADE	Scientific papers in other foreign journals	8
ADF		
ADM	Scientific papers in foreign journals registered in the Web of Science or SCOPUS databases	3
ADN		
AEC	Scientific papers in foreign scientific journals, monographs	2
AED		
ADE		
ADF		
AGJ		
BCI		
AFC	Reviewed proceedings of international conferences	19
AFD	Reviewed proceedings of national conferences	4
DAI	Dissertation	6
GII	Various publications and documents	1

Monographs

[1]	DOBRUCKÝ, Branislav - LAŠKODY, Tomáš - KOŇARIK, Roman: Two-Phase Inverters with Minimum Switching Devices. In: Recent Developments on Power Inverters, INTECH, 2017, ISBN 978-953-51-3232-5, 28 pp. (in English)
[2]	HOCK, Ondrej - ŠEDO, Jozef: Forward and Inverse Kinematics Using Pseudoinverse and Transposition Method for Robotic Arm DOBOT. In: Kinematics, INTECH, 2017, ISBN 978-953-51-3688-0, ISBNp 978-953-51-3687-3, 75-94 pp. (in English)

Current Content Journals

[1]	FRIVALDSKÝ, Michal - ŠPÁNIK, Pavol - DRGOŇA, Peter - LONCOVÁ, Zuzana: Algorithms for indirect investigation of heat distribution in electronic systems. In: International Journal of Thermal Sciences, 2017, Elsevier, Vol. 114, ISSN 1290-0729, pp. 15-34. (in English)
[2]	KINDL, Vladimír - FRIVALDSKÝ, Michal - ŠPÁNIK, Pavol - PÍRI, Marek - JAROŠ, Viliam: Transfer properties of various compensation techniques for wireless power transfer system including parasitic effects. In: COMPEL: The international journal for computation and mathematics in electrical and electronic engineering, 2017, Vol.36, No.4, ISSN 0332-1649, DOI: 10.1108/COMPEL-04-2016-0143, pp. 1198-1219. (in English)
[3]	FRIVALDSKÝ, Michal - DONIČ, Tibor - VAVRÚŠ, Vladimír - Pavelek, Miroslav: Experimental research of optimization methodology for local, resistive - heating of thin molybdenum plates. In: International Journal of Thermal Sciences, Elsevier, Vol. 121 (2017), DOI https://doi.org/10.1016/j.ijthermalsci.2017.07.009 , ISSN 1290-0729, pp. 111-123. (in English)
[4]	FRIVALDSKÝ, Michal - PÍRI, Marek - ŠPÁNIK, Pavol - JAROŠ, Viliam - KONDELOVÁ Anna: Peak

	efficiency - peak power point operation of wireless energy transfer (WET) system - analysis and verification. In: Electrical Engineering - Archiv für Elektrotechnik, SI, SPRINGER, Vol. 99, Issue 4, 2017, DOI 10.1007/s00202-017-0658-4, ISSN 0948-7921, ISSN(e) 1432-0487, pp. 1439-1451. (in English)
[5]	ŠEDO, Jozef - KAŠČÁK, Slavomír: Design of Output LCL Filter and Control of Single-Phase Inverter for Grid Connected System. In: Electrical Engineering - Archiv für Elektrotechnik, SI, SPRINGER, Vol. 99, Issue 4, DOI 10.1007/s00202-017-0617-0, ISSN 0948-7921, ISSN(e) 1432-0487, pp. 1217-1232. (in English)
[6]	ŠPÁNIKOVÁ, Gabriela - ŠPÁNIK, Pavol - FRIVALDSKÝ, Michal - PAVELEK, Miroslav - BASSETTO, Franco - VINDIGNI, Vincenzo: Electric model of liver tissue for investigation of electrosurgical impacts. In: Electrical Engineering - Archiv für Elektrotechnik, SI, SPRINGER, Vol. 99, Issue 4, DOI 10.1007/s00202-017-0625-0, ISSN 0948-7921, ISSN(e) 1432-0487, pp. 1185-1194. (in English)
[7]	GALÁD, Martin - ŠPÁNIK, Pavol - CACCIATO, Mario - NOBILE Giovanni: Analysis of State of Charge Estimation Methods for Smart Grid with VRLA Batteries. In: Electrical Engineering - Archiv für Elektrotechnik, SI, SPRINGER, Vol. 99, Issue 4, DOI 10.1007/s00202-017-0618-z, ISSN 0948-7921, ISSN(e) 1432-0487, pp. 1233-1244. (in English)
[8]	FRIVALDSKÝ, Michal - KOZÁČEK, Boris: Improvement of qualitative indicators of LLC converter using the evaluation method FoM of perspective semiconductor and magnetic components. In: Electrical Engineering - Archiv für Elektrotechnik, SI, SPRINGER, Vol. 99, Issue 4, DOI 10.1007/s00202-017-0615-2, ISSN 0948-7921, ISSN(e) 1432-0487, pp. 1195-1206. (in English)
[9]	DOBRUCKÝ, Branislav - ŠTEFANEC, Pavol - KOŇARIK, Roman - CHCERNOYAROV, V. Oleg: Modelling of Transient Phenomena of Complex Electrical Circuits under Periodic Non-Harmonic Converter Supply. In: Electrical Engineering - Archiv für Elektrotechnik, SI, SPRINGER, Vol. 99, Issue 4, DOI 10.1007/s00202-017-0612-5, ISSN 0948-7921, ISSN(e) 1432-0487, pp. 1429-1438. (in English)
[10]	SIMONOVÁ, Anna - HARGAŠ, Libor - KONIAR, Dušan - HRIANKA, Miroslav - LONCOVÁ, Zuzana - URIČA, Tomáš - TARABA, Michal: Uses of on-off controller for regulation of higher order system in comparator mode. In: Electrical Engineering - Archiv für Elektrotechnik, SI, SPRINGER, Vol. 99, Issue 4, DOI 10.1007/s00202-017-0610-7, ISSN 0948-7921, ISSN(e) 1432-0487, pp. 1367-1375. (in English)
[11]	KONIAR, Dušan - HARGAŠ, Libor - LONCOVÁ, Zuzana - SIMONOVÁ, Anna - DUCHOŇ, František - BEŇO, Peter: Visual system-based object tracking using image segmentation for biomedical applications. In: Electrical Engineering - Archiv für Elektrotechnik, SI, SPRINGER, Vol. 99, Issue 4, DOI 10.1007/s00202-017-0609-0, ISSN 0948-7921, ISSN(e) 1432-0487, pp. 1349-1366. (in English)
[12]	SAPON LUHIN, V. - SOVASTEI, O. - ŠPÁNIK, Pavol - BONDARIEV, V.: Identification and fragmentation of cefalosporins, lincosamides, levofloxacin, doxycycline, vancomycin by ESI-MS. In: Acta Physica Polonica A, Vol. 132, no. 2 (2017), ISSN 0587-4246, pp. 236-239. (in English)

Patents, Industrial Designs, Author's Certificates and Discoveries

Granted in 2017:

[1]	Category: Industrial design Application number: 65-2017 Date of publication of the application: 05.02.2018 Authors: Praženica Michal, Dobrucký Branislav, Kaščák Slavomír, Drgoňa Peter Title: Two-stage power semiconductor system with multi-resonant and matrix converter
[2]	Category: Industrial design Application number: 66-2017 Authors: Praženica Michal, Dobrucký Branislav, Kaščák Slavomír, Drgoňa Peter Title: Two-stage converter with a half bridge matrix converter and low-frequency output
[3]	Category: Industrial design

	Application number: 72-2017 Authors: Praženica Michal, Dobrucký Branislav, Kaščák Slavomír, Drgoňa Peter Title: Single-phase bridge pulse cycloconverter with a reduced number of semiconductor elements
[4]	Category: Industrial design Application number: 155-2017 Authors: Praženica Michal, Prídala Michal, Frivaldský, Michal Title: Double LCCT converter with VF TR and DC output
[5]	Category: Industrial design Application number: 156-2017 Authors: Praženica Michal, Kaščák, Slavomír, Dobrucký, Branislav Title: Dual multi-resonant converter with symmetrical output
[6]	Category: Industrial design Application number: 157-2017 Authors: Praženica Michal, Kaščák, Slavomír, Frivaldský, Michal, Šedo, Jozef Title: Dual serial-parallel resonant (LLC) converter utilising full voltage of a source
[7]	Category: Industrial design Application number: 158-2017 Authors: Praženica Michal, Kaščák, Slavomír, Frivaldský, Michal, Šedo, Jozef Title: Series-parallel resonant (LLC) converter with dual resonance capacitor
[8]	Category: Industrial design Application number: 186-2017 Authors: Praženica Michal, Frivaldský, Michal, Pavelek, Miroslav, Hanko Branislav Title: Interlaced step-up converter with a high gain, bound inductance and magnetic flux reset
[9]	Category: Industrial design Application number: 180-2017 Authors: Praženica Michal, Dobrucký, Branislav, Kaščák, Slavomír, Koňarik, Roman Title: Connection of a two-phase electric motor supplied by constant frequency from single-stranded matrix converter from industrial networks
[10]	Category: Industrial design Application number: 188-2017 Authors: Praženica Michal, Dobrucký, Branislav, Kaščák, Slavomír, Koňarik, Roman Title: Connection of a two-phase electric motor supplied by variable frequency from single-stranded matrix converter from industrial networks
[11]	Category: Industrial design Application number: 187-2017 Authors: Praženica Michal, Dobrucký, Branislav, Kaščák, Slavomír, Koňarik, Roman Title: Connection of a two-phase electric motor supplied from single-stranded matrix converter with switched capacitor from industrial networks
[12]	Category: Industrial design Application number: 159-2017 Authors: Píri, Marek, Frivaldský, Michal, Drgoňa Peter Title: Device for testing the topologies of power semiconductor converters

Specific Realization Outputs (poznámka: napr. vývoj prototypu, priamo využiteľný výstup, metodika)

Output type: Method of solution to AC / AC transmission for HEV

Output description: Within the project VEGA 1/0928/15, Research of electronic control of power transmission and motion of road ICE- hybrid HEV and EV vehicles, this was an AC / AC transmission of HEV with the MxC central direct converter and with power transmission via motor-wheels, which are associated with vehicle movement control: electronic directional control via an electronic differential, and with the possibility of an independent steering wheel-motor from one converter.

The new type compared to the front-end VSI type is characterized by smaller losses, thus even better efficiency in the nominal performance of the vehicle, which is essential. Moreover, since the phase currents are smaller, thermal stress is also reduced (about one third). The total number of passive components and their use is also a bit better, while the absence of a bulky smoothing capacitor is important. Comparison of a 5-phase motor with a 3-phase brings less torque ripple, less noise, a slightly better efficiency, and especially in the case of failure of one phase it can continue to work with 80% performance. The possibility of independent control of two motors from one inverter (thanks to the permutation of the motor phases) is its main advantage.

Co-operation

Co-operation Partners in Slovakia

- EVPÚ a.s. Nová Dubnica
- Panasonic Electronic Devices Slovakia, s.r.o., Trstená
- NES, Nová Dubnica
- Bell Power Solution, Dubnica nad Váhom
- DELTA Electronics Slovakia, Nová Dubnica
- Siemens, s.r.o., Bratislava, Žilina
- LJF Martin, UK Bratislava
- ABB Slovakia, Bratislava
- Continental MATADOR s.r.o., Púchov
- HAGARD:HALL a.s. Nitra, Žilina
- IPESOFT s.r.o., Žilina
- Považská cementáreň a.s., Ladce
- Energo controls s.r.o., Žilina
- Schneider Electric Slovakia, s.r.o., Bratislava, Žilina
- ELTECO, a.s., Žilina
- A2B Žilina
- BH motorsport Turany
- SSE, a.s., Žilina
- Department of El. Engineering, Mechatronics and Industrial Engineering, FEI TU Košice
- Institute of Automotive Mechatronics, FEI STU, Bratislava
- INA Kysuce, a.s., Kysucké Nové Mesto
- KIA Motors, s.r.o., Žilina
- CONTINENTAL Výskum a vývoj, s.r.o., Zvolen
- AAUTO, s.r.o., Žilina
- GS1 Slovakia, Žilina
- EAN Slovakia, Žilina
- Htest Slovakia, Banská Bystrica
- NDS, Bratislava
- SEMIKRON s.r.o., Vrbové
- EMIS s.r.o., Bratislava
- Pneustyle s.r.o., Žilina
- AXONpro a.s., Bratislava
- ŽOS, Vrútky

- ŽOS, Zvolen
- AEROMOBIL, Nitra
- BROSE Prievidza
- ON Semiconductor, Bratislava
- Národné centrum robotiky, Bratislava
- UFOX s.r.o., Bratislava
- JANEKO s.r.o., Bratislava
- NISSAN s.r.o., Bratislava
- REGIONIS s.r.o., Bratislava
- Auto Becchi, s.r.o. Žilina

International Co-operation Partners (neuvádzať Erasmus partnerov, ...)

- ST Microelectronics, Catania, Italy
- Panasonic Electronic Devices Co., Ltd., Kadoma, Japan
- Panasonic Electronic Devices Europe GmbH, Lüneburg, Germany
- National Instruments, s.r.o., Czech Republic
- XILINX, USA
- Humusoft s.r.o., Praha, Czech Republic
- FAIRCHILD Semiconductor - Power Franchise, EU
- QUALCOMM s.r.o., Rožňov pod Radhoštěm, Czech Republic
- ON Semiconductor, Rožňov pod Radhoštěm, Czech Republic
- Rockwell Automotion s.r.o., Praha, Czech Republic
- EQUINOCCIO Madrid, Spain
- ON Semiconductor, Phoenix – USA
- MPEI Moscow Power Engineering Institute, Moscow – Russian Federation
- SLOT Consulting Company, Budapest, Hungary

Non-contractual Cooperation with Academic Institutions

- Università degli studi di Catania -Italy, DIEES
- Politecnico di Bari, Italy, DEE
- Technikum Wien, Austria
- Technical University RWTH Aachen, Germany
- Politechnika Radomska, Poland
- TU – VŠB, Ostrava, Czech Republic
- University Ioan Slavici, Timisoara, Romania
- The University of Strathclyde, Glasgow, United Kingdom
- Politechnika Lublin, Poland
- Lappeenranta University of Technology, Finland
- Aalto University – Espoo, Helsinki, Finland
- Západočeská univerzita v Plzni, Czech Republic
- Ternopil National Technical University, Ternopil, Ukraine

Visitors to the Department

Name	Institution	Length of stay
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Vadym Bilousov	Applicant's foreign research partner JANEKO, s.r.o., Ukraine	1 day
Lukasz Nowinski	Applicant's foreign research partner UFOX, s.r.o., Poland	2 x 1 day
Manuel Mendigutía, MBA	European Commission Executive Agency for Small and Medium-sized Enterprises (EASME), Belgium	1 day
Vanessa Ricci MBA	European Commission Executive Agency for Small and Medium-sized Enterprises (EASME), Belgium	1 day
Milan Michalko	Foreign research partner, OFI Global, s.r.o. Brno, Czech republic	2 days
Anthony Roybal	ON Semiconductor, Seattle, USA	1 day
Paul Dieffenderfer	ON Semiconductor, Seattle, USA	1 day
Scott Craig	ON Semiconductor, Seattle, USA	1 day
Enrico Corti	ON Semiconductor, Cernusco, EU	1 day

Visits to Foreign Institutions

Name	Institution	Length of stay
Branislav Dobrucký	Moskovský energetický inštitút, Russian Federation	30 days
Branislav Dobrucký	TransComp 2017, Zakopane, Poland	1 day
Peter Drgoňa	TransComp 2017, Zakopane, Poland	1 day
Branislav Dobrucký	Logitrans, Szczyrk, Poland	1 day
Peter Drgoňa	Logitrans, Szczyrk, Poland	1 day
Branislav Dobrucký	Nazarbayev University, Astana, Kazakhstan	3 days
Pavel Pavlásek	European Commission, Brusel, Belgium	5 days
Pavel Pavlásek	SLOT Consultancy Company, Budapest, Hungary	1 day
Pavel Pavlásek	Heviz Airport, Heviz, Hungary	1 day
Pavel Pavlásek	IATED, Barcelona, Spain	3 days
Zuzana Loncová	IMCIC 2017, Orlando, Florida, USA	7 days
Pavol Špáňik	IMCIC 2017, Orlando, Florida, USA	7 days
Libor Hargaš	IMCIC 2017, Orlando, Florida, USA	7 days
Zuzana Loncová	PIERS 2017, St Petersburg, Russian Federation	5 days
Boris Kozáček	PIERS 2017, St Petersburg, Russian Federation	5 days
Juraj Adamec	Conference NI Automotive Forum, Czech Republic	1 day
Michal Taraba	Conference NI Automotive Forum, Czech Republic	1 day
Matúš Danko	Conference NI Automotive Forum, Czech Republic	1 day
Juraj Adamec	Conference EPE 2017, VŠB Ostrava, Kouty nad Desnou, Czech Republic	3 days
Michal Taraba	Conference EPE 2017, VŠB Ostrava, Kouty nad Desnou, Czech Republic	3 days
Tomáš Uriča	Conference EPE 2017, VŠB Ostrava, Kouty nad Desnou, Czech Republic	3 days
Roman Koňarik	Conference EPE 2017, VŠB Ostrava, Kouty nad Desnou, Czech Republic	3 days
Miroslav Pavelek	Conference EPE 2017, VŠB Ostrava, Kouty nad Desnou, Czech Republic	3 days
Michal Frivaldský	PCIM EUROPE 2017, Nuremberg, Germany	2 days
Jozef Šedo	PCIM EUROPE 2017, Nuremberg, Germany	2 days
Ondrej Hock	PCIM EUROPE 2017, Nuremberg, Germany	2 days
Michal Praženica	PCIM EUROPE 2017, Nuremberg, Germany	2 days
Michal Frivaldský	ISIE 2017, Edinburg, Great Britain	5 days
Miroslav Pavelek	ISIE 2017, Edinburg, Great Britain	5 days
Michal Frivaldský	UNICT Catania, Italy	5 days

Miroslav Pavelek	CEEPUS, Silesian University of Technology, Gliwice, Poland	10 days
Tomáš Uriča	CEEPUS, Silesian University of Technology, Gliwice, Poland	10 days
Michal Prídala	CEEPUS, Silesian University of Technology, Gliwice, Poland	10 days
Michal Prídala	Erasmus, Aalto University, Helsinki, Finland	4 months
Ing. Matúš Danko	SLED 2017, UNICT, Catania Italy	5 days
Michal Frivaldský	EDPE 2017, Dubrovnik, Croatia	5 days
Juraj Adamec	EDPE 2017, Dubrovnik, Croatia	5 days
Michal Taraba	EDPE 2017, Dubrovnik, Croatia	5 days
Matúš Danko	EDPE 2017, Dubrovnik, Croatia	5 days
Michal Prídala	EDPE 2017, Dubrovnik, Croatia	5 days
Miroslav Pavelek	EDPE 2017, Dubrovnik, Croatia	5 days
Roman Koňarik	EDPE 2017, Dubrovnik, Croatia	5 days
Michal Frivaldský	The city council of Turin, Italy	3 days
Peter Drgoňa	The city council of Turin, Italy	3 days
Libor Hargaš	Instytut Gruźlicy i Chorób Płuc, Rabka-Zdrój, Poland	3 days
Dušan Koniar	Instytut Gruźlicy i Chorób Płuc, Rabka-Zdrój, Poland	3 days
Anna Simonová	Instytut Gruźlicy i Chorób Płuc, Rabka-Zdrój, Poland	3 days
Pavol Špánik	Silesian University of Technology, Gliwice, Poland	2 days
Pavol Špánik	State University of Radio-Technology, Ryazan, Russian Federation	4 days
Pavol Špánik	VŠB TU, Ostrava, Czech Republic	4 days

Contracts (Business Activities)

SOLEZ CE243: Strategic document: Action Plan of Low-Carbon Mobility in the City of Žilina and its Urban Area	
Customer:	The study for the city of Žilina
Coordinator:	Pavol Špánik
Co-operators:	Peter Drgoňa, Michal Frivaldský, Peter Čuboň, Matúš Danko

Associated center for application support and research tasks of the ON Semiconductor company	
Customer:	ON Semiconductor
Coordinator:	Michal Frivaldský, Pavol Špánik
Co-operators:	Viliam Jaroš, Boris Kozáček, student 1 on internship, student 2 on internship

Other Activities

Conferences, Workshops, Symposiums Organized by the Department

- Competition for secondary school students: The Technical Idea of the Year, 23.03.17, Department of Mechatronics and Electronics, Faculty of Electrical Engineering, University of Žilina, Jozef Šedo, Ondrej Hock
- Popularization of department research through the program Science and Technology on RTVS: broadcasted on 23.02.17, DME FEE UNIZA / Clinic of children and adolescents JLF UK, Martin, Dušan Koniar, Libor Hargaš, Michal Taraba / Peter Ďurdík

- Obtaining the certificate CLAD (Certified LabVIEW Associate Developer), 01.08.17, National Instruments, Libor Hargaš
- Establishment of the LabVIEW Academy, 01.11.17, FEE UNIZA, National Instruments, Libor Hargaš, Dušan Koniar

Specialised Lectures and Courses Organized by the Department

Smart & Clean mobility-sharing	
Customer:	UFOX, s.r.o.
Lecturer:	Pavel Pavlásek
Date:	22th February 2017

Seminar in the framework of the exhibition Days of Opportunities	
Customer:	Students of bachelor's degree of FEE University of Žilina
Lecturer:	Pavel Pavlásek
Date:	7th – 8th March 2017

Signs of novelty in the field of intellectual and industrial property protection, including activity: patent, industrial design, trademark, design, topology	
Customer:	Students of Department of Mechatronics and Electronics of FEE University of Žilina
Lecturer:	Pavel Pavlásek
Date:	17th March 2017

Excursion focusing on the collaboration of the Department of Mechatronics and Electronics at the Faculty of Electrical Engineering with a production company in the region	
Customer:	KIA Motors Slovakia, students of Department of Mechatronics and Electronics of FEE University of Žilina
Lecturer:	Pavel Pavlásek
Date:	18th April 2017

Identification of components and services	
Customer:	EAN Slovakia, students of bachelor's degree of FEE University of Žilina
Lecturer:	Pavel Pavlásek, Miroslav Štaffen
Date:	3rd October 2017

Identifiers: Design and verification of the functionality of modules with barcodes in automatic control	
Customer:	GS1 Slovakia, students of bachelor's degree of FEE University of Žilina
Lecturer:	Pavel Pavlásek, Miroslav Štaffen
Date:	10th October 2017

RFID identifiers: Standardization of systems, communication systems and product flows verification systems	
Customer:	GS1 Slovakia, students of bachelor's degree of FEE University of Žilina
Lecturer:	Pavel Pavlásek, Miroslav Štaffen
Date:	24th October 2017

Design, measurement and operation verification of the unique identifier and its characteristics	
Customer:	EAN Slovakia, students of bachelor's degree of FEE University of Žilina
Lecturer:	Pavel Pavlásek, Miroslav Štaffen
Date:	31st October 2017

Development of Single-Purpose Machines	
Customer:	Schaeffler, students of master's degree of FEE University of Žilina
Lecturer:	Pavel Pavlásek, Ondrej Hvizdák
Date:	28th November 2017

Seminar in the framework of the exhibition Days of Opportunities	
Customer:	Students of bachelor's degree of FEE University of Žilina
Lecturer:	Pavel Pavlásek
Date:	28th – 29th November 2017

Invited Lectures/Papers

Recent Advances on Power Electronic Systems on DME	
Lecturer:	Michal Frivaldský
Where:	UNICT, Catania, Italy
Date:	10th July 2017

Electrical equipment and lightning conductors	
Lecturer:	Peter Drgoňa
Where:	Regional branch of SKSI Žilina, Slovakia
Date:	10th October 2017

Overhead lines, standards, design of electrical equipment	
Lecturer:	Peter Drgoňa
Where:	Regional branch of SKSI Žilina, Slovakia
Date:	21th November 2017

Membership in International Institutions/Committees

Individual membership of employees of international organizations		Function
Branislav Dobrucký	IEEE IE Society - Senior Member, USA	senior member
Pavel Pavlásek	Brandon Hall Excellence in Learning Technology Awards, USA	expert
Pavel Pavlásek	Expert of EC H2020 SMEINST, Belgium	expert
Pavel Pavlásek	Member of European Committee expert team for science and research, Belgium	member of expert team
Pavol Špánik	IEEE IE Society - Senior Member, USA	senior member
Michal Frivaldský	IEEE IE Society, USA	member
Michal Frivaldský	IEEE SMTC 2016 Evaluation Committee – competition, USA	member
Peter Drgoňa	IEEE IE Society, USA	member
Libor Hargaš	IEEE IE Society, USA	member
Dušan Koniar	IEEE IE Society, USA	member
Slavomír Kaščák	IEEE IE Society, USA	member
Michal Praženica	IEEE IE Society, USA	member
Ondrej Hock	IEEE IE Society, USA	member
Marek Paškala	IEEE IE Society, USA	member
Martin Galád	IEEE IE Society, USA	student member
Zuzana Loncová	IEEE IE Society, USA	student member
Viliam Jaroš	IEEE IE Society, USA	student member
Pavol Štefanec	IEEE IE Society, USA	student member
Marek Píri	IEEE IE Society, USA	student member
Boris Kozáček	IEEE IE Society, USA	student member

Individual membership of employees in scientific committees of international journals		Function
Branislav Dobrucký	EPE journal, Print ISSN: 0939-8368 Online ISSN: 2376-9319, Brusel, Belgium	reviewer

Branislav Dobrucký	IEEE Transactions on Industrial Electronics, ISSN: 0278-0046, USA	reviewer
Branislav Dobrucký	IEEE Transactions on Power Electronics, ISSN: 0885-8993, USA	reviewer
Michal Frivaldský	International Journal on Thermal Science, ISSN: 1290-0729, France	reviewer
Michal Frivaldský	Transactions on Industrial Electronics, ISSN: 0278-0046, USA	reviewer
Michal Frivaldský	Electronics Science Technology and Application, ISSN: 2424-8460 (Online) 2251-2608 (Print), Singapore	member of the editorial board
Pavol Špánik	Advances in Electrical and Electronic Engineering, ISSN: 1336-1376 (Print) 1804-3119 (Online), Czech Republic, Slovakia	member of the editorial board

Individual membership of employees in the scientific committees of international conferences		Function
Branislav Dobrucký	TransComp 2017 – THU Radom, Poland	member of the program committee
Branislav Dobrucký	Power Electronics Ee 2017, University of Novi Sad, Serbia	member of the program committee
Branislav Dobrucký	Logitrans, Szcyrk, Poland	member of the program committee

Individual membership of employees in scientific boards and trade commissions abroad		Function
Pavol Špánik	Scientific board of FEI – VŠB - TU Ostrava, Czech Republic	member
Pavol Špánik	Electronics Committee, FEI – VŠB TU Ostrava, Czech Republic	member
Pavol Špánik	Electric machines, instruments and drives Committee, FEL ČVUT Prague, Czech Republic	member
Pavol Špánik	Program committee of The Faculty of Electrical Engineering Silesian University of Technology, Gliwice, Poland	member

Membership in National Institutions/Committees

Individual membership of employees in organizations of the SR		Function
Pavel Pavlásek	Commission of Transport and Road Administration Port (The Žilina Self-governing region)	member
Pavel Pavlásek	Commission of the Ministry of Education of Slovak Republic for Selection of Candidates for study in Slovak Republic within the Aid for Developing Countries and Compatriots	member
Pavol Špánik	Working Group „Industry Technologies“ at the Ministry of Education, Science, Research and Sport of the Slovak Republic	member
Pavol Špánik	Working Group „Electro-mobility“ at the Ministry of Economy of the Slovak Republic	member
Pavol Špánik	Grant Commission for Scientific Grant Agency of the Slovak Republic VEGA No 5 for electrical engineering and informatics	member
Libor Hargaš	National Robotics Centre, Bratislava	member

Dušan Koniar	National Robotics Centre, Bratislava	member
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Individual membership of employees in editorial boards of national journals		Function
Branislav Dobrucký	Editorial board of the scientific journal ŽU - Komunikácie – vedecké listy (Communication - Scientific papers), ISSN (print version) 1335-4205, ISSN (online version) 2585-7878	member of the editorial board
Michal Frivaldský	Editorial board of the scientific journal ŽU - Komunikácie – vedecké listy (Communication - Scientific papers), ISSN (print version) 1335-4205, ISSN (online version) 2585-7878	member of the editorial board
Pavol Špánik	Editorial board of the scientific journal ŽU - Komunikácie – vedecké listy (Communication - Scientific papers), ISSN (print version) 1335-4205, ISSN (online version) 2585-7878	member of the editorial board

Individual membership of employees in the scientific committees of national conferences		Function
Branislav Dobrucký	ALER 2017, Liptovský Mikuláš, Boborovec	member of the program committee

Individual membership of employees in scientific boards and trade commissions outside of FEE UNIZA		Function
Pavol Špánik	Mechatronics - Committee, Faculty of Mechanical Engineering, TU Košice	member
Pavol Špánik	Board of directors of the University of Žilina	member
Pavol Špánik	Scientific Board of the University of Žilina	member
Pavol Špánik	Scientific Board of the Faculty of Mechanical Engineering, University of Žilina	member
Pavol Špánik	Scientific Board of the JLFUK Martin	member
Pavol Špánik	Scientific Board of the FEI TU Košice	member
Pavol Špánik	Scientific Board of the FEI STU Bratislava	member
Pavel Pavlásek	Technical Subjects Didactics Committee, UKF Nitra	member

Awards

Zuzana Loncová	Session's Best Paper Award entitled: Interdisciplinary Research in Field of Biomedical Image Processing, Session: ICT Applications in Health Care and Bio-Medical ICT II on the 8th International Multi-Conference IMCIC 2017 in Orlando, Florida, USA.
Dušan Koniar	Session's Best Paper Award entitled: Interdisciplinary Research in Field of Biomedical Image Processing, Session: ICT Applications in Health Care and Bio-Medical ICT II on the 8th International Multi-Conference IMCIC 2017 in Orlando, Florida, USA.
Libor Hargaš	Session's Best Paper Award entitled: Interdisciplinary Research in Field of Biomedical Image Processing, Session: ICT Applications in Health Care and Bio-Medical ICT II on the 8th International Multi-Conference IMCIC 2017 in Orlando, Florida, USA.
Anna Simonová	Session's Best Paper Award entitled: Interdisciplinary Research in Field of Biomedical Image Processing, Session: ICT Applications in Health Care and Bio-Medical ICT II on the 8th International Multi-Conference IMCIC 2017 in Orlando, Florida, USA.

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