UNIVERSITY OF ŽILINA

FACULTY OF ELECTRICAL ENGINEERING AND INFORMATION TECHNOLOGY

ANNUAL REPORT 2020

UNIVERSITY OF ŽILINA

Foreword

The Faculty of Electrical Engineering and Information Technology is an essential part of the University of Žilina – a modern university providing a full range of technological, economic, management, and a limited range of humanistic and natural science education at under-graduate, graduate and post-graduate levels.

During its more than 60-year existence the University has become a reputable institution with the firm position in the system of the Slovak higher education institutions. It was originally established in 1953 as the College of Railways in Prague. In 1959 the College changed its name to the University of Transport and in 1962 it was moved to Žilina. Afterwards, as a result of the increasing role of communications, the title was amended to the University of Transport and Communications. A series of transformation steps that brought essential changes into the academic life of the University and its Faculties and Institutes started in 1989. They proved effectiveness on the way towards a modern institution, featuring a character of a full-value university, named the University of Žilina since November 1996.

Nowadays, the University of Žilina consists of 7 Faculties (important dates of their establishing and/or transformation are indicated in parentheses):

- Faculty of Electrical Engineering and Information Technology (1953; 1992; 2019),
- Faculty of Mechanical Engineering (1953; 1992),
- Faculty of Operation and Economics of Transport and Communications (1953),
- Faculty of Civil Engineering (1990),
- Faculty of Management Science and Informatics (1990, 1996),
- Faculty of Security Engineering (1952, 1998, 2014),
- Faculty of Humanities (1998, 2010).

In addition to the Faculties, the University also involves the following 10 Institutes:

- Institute of High Mountain Biology,
- CETRA – Centre for Transportation Research,
- Institute of Forensic Research and Education,
- Institute of Competitiveness and Innovations,
- University Science Park,
- Research Centre,
- Institute of Physical Education,
- Institute of Lifelong Education,
- Aviation Training and Education Centre,
- Institute of Information and Communication Technologies.

PROFILE AND STRUCTURE OF THE FACULTY OF ELECTRICAL ENGINEERING AND INFORMATION TECHNOLOGY

As mentioned above, history of the Faculty of Electrical Engineering and Information Technology goes back to the year 1953 . In 1959 it was merged with the Faculty of Mechanical Engineering and that symbiosis took 33 years. In 1992, after the split, the Faculty returned to its previous original name. The Faculty of Electrical Engineering was renamed in January 2019 to the Faculty of Electrical Engineering and Information Technology. The Faculty became the first technically oriented faculty and generally the second Faculty in the Slovak Republic awarded the Quality Certificate for quality control system according to ISO 9001 (in 2003). Since that time further three successful re-certifications were realized (2007; 2010, and 2013 and 2016).

Structure of the Faculty

From a structure point of view, the Faculty of Electrical Engineering and Information Technology (FEEIT) consists of eight departments (seven departments are located directly in Žilina and one institute established at the satellite work place in Liptovský Mikuláš), the Service centre and the Dean's office. Scientific and research activities, properly projected to educational activities, are dynamically developing as a response to floating markets seen within both national and pan-European context. At the very beginning, the activities of original departments were mainly oriented on technical aspects of classical transport, its safety and problems of technical operation of telecommunications. At present, the scientific and research activities addresses the latest problems of information and communication technologies, safety-related control of transport and industry processes, telecommunication engineering, power electronic systems, modern control of electric networks and others. Additionally, such interdisciplinary fields as mechatronic and biomedical engineering are also developed.

The FEEIT's Departments are listed below:

- Department of Physics (DPh),
- Department of Measurement and Applied Electrical Engineering (DMAEE),
- Department of Electromagnetic and Biomedical Engineering (DEBE),
- Department of Mechatronics and Electronics (DME),
- Department of Power Systems and Electric Drives (DPSED),
- Department of Control and Information Systems (DCIS),
- Department of Multimedia and Information-Communication Technologies (DMICT),
- Institute of Aurel Stodola situated in Liptovský Mikuláš (IAS).

The following table 1 shows the distribution of the pedagogical and the research positions at particular FEEIT's departments as of 31.12.2020.

Tab. 1: Number of pedagogical and research employees at the departments of FEEIT as of 31.12.2020

Department	Pedagogical staff		Research staff	
	Full-time	Part-time	Full-time	Part-time
DPh	14	2	2	1
DMAEE	7	1	-	-
DEBE	9	0	1	1
DME	12	2	2	12
DPSED	13	2	2	1

DCIS	13	1	2	-
DMICT	20	4	4	-
IAS	5	1	-	-
Total	**93**	**13**	**13**	**15**

Number of employees at FEEIT according to the categories can be seen in the table 2.

Tab. 2: Number of employees at FEEIT according to the categories in 2014-2020

Year	**2014**		**2015**		**2016**		**2017**		**2018**		**2019**		**2020**	
Full-time / Part-time	**FT**	**PT**	**FT**	**PT**	**FT**	**PT**	**FT**	**PT**	**FT**	**PT**	**FT**	**PT**	**FT**	**PT**
Prof.	18	-	17	-	19	-	18	-	15	-	16	-	15	-
Assoc. Prof. in the position of Prof.	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Guest Prof.	-	4	-	4	-	4	-	4	-	1	-	1	-	3
Assoc. Prof.	36	1	34	3	29	4	28	3	32	1	29	1	29	1
Senior Lecturer	49	6	51	8	53	5	57	6	53	9	53	8	48	10
Lector	5	-	4	-	4	-	2	3	2	2	1	2	-	2
Tech. Admin. Staff	31	3	27	2	26	3	27	2	22	2	25	2	23	2
Research Staff	16	6	12	6	14	4	16	6	18	8	13	14	13	15
Total	**155**	**20**	**145**	**23**	**145**	**20**	**147**	**24**	**142**	**23**	**137**	**28**	**129**	**33**

Highlights

The most important events in 2020 can be summarized as follows:

- Implementation of the project SENSIBLE “SENSors and Intelligence in BuiLt Environment” Marie Skłodowska-Curie Actions (MSCA) Research and Innovation Staff Exchange (RISE) H2020-MSCA-RISE-2016;
- Submission of five proposals of international research projects;
- Building of a top team at FEEIT in the area of efficient conversion, supply and transfer of energy, the use of unconventional resources, promising technologies, materials, thermal management, sustainability, space applications, energy storage and lighting technology;
- Successful submission and realization of projects under the operational program Research and Innovations;
- Extension of cooperation with industrial entities HAKO, a.s., Ineltech, s.r.o., Atelsys, s.r.o., A2B, s.r.o .;
- Successful implementation and realization of national research projects (SRDA, VEGA, KEGA);
- Organization and co-organization of conferences: ELEKTRO 2020, ADEPT 2020, Masterclasses 2020, Technical idea of the year, and others;
- Continuing graduation growth of the Faculty staff by appointment of six associate professors;
- Historically highest attendance at the FEEIT Open Day (participation of more than 500 applicants from 53 schools, of it 3 schools from abroad);
- The third highest number of enrolled students in the 1st year of Bachelor study at FEEIT UNIZA in the history of the Faculty (427);
- Enhancement and further implementation of a marketing strategy aimed at promoting of studies at FEEIT;
- Student award of Lenka Urbancová, the winner (laureate) in the category "Student personality of the year 2019/20" in the category Electrical Engineering. Industrial Technologies;
- Organization of the e-sports festival HernaZona.sk UNIZA MASTERS with international participation. The festival was realized online. It was attended by more than 350 players and more than 10,000 guests. The aim of the event was to support the sports community and build the name of UNIZA and FEEIT;
- The Faculty regularly began producing FEEIT News from the Faculty's life through its youtube channel and selected operators.

EDUCATIONAL ACTIVITIES

- The courses in social sciences, psychology, economics and law are offered to the students in all study programs at Bachelor and Master degree study.
- In all study programs at Bachelor and Master degree study students are also offered courses focused on project teaching form through which students better acquire theoretical and practical aspects of their education.
- FEEIT increases the attention given to the adaptation of new 1st degree students to the university environment (information sessions, detailed monitoring of study results, support of mutual communication between students – teachers, support for solving common student activities).
- Considerable attention is paid to students of the 3rd degree study. FEEIT supports them mainly in preparing high quality publication outputs, fulfilment of curricula, preparation and defending the dissertation thesis in the standard length of study.
- The FEEIT is using complex software system for supporting e-learning, which enables access to electronic materials supporting the traditional form of teaching, testing and examination of students, and organizational provision of study. FEEIT claims from pedagogical staff and students to actively use the e-learning system and at the same time creates conditions for the development of e-learning, not only within FEEIT but also within the University. Due to the established preventive measures to reduce the spread of coronavirus Covid-19, full-time teaching at FEEIT during the summer semester of the academic year 2019/20 and the autumn semester of the academic year 2020/21 switched to distance learning, which made full use of a comprehensive software system to support e-learning.
- FEEIT participates in a student mobility system. Mobility of students to foreign universities, as well as to industrial environment are supported and fully integrated into the learning process of students. Students can thus part of their study take at leading foreign educational institutions or in major industrial enterprises or corporations.
- FEEIT supports the development of interdisciplinary, multidisciplinary, distance and lifelong learning; and education of foreign languages mainly for young employees and doctoral students.
- FEEIT has had the credit system for all study degrees. The system enables uniform evaluation of study results in the frame of EU and markedly makes the realization of mobility and acceptation of achieved results simpler.
- At FEEIT there is a contact person (vice-dean for education) responsible for help and life coordination of disabled students.
- In 2020, a successful generational exchange contunues in the position of guarantors and staffing in several study programs at all three levels of higher education.

Tab.3: Overview of accredited study programs (1st degree - Bachelor study programs, 2nd degree - Master study programs, 3rd degree - Doctoral study programs)

Field of study	Study program	Form of study	Duration of study	Title awarded	Guaranteed by
1st study degree					
Cybernetics	Control Engineering	FT	3 years	Bc.	Juraj Ždánsky
Electrical Engineering	Biomedical Engineering	FT	3 years	Bc.	Ladislav Janoušek
Electrical Engineering	Autotronics	FT	3 years	Bc.	Pavol Špánik
Electrical Engineering	Electrical Engineering	FT	3 years	Bc.	Alena Otčenášová
Electrical Engineering	Electrical Engineering	PT	4 years	Bc.	Alena Otčenášová
Informatics	Digital Technologies	FT	3 years	Bc.	Jarmila Műllerová
Informatics	Digital Technologies	PT	4 years	Bc.	Jarmila Műllerová Milan Dado
Informatics	Multimedia Technologies	FT	3 years	Bc.	Roman Jarina
Informatics	Telecommunications	FT	3 years	Bc.	Peter Počta
2nd study degree					
Cybernetics	Applied Telematics	FT	2 years	Ing.	Aleš Janota
Cybernetics	Process Control	FT	2 years	Ing.	Juraj Spalek
Electrical Engineering	Biomedical Engineering	FT	2 years	Ing.	Ladislav Janoušek
Electrical Engineering	Photonics	FT	2 years	Ing.	Dušan Pudiš
Electrical Engineering	Electric Power Systems	FT	2 years	Ing.	Juraj Altus
Electrical Engineering	Electric Drives	FT	2 years	Ing.	Pavol Rafajdus
Electrical Engineering	Power Electronic Systems	FT	2 years	Ing.	Pavol Špánik
Informatics	Multimedia Engineering	FT	2 years	Ing.	Róbert Hudec
Informatics	Telecommunication and Radio-com. Engineering	FT	2 years	Ing.	Peter Brída
3rd study degree					
Cybernetics	Process Control	FT	3 years	PhD.	Karol Rástočný, Aleš Janota, Rastislav Pirník
Electrical Engineering	Electric Power Systems	FT	3 years	PhD.	Juraj Altus, Alena Otčenášová, Peter Braciník
Electrical Engineering	Electric Power Systems	PT	4 years	PhD.	Juraj Altus, Alena Otčenášová, Peter Braciník
Electrical Engineering	Electrotechnologies and Materials	FT	3 years	PhD.	Dušan Pudiš, Ivan Martinček, Jarmila Müllerová
Electrical Engineering	Electrotechnologies and Materials	PT	4 years	PhD.	Dušan Pudiš, Ivan Martinček, J. Müllerová
Electrical Engineering	Power Electrical Engineering	FT	3 years	PhD.	Pavol Špánik, Pavol Rafajdus, Michal Frivaldský

Electrical Engineering	Power Electrical Engineering	PT	4 years	PhD.	Pavol Špánik, Pavol Rafajdus, Michal Frivaldský
Informatics	Telecommunications	FT	3 years	PhD.	Peter Brída, Milan Dado, Róbert Hudec
Informatics	Telecommunications	PT	4 years	PhD.	Peter Brída, Milan Dado, Róbert Hudec
Electrical Engineering	Theory of Electrical Engineering	FT	3 years	PhD.	Ladislav Janoušek, Mariana Beňová, Milan Smetana

Tab. 4: Number of the faculty students (as of 31.10.2020)

Field of study/Study program	Number of students			
	Full-time study		Part-time study	
	Nationals	Foreigners	Nationals	Foreigners
1st study degree				
Control Engineering	107	2		
Autotronics	56	3		
Biomedical Engineering	87	1		
Electrooptics	3	0		
Electrical Engineering	202	2	1	
Digital Technologies	0	0	7	
Multimedia Technologies	165	12		
Communication and Information Techn.	121	1		
Total	**741**	**21**	**8**	
2nd study degree				
Applied Telematics	0	0		
Biomedical Engineering	33	1		
Electric Power Systems	38	1		
Electric Drives	14	0		
Photonics	5	0		
Multimedia Engineering	78	2		
Process Control	59	1		
Telecomm. and Radio-comm. Eng.	35	0		
Power Electronic Systems	26	7		
Total	**288**	**12**		
3rd study degree				
Electric Power Systems	3			
Electrotechnologies and Materials	3			
Process Control	5			
Power Electrical Engineering	20	1	2	
Telecommunications	17		1	
Theory of Electrical Engineering	6			
Total	**54**	**1**	**3**	

Tab. 5 and 6: Overview of the faculty students' number since 2015 (as of 31.10.2020)

Full-time study				
2016	**2017**	**2018**	**2019**	**2020**
654	634	578	639	741
356	346	317	295	288
51	48	48	53	54

Part-time study				
2016	**2017**	**2018**	**2019**	**2020**
23	21	10	18	8
31				
9	8	5	4	3

Admission for study

a) Form of the admission procedure in 2020 and a brief assessment:

The basic condition for admission to bachelor study (1st level study programme) is completed secondary education or completed secondary vocational education. The admission procedure takes place in two forms: without an entrance examination and with an entrance examination. Applicants (except for applicants for the study program of *Multimedia Technology*) were admitted to the study without an entrance examination, if they meet the basic conditions for the bachelor's study. If the applicant provided all required annexes to the study application, the admission procedure takes place without the personal participation of the applicants. Applicants for the study program in multimedia technology have passed an entrance examination consisting of three parts:

- presentation of the motivation of the applicant for the study program,
- evaluation of achieved study results of the applicant and the general outlook of the applicant,
- presentation of the applicant's multimedia activities and secondary school knowledge, including anexplanation of the procedures and techniques used.

The selection process for the 2nd study degree is based on results from previous Bachelor study of an applicant. Those applicants who completed the Bachelor degree with honours, or reached the required weighted average are accepted without the selection procedure. The other applicants are accepted according to a ranking list established on the basis of weighted averages for the whole Bachelor study.

The selection procedure for the 3rd study degree takes the form of a personal interview with each applicant individually in front of an admission committee. One part of the interview is focused on mapping the overview of the applicant in the professional field related to the chosen topic of the doctoral study. The next part aims to verify the knowledge of foreign languages and the assumptions for individual scientific work. The order of applicants is drawn up by the committee in the form of the secret voting.

b) Faculty activities that promote learning:

FEEIT devoted considerable effort to promote the study programs to students of secondary schools. Representatives of the Faculty participated in the Open Days at selected secondary schools. FEEIT organized for secondary schools its own Open Day in Žilina and also at the IAS in Liptovský Mikuláš, also organized special exercises for students of selected secondary schools. FEEIT representatives took part in various promotional events organized at university level (Researcher's Night, Christmas at the University, ...). At the same time, the online promotion of FEEIT study opportunities intensified on social networks (Facebook, Instagram, Youtube, ...).

Number of applicants for study and number of enrolled students can be seen in the following Tables.

Tab.7: Statistical review of the admission procedure in 2020

Field of study/Study program	Number of applicants for study					
	Full-time study			Part-time study		
	S	P	E	S	P	E
1st study degree						
Control Engineering	111	111	59			
Autotronics	60	58	31			
Biomedical Engineering	83	79	46			
Digital Technologies	0	0	0			
Electrooptics	9	9	3			
Electrical Engineering	177	176	101			
Multimedia Technologies	173	170	119			
Communication and Information Techn.	163	158	89			
Total	**776**	**761**	**448**			
2nd study degree						
Applied Telematics	2	2	2			
Biomedical Engineering	18	17	17			
Electric Drives	11	11	8			
Electric power systems	22	22	20			
Photonics	1	1	1			
Multimedia Engineering	49	44	39			
Process Control	31	31	29			
Telecomm. and Radio-comm. Eng.	25	22	17			
Power Electronic Systems	33	32	21			
Total	**192**	**182**	**154**			
3rd study degree						
Electric Power Systems	3	1	1			
Electrotechnologies and Materials	1	1	1			
Process Control	2	2	2			
Power Electrical Engineering	14	8	8	1	1	1
Telecommunications	6	5	5			
Theory of Electrical Engineering	2	2	2			
Total	**28**	**19**	**19**	**1**	**1**	**1**

S - Subscribers, P - Participation in the admission procedure, E - Enrolled

Tab.8: Number of graduates of the Faculty in the academic year 2019/2020

Field of study/Study program	Number of graduates in 2019/2020			
	Full-time study		Part-time study	
	Nationals	Foreigners	Nationals	Foreigners
1st study degree				
Control Engineering	26	1		
Autotronics	14			
Biomedical Engineering	16	2		
Digital Technologies	9		5	
Electrical Engineering	43		4	
Multimedia Technologies	13			
Telecommunications	13	1		
Total	**134**	**4**	**9**	
2nd study degree				
Applied Telematics	7			
Biomedical Engineering	24			
Electric Power Systems	24	1		
Electric Drives	6	1		
Photonics	4			
Multimedia Engineering	18			
Process Control	17			
Telecomm. and Radio-comm. Eng.	16	1		
Power Electronic Systems	8			
Total	**124**	**3**		
3rd study degree				
Electric Power Systems	2		1	
Electrotechnologies and Materials	1			
Process Control				
Power Electrical Engineering	6			
Telecommunications	3			
Theory of Electrical Engineering	2			
Total	**14**		**1**	

Tab.9: Overview of graduates of the Faculty since 2013/2014 (as of 31.12.2020)

Full-time study					
2014/15	**2015/16**	**2016/17**	**2017/2018**	**2018/2019**	**2019/2020**
186	196	167	165	140	134
197	198	161	163	153	124
14	12	18	17	13	14
Part-time study					
2014/15	**2015/16**	**2016/17**	**2017/2018**	**2018/2019**	**2019/2020**
			4		9

		31			
3	3	1	2	1	1

Graduates' employment

Bachelor study programmes

Control Engineering
(Field of study Control Engineering)

The graduate will acquire education in the field of control engineering and process control with the support of information and communication technologies. He/she has also practical experience in application of safety critical control and communication systems performed mainly based on PLC and industrial networks. He/she will successfully apply in the operation of control and information systems at the process and operative level. Theoretical knowledge acquired during the bachelor study will create good prerequisites for further education, either within the further forms of university study or within lifelong education.
Software skills: C language, C++, MATLAB, PLC, ATMEL, MS ACCESS, HTML, CSS, Tia Portal.

Autotronics
(Field of study Electrical Engineering)

The graduate will acquire basic and general knowledge required in wide spectrum of electrical proficiency especially in areas of automobile electronics, hybrid vehicles and electromobility. The gained knowledge is needed for the second degree study programs in this study program or affinitive ones. Even if a graduate would not continue in the next level of the university studies, he/she will gain required wide professional profile and he/she is able to adapt in different technical or other businesses. The graduates of Autotronics study program should be professionals who are able to identify various electronic faults in cars. They can successfully apply mainly in car services and repair workshops, car selling shops and in education institutions.
Software skills: C language, C++, MATLAB, Simulink, CodeWarrior, CodeComposer, Asembler, AVR Studio, Vissim, PLECS.

Biomedical Engineering
(Field of study Electrical Engineering)

The graduate will acquire knowledge in the subjects of theoretical and technical basis, as well as in theoretical basis of medical disciplines with emphasis on the structure and functioning of biological objects, biochemical, physiological and pathophysiological processes. He/she will gain knowledge of medical technique and its applications, modern tools of biomedicine, principles of their activities, conditions for operation and their safe for diagnostic and treatment purposes. He/she is able to evaluate functionality of technical and computer aided equipment under given conditions of a health care facility or other operations and laboratories and at the same time able to lead qualified communication with the health care staff. He/she will successfully apply as an expert in medical and biological laboratories, in the operation of biomedical technique, in business and service organisations.
Software skills: C language, MATLAB, EAGLE.

Electrical Engineering
(Field of study Electrical Engineering)

The graduate will acquire knowledge from the subjects of theoretical base applied in the fields of power electronics, utilisation of applied microprocessor technique and programming, electric drives, electrical traction, electric power systems and mechatronics. He/she will gain knowledge in the field of quality management and reliability in a production company, marketing and trade, electrical standards, rights and legal regulations related to the field of study. Graduates may further specialise in the field of automobile electrical engineering, electrical traction, electric drives, electric power systems, power electronic systems and mechatronics systems. Graduates obtain theoretical knowledge and practical experience in order to acquire the principles, installations, operations, functions, service and repairs of electrical products, devices and equipment in compliance with international standards. He/she will successfully apply in all fields of power electrical engineering, in the field of mechatronics, robotics, applied microprocessor technique, electronics, optoelectronics, power electronics, computer design and construction in organisations of administrative, production, operation or repair character.
Software skills: MS Office, MATLAB, SIMULINK, FEMM, MOTORSOLVE, SICHR, DIALUX, DSPACE, CODE WARIOR, LABWIEV, EMPT-ATP, MODES, GE-PSLF, RUPLAN, RS Logix, RS Link, RS View, Assembler, AVR Studio, EAGLE, OrCAD-PSPICE, PLECS.

Electrooptics
(Field of study Electrical Engineering)

Electrooptics is a field at the interface of physical and several technical sciences, which is mainly connected to optics and electronics. It is a young field that has already found a firm place in the study programmes at many universities around the world. Graduates of the bachelor's degree study programme Electro-optics are able to continue their study in the engineering study programme Photonics that has a close connection and thus the application especially in telecommunications, information technology, medicine, industrial technologies, aviation, military technology, construction industry, but it is also used in consumer devices and entertainment industry. Graduates of Electro-optics should be able to orientate themselves in the following areas: geometric optics; optical radiation properties; principles of fibre optics; electronics and microprocessors; principles of nanotechnologies; principles of photonics; analysis and testing of fibre optic lines; testing of laser devices and components for telecommunications, medicine and other purposes; testing of optical, photonic or imaging prototypes and devices; determination of commercial, industrial or scientific use of electro-optical applications or elements.

Multimedia Technologies
(Field of study Informatics)

The graduate will acquire knowledge in acquisition, processing and presentation of digital signal at an adequate technical, aesthetical, ethical and art levels. The synergy of technical and art education will make the graduate a specialist in creating multimedia presentations. The graduate will gain knowledge and practical experience in working with the screen and the sound element of multimedia that predetermines him/her for working in organisations focused on information technologies, advertising and counselling activities, in public administration institutions, in studios producing multimedia products.
Software skills: C language, C++, MATLAB, Java, JSP, Blender, Cinema 4D, Adobe Premiere, Adobe Audition, Adobe Photoshop, Adobe Illustrator, Adobe InDesign, Protools, HW, SQL, PSpice, Microsim, Corel Draw, QuarkxPress, LaTex.

Communication and Information Technologies
(Field of study Informatics)

Graduates of the bachelor's degree study programme - Communication and Information Technologies in the field of study - Informatics will acquire the ability to specialize and adapt to the latest and future needs and requirements of practice in manufacturing companies of network operators and in service companies in the field of electronic communications. They will be prepared for a continuous deepening of knowledge from the field. They can work as qualified workers for the operation and design of technology of communication networks and services and will be able to solve the tasks of practice in team. They can work at the positions of executives, operators of electronic communications, network specialists in enterprises and institutions and developers of communication services and in companies developing technologies of Industry 4.0. Graduates can work as designers, system designers or specialists for various areas of ICT.

Master study programmes

Applied Telematics
(Field of study Cybernetics)

The graduate will acquire education in the areas of design, modelling, application, implementation, inspection, service and maintenance of telematics systems and their components, especially intelligent transport systems, control systems of road and railway tunnels, complex transportation systems and telematics systems in health care. He/she will gain theoretical knowledge about sets of technical instruments utilized in selected application areas (primarily in the area of transport, additionally in other areas – health care, public services, etc.) that are required for understanding of telematics systems, their components, modern development trends, position of human factor in these systems as well as knowledge needed for design, control and assessment of those systems.
Software skills: Ethernet, PLC, PHP language, MySQL, HTML language, UML, OCL language, MATLAB, PYTHON language, SCADA/HMI systems.

Biomedical Engineering
(Field of study Electrical Engineering)

The graduate has an overview of modern technical tools of biomedicine, diagnostic, therapeutic and rehabilitation devices, their safe use and the world trend in their development. He/she gains knowledge in theoretical and selected clinical medical disciplines in order to understand the purpose of technical tool application, ability to assess functionality and ability to create conditions for qualified communication with medical doctors. He/she has wide knowledge of existing information systems and technologies. He/she gains knowledge in the field of management in health care, bioethics, medical ethics and psychology of management. The graduate can successfully apply in all fields of technical and information provision of health care facilities, in institutes and laboratories of biomedical research and development, in the field of information systems and in technical management of mainly health care operations. He/she will also operate as managerial employee in the management of health care facilities, as well as a pedagogue and researcher at universities.
Software skills: C language, HTML, PHP, MATLAB, Simulink, CST-studio suite.

Electric Power Systems
(Field of study Electrical Engineering)

The graduate has knowledge in the subjects of theoretical base developed in the field of power and applied electronics, programming and utilisation of computer technology, electric drives, electrical traction, electric power systems, management of electricity transmission systems and information systems in electric power

systems, has basic knowledge of economic methods for operation of systems, has knowledge of law, psychology and quality management. The graduate is capable of independent projection, constructional and design works, is able to decide on concept issues and management of large organisational units. The graduate may successfully operate in projecting, management, construction and operation of industrial companies, railways, city public transport, in all areas of electric power systems, in projection and research institutes and other organisations of administrative, production, operation or repair character.
Software skills: MATLAB, EMTP-ATP, MODES, GE-PSLF, MS OFFICE, PTOLEMY, SICHR, LABVIEW, EAGLE, ASSEMBLER, VISUAL STUDIO, C++, C, RUPLAN.

Electric Drives
(Field of study Electrical Engineering)

The graduate has knowledge in the subjects of theoretical base developed in the field of power and applied electronics, programming and utilisation of computer technology, electric drives, electrical traction, electric power systems, management of electricity transmission systems and information systems in electric power systems, he/she has basic knowledge of economic methods for operation of systems, has knowledge of law, psychology and quality management. The graduate is capable of independent projection, constructional and design works, is able to decide on concept issues and management of large organisational units. The graduate may successfully operate in projecting, management, construction and operation of industrial companies, railways, city public transport, in all areas of electric power systems, in projection and research institutes and other organisations of administrative, production, operation or repair character.

Software skills: FEMM, MATLAB, OPERA-3D, COMSOL Multiphysics, MS Office, Code Warrior, EAGLE, Altium Desinger, Visual Studio, Python, Step 7, Micro win, WinCC.

Photonics
(Field of study Electrical Engineering)

The application of graduates has close connection especially with telecommunications, information technologies, medicine, industrial technologies, aeronautics, military technologies, and civil engineering as well as in consumer goods and entertainment industry. The graduate should know to creatively, analytically and in details orient in the following technical areas: design, modification and testing of laser equipment and components for telecommunications, medicine and for other purposes; utilization and enhancing quality and design of optical fibres technologies; development and testing of optical, photonic or imaging prototypes and equipment; design of electro-optical sensor systems; application of new photonic technologies and equipment into different industrial areas; optical design of standard lighting; definition of commercial, industrial or scientific utilization of electro-optical applications; creation, analysis and testing of optical fibres lines.
Software skills: Code Block (C, C++), LabVieW.

Power Electronic Systems
(Field of study Electrical Engineering)

Universality of this study programme guarantees very wide application of graduates on the labour market. The acquired knowledge may be applied in the most lucrative areas of electrical engineering, machinery and energetic industry, as well as in transportation. In the future their application in the services field is also expected. These are mainly areas of development, design, projection and application of power and control electronic systems, mechatronic and automotive systems, their control nodes, superior control systems, industrial automatic machines and robots and equipment of industrial automation. With regard to significant representation of subjects oriented to programming and development of control software, the graduate may operate successfully in very interesting jobs. The graduates from this study programme may apply for jobs at

companies dealing with projects, production and application of power electronic and/or mechatronic systems and industrial automation. They may successfully apply also in specialised machinery companies working in the fields of automobile industry, chemical and petrochemical industry, gas industry, paper mill and transportation.
Software skills: Freescale ARM, Texas Instruments DSP, ANSI C language, EAGLE, OrCADPSpice, PLECS, LabVieW, Simulink, COMSOL, VHDL ISE Desing Suite, dSpace, Texas Instruments Education Modules.

Process Control
(Field of study Cybernetics)

The graduate gains education in the field of analysis and synthesis of automated control and information systems mainly for the area of information processing and transmission in the control of safety critical processes. Graduates from the study programme Process Control specialize in safe control of transportation process with emphasis on intelligent transport systems and signalling systems. They handle support telematic systems and safe control of industrial processes with emphasis on complex technologies, safe critical production applications, intelligent buildings, security systems for personal and property protection, security of information systems and modern computer networks.
Software skills: Ethernet, PLC, Jazyk PHP, MySQL, Jazyk HTML, UML, Jazyk OCL, MATLAB, Jazyk PYTHON, SCADA/HMI systems.

Telecommunication and Radiocommunication Engineering
(Field of study Informatics)

The education is focused on the topic of telecommunication and information networks with direction on digital communication networks, i.e. optic and metallic systems and networks, intelligent networks, terrestrial mobile networks, microwave radio and satellite communication, network management, architecture of signalling systems and communication protocols, applications of multimedia and multimedia services, reliability and diagnostics of systems and networks. The graduate will successfully apply as a creative employee in research, technical development, telecommunication design and management, as well as in all fields of applications of telecommunication, radiocommunication and information and communication technologies and services.
Software skills: ADOBE, HTML, PHP, MySQL, Blender, 3dMax, Cinema 4D, Android, JAVA, Microsoft Direct3D, OpenGL, MATLAB, After Effect, ZScan, Geomagic, MS Office, MATLAB, SIMULINK, from SPICE family – simulation programs oriented in analyses and syntheses of electronic circuits, VPIphotonics, ASEMBLER.

Multimedia Engineering
(Field of study Informatics)

The student of the Multimedia Engineering study programme in the informatics field of study will enhance his/her knowledge to the necessary extent in the subjects of theoretical base of the field of study and gain detailed knowledge of media communication, networks and services, their convergences and also their securities. By selection of optional subjects he/she may more closely specialize in the field of processing image, graphic or audio information. A significant element of knowledge is understanding of web technologies, mainly as far as the design of web services is concerned, knowledge of 2D and 3D graphic and animation systems and applications and digital processing of the multimedia contents. The student of this study will also acquire knowledge of aesthetics and creative attitude in the design of multimedia products, legal regulations in the field of electronic communication, their management, economics and marketing. The graduate from master study will be able to specialise and to adapt to different levels depending on the needs of practice, research and development, as well as the ability of permanent knowledge enhancement in the field. The students will obtain knowledge and skills that enable them to work independently as well as in teams in solving projects integrating the technical and creative level into one, or even to lead such teams.

Software skills: ADOBE, HTML, PHP, MySQL, Blender, 3dMax, Cinema 4D, Android, JAVA, Microsoft Direct3D, OpenGL, After Effect, ZScan, Geomagic, MS Office, MATLAB, SIMULINK, from SPICE family – simulation programs oriented in analyses and syntheses of electronic circuits.

Doctoral study programmes

Electric Power Systems
(Field of study Electrical Engineering)

The doctoral study in the field of Electric power systems is designed for graduates of the second degree of university study (Master/Master of Science) who tend to the original solutions of engineering and scientific problems in the electrical engineering/electric power systems. For solving of these challenges the doctoral student utilises the latest findings of modern analytical and numerical methods, methods of mathematical and physical modelling, informatics, measurements of electric and non-electric variables, microelectronics, electric power systems, automatic and discrete control up to the level of artificial intelligence, including the implementation of control by corresponding processors, as well as knowledge of other disciplines. Prerequisites for successful completion of the doctoral degree studies are the PhD student´s ability of abstract thinking and his/her ability to apply and implement acquired knowledge when solving technical problems. The PhD student learns how to properly characterize and understand physical phenomena and experimental observations on them; he/she searches for their adequate models and is able to implement new applications in the above specified disciplines in science, research and practice. During his/her doctoral studies the PhD student acquires comprehensive theoretical knowledge, experimental skills and practical experience. He/she masters methodology of scientific work and is prepared for independent scientific work.

Electro-technologies and Materials
(Field of study Electrical engineering)

The graduates in the doctoral degree study in the field of Electro-technologies and materials master scientific methods of evaluation of material structures and systems in terms of process technology, structure, durability, reliability, intermediate and final diagnostics and control, both in terms of determination their basic physical properties of the substrate material and their final structure. The graduate is able to use the obtained in-depth knowledge in a wide range of production technologies in electronics, in the design, as well as in the organization and optimisation of various technological processes.
The graduate acquires abilities to predict changes of material properties in various conditions of their use as well as in terms of utilising various technological procedures in production of electrical components, structures, systems and equipment.
The graduates of the third degree of university studies in the field of study Electrotechnologies and materials acquire deep theoretical and methodological knowledge of technologies and materials applied in electrical and electronics industry, of properties of materials and processes running in them that create the object of the scientific research and development at the state-of-the-art level of scientific research in the world.

Power Electrical Engineering
(Field of study Electrical Engineering)

The doctoral study in the field of Power electrical engineering is designed for graduates of the second degree of university study (Master/Master of Science) who tend to the original solutions of engineering and scientific problems in the field of power electrical engineering, i.e. electric drives, power electronics, electric traction, electrical machinery and equipment and traction electric power systems. For solving of these challenges the doctoral student utilises the latest findings of modern analytical and numerical methods, methods of mathematical and physical modelling, informatics, measurements of electric and non-electric variables, microelectronics, electric power systems, automatic and discrete control up to the level of artificial

intelligence, including the implementation of control by corresponding processors, as well as knowledge of other disciplines. Prerequisites for successful completion of the doctoral degree studies are the PhD student´s ability of abstract thinking and his/her ability to apply and implement acquired knowledge when solving technical problems. The PhD student learns how to properly characterize and understand physical phenomena and experimental observations on them; he/she searches for their adequate models and is able to implement new applications in the above specified disciplines in science, research and practice. During his/her doctoral studies PhD student acquires comprehensive theoretical knowledge, experimental skills as well as practical experience. He/she masters methodology of scientific work and is prepared for independent scientific work. The graduates in the doctoral study in Power electrical engineering acquire knowledge based on the state-of-the-art scientific knowledge in the field and by their own creative work they will contribute to their development as well as to new findings in the respective field.

Theory of Electrical Engineering
(Field of study Electrical engineering)

The doctoral study in the field of Theory of electrical engineering is designed for graduates of the second degree of university study (Master/Master of Science) who tend to the original solutions of engineering and scientific problems in the field of electrical engineering and its applications. For solving of these challenges the doctoral student utilises the latest findings of modern analytical and numerical methods, methods ofmathematical and physical modelling, informatics, measurements of electric and non-electric variables, interdisciplinary methodologies, biomedical applications, as well as knowledge of other disciplines.
Prerequisites for successful completion of the doctoral degree studies are the PhD student´s ability of abstract thinking and his/her ability to apply and implement acquired knowledge when solving technical problems. The PhD student learns how to properly characterize and understand physical phenomena and experimental observations on them; he/she searches for their adequate models and is able to implement new applications in the above specified disciplines in science, research and practice. During his/her doctoral studies the PhD student acquires comprehensive theoretical knowledge, experimental skills as well as practical experience. He/she masters methodology of scientific work and is prepared for independent scientific work.

Process Control
(Field of study Cybernetics)

The doctoral study in the field of Cybernetics is designed for graduates of the second degree of university study (Master/Master of Science) who tend to the original solutions of engineering and scientific problems in management and control of transport and technological processes. For solving of these challenges the doctoral student utilises the latest findings of modern analytical and numerical methods, methods of mathematical and physical modelling, informatics, measurements of electric and non-electric variables, microelectronics, electric power systems, automatic and discrete control up to the level of artificial intelligence, including the implementation of control by corresponding processors, as well as knowledge of other disciplines. Prerequisites for successful completion of the doctoral degree studies are the PhD student´s ability of abstract thinking and his/her ability to apply and implement acquired knowledge when solving technical problems. The graduates in the field of study Automation gain knowledge based on the state-of-the-art scientific knowledge in the field and by their own creative work they will contribute to their development as well as to new findings in the respective field. The aim of the doctoral study is to educate such a specialist who will not only possess complex knowledge but will be able to enrich the science and knowledge in the field of process control.
The graduates acquire in-depth theoretical and methodological knowledge and practical experience in the main areas of process control (including processes related to security) such as the theory of automatic control, system theory, process control, control systems, logic and event systems and also in the field of secure communication and information processing.

Telecommunications
(Field of study Informatics)

The aim of the doctoral degree studies is to prepare skilled professionals focused on the development, implementation, management and operation of complex telecommunication systems of the new generations that virtually permeated all spheres of human activity. The study programme is built on the previously accredited field of study Telecommunications / doctoral degree study programme. Research activities of the Department of Telecommunications and Multimedia of the Faculty of Electrical Engineering UNIZA aim in the field of telecommunications at optical communication systems, broadband networks, mobile radio networks and digital signal processing. The PhD graduates in the field of Telecommunications gain deep theoretical and methodological knowledge and practical experience in key areas of telecommunications at the current state of research in the world, acquire principles of individual and team research work, research exploration, scientific formulation of problems, solutions of complex scientific problems and presentation of scientific results. They are able to analyse and solve complex and non-standard tasks in the field of telecommunications and to provide original, new solutions, to apply acquired knowledge in practice in a new, creative way. They are able to apply the acquired knowledge in various fields of science, research, industry and services in the public as well as in private sectors. The graduates are capable of following the latest scientific and research trends in telecommunications and of adding and updating their knowledge through lifelong learning process.

Tab. 10: Information about final thesis

Number of submitted thesis	Number of defended theses	Physical number of tutors of final thesis	Physical number of tutors of final thesis (without PhD.)	Physical number of tutors of final thesis (experts from practice)
Bachelor thesis				
148	147	85	26	6
Master thesis				
146	145	85	3	12
Doctoral thesis				
16	16	12	0	0

Students' awards

Awards of students within the university

- Dean's prize was in 2020 awarded to the following students of the 1st degree study:
  - Damián Čambal (study program Electrical Engineering)
  - Šimon Pecho (study program Digital Technologies)
  - Barbora Kubová (study program Biomedical Engineering)
  - Vincent Uhliarik (Autotronics)
- Dean's prize was in 2020 awarded to the following students of the 2nd degree study:
  - Ivana Králiková (study program Biomedical Engineering)
  - Peter Hrabaj (study program Electric Power Systems)
  - Juraj Jarina (study program Photonics)
  - Michal Vidlák (study program Electric Drives)
  - Jakub Škorvaga (study program Power Electronic Systems)

- Rector's prize was awarded in 2020 to:
    - Milan Šnapko (study program Electrical Engineering, 1st degree study)
    - Patrik Miček (study program Photonics, 2nd degree study)
    - Marek Furmanik for diploma thesis (study program Electric Drives, 2nd degree study)

Support for students in 2020

Scholarships (motivation, faculty)

For excellent study results the Faculty provides the scholarships to students. These scholarships were allocated in 2020:

- merit scholarships - the number of students: 83, the amount paid: 43 080,50 EUR,
- special scholarships - the number of students: 12, the amount paid: 1 870 EUR,
- social scholarships - the average number of recipients/students: 33,9, the amount paid: 49 385 EUR,
- trade scholarships - number 375, the amount paid: 161 099,35 EUR,
- from own resources - the number of students: 61, the amount paid: 13 015 EUR.

Consultation and advice

Students have the opportunity to consult issues related to the study with student advisors and the vice dean for education, what they are actively using.

Level of students' satisfaction with the services (accommodation, food, availability of administrative staff, library, learning environment, ICT ...)

Students expressed their satisfaction/dissatisfaction with the services through the questionnaires that are continuously processed and evaluated. Positive suggestions are used for improving the quality of the services.

SCIENTIFIC RESEARCH ACTIVITIES

Together with education, the scientific and research activities are the primary mission of the Faculty and its further growth is a necessary assumption of the future development since it is closely related to the quality of education. Scientific and research activities are at FEEIT realized especially in the form of projects and are mainly based on individual activities at departments and their co-operation. One of the major outputs of scientific and research activities are scientific publications indexed in major international databases such as Web of Science and SCOPUS and international conferences supported by major professional organizations, in particular the IEEE, SPIE, IFAC, IFIP, ACM, SEFI and the IET.

The most important types of projects are international ones together with projects financed from the Structural Funds as well as projects supported from national resources through the Slovak Research and Development Agency (SRDA), the Scientific Grant Agency of the Slovak Ministry of Education, Science, Research and Sport and the Slovak Academy of Sciences (VEGA) and the Cultural and Educational Grant Agency of the Ministry (KEGA). Cooperation with industrial partners in the field of applied research is also of high importance.

Grant projects and cooperation with practice

In total 16 projects of international cooperation, 46 projects financed from national sources, 3 projects of Structural Funds and 14 other projects have been realized at FEEIT in 2020. The most important information about the projects is summarized in the following subsections. The contract-based expertise activities are also listed.

Projects of International Programmes

Horizon 2020

MSCA-RISE-2016: SENSors and Intelligence in BuiLt Environment SENSIBLE	
Summary:	The goal of this project is to develop novel information sensing research and innovation approaches for acquiring, communicating and processing a large volume of heterogeneous datasets in the context of smart buildings, by building an international, inter-disciplinary and inter-sectoral collaboration network through research and innovation staff exchanges and seamless exchange of ideas, expertise, data, testbeds, and know-how. The need to sense and process ever increasing amount of data requires novel engineering that goes far beyond conventional centralised methods, where signal acquisition, communications and data processing are performed centrally and independently. Building on integrating signal acquisition, communications and information extraction into an overarching smart sensing approach, the project will provide a holistic decision support framework for non-residential buildings of the future. The key challenges of providing intelligence to the building lie in ubiquitous sensing, inside and outside the building, and connecting the sensing technology to people and outside world via meaningful decision support. Though significant research has been dedicated to developing novel sensing and instrumentation technologies, further research and innovation advances are needed to integrate physical sensing to data processing via distributed estimation and fusion approaches, giving actionable meaning to the suite of collected data. In that context, it is necessary not only to continuously monitor the environment,

	equipment, systems and processes, but also to sense occupants' behaviour inside and outside the building and provide timely response and feedback.
Realization:	01/2017 – 12/2020
Coordinator:	Vladimir Stankovic, University of Strathclyde, Glasgow, UK
Sub-Coordinator from FEEIT:	Juraj Machaj (DMICT)
Co-operators:	Milan Dado (DMICT), Jarmila Müllerová, Stanislav Jurečka, Libor Ladányi, Gabriel Cibira (IAS), Peter Holečko, Michal Gregor, Vojtech Šimák (DCIS), Peter Braciník (DPSED)

COST projects

Action CA16212: Impact of Nuclear Domains On Gene Expression and Plant Traits (INDEPTH)	
Summary:	Plants are vital to human life and health and are essential to mitigate the effects of climate change. Due to their sessile lifestyle, plants have developed the ability to rapidly adapt their genome expression in response to environmental challenges. Multiple lines of evidence indicate that spatial (3D) organization of nuclear DNA is critical in this adaptation process and the Impact of Nuclear Domains On Gene Expression and Plant Traits (INDEPTH) network will decipher how nuclear architecture, chromatin organization and gene expression are connected and modified in response to internal and external cues. To address this challenge, the INDEPTH Action gathers a pan-European network addressing this by bringing state-of-the-art technologies and fostering multidisciplinary approaches at research, training, education and industrial levels in high- and super-resolution microscopy, 3D image analysis and software development, chromatin domain mapping, genomics, bioinformatics and plant phenotyping. Standard protocols and procedures will be defined in these fields of competence and relevant -omics and 3D images datasets will be deposited in a public repository for inter-laboratory benchmarking and teaching. INDEPTH will promote early career investigators and foster exchange of skills, techniques and know-how between partners through Short Term Scientific Missions and Training Schools. Industrial partners developing software for microscopic devices, new expression technologies or plant varieties with enhanced yield adapted to climate change will integrate INDEPTH outputs for commercial developments. INDEPTH will ultimately lead to a better understanding of agriculturally relevant challenges such as complex plant traits and their interactions with the environment in the context of climate change.
Realization:	11/2017 – 11/2021
Coordinator:	Patrik Kamencay (DMICT)

Action CA17136: INDAIRPOLLNET	
Summary:	INDAIRPOLLNET (INDoor AIR POLLution NETwork) will improve our understanding of the cause of high concentrations of indoor air pollutants. It will assemble experts in laboratory and chamber experiments, modelling studies and measurements of relevance to indoor air quality (IAQ), including outdoor air chemists. Our network includes experts in chemistry, biology, standardisation, particulate matter characterisation, toxicology, exposure assessment, building materials (including those manufactured specifically to improve IAQ such as green materials), building physics and engineering (including ventilation and energy) and building design. This Action aims to significantly advance the field of indoor air pollution science, to highlight future research areas and to bridge the gap

	between research and business to identify appropriate mitigation strategies that optimise IAQ. The findings will be disseminated to relevant stakeholders such as architects, building engineers and instrument manufacturers.
Realization:	09/2018 – 09/2022
Coordinator:	Peter Brída (DMICT)

Action CA19121: Network on Privacy-Aware Audio- and Video-Based Applications for Active and Assisted Living	
Summary:	The aim of GoodBrother is to increase the awareness on the ethical, legal, and privacy issues associated to audio- and video-based monitoring and to propose privacy-aware working solutions for assisted living, by creating an interdisciplinary community of researchers and industrial partners from different fields (computing, engineering, healthcare, law, sociology) and other stakeholders (users, policy makers, public services), stimulating new research and innovation. GoodBrother will offset the "Big Brother" sense of continuous monitoring by increasing user acceptance, exploiting these new solutions, improving market reach.
Realization:	09/2020 – 09/2024
Coordinator:	Peter Počta (DMICT)

Action TN 1302: BESTPRAC	
Summary:	BESTPRAC is a COST Targeted Network that gathers administrative, financial and legal staff at universities and research-driven institutions who are carrying out different tasks to support transnational external competition based (in particular EU funded) research projects. The network serves as a platform for exchanging experiences, sharing and developing best practices, encouraging knowledge sharing, knowledge transfer and increasing efficiency in these fields.
Realization:	03/2016 – 03/2020
Coordinator:	Juraj Machaj (DMICT)

Action CA 15104: The Inclusive Radiocommunications (IRACON)	
Summary:	This COST Action aims at scientific breakthroughs by introducing novel design and analysis methods for the 5th-generation (5G) and beyond-5G Radiocommunication networks. Challenges include i) modelling the variety of radio channels that can be envisioned for future inclusive radio, ii) capacity, energy, mobility, latency, scalability at the physical layer and iii) network automation, moving nodes, cloud and virtualisation architectures at the network layer, as well as iv) experimental research addressing Over-the-Air testing, Internet of Things, localization and tracking and new radio access technologies.
Realization:	03/2016 – 03/2020
Coordinator:	Juraj Machaj (DMICT)
Co-operators:	Peter Brída (DMICT)

Action CA15213: Theory of hot mater and relativistic heavy-ion collisions	
Summary:	This COST Action „Theory of hot mater and relativistic heavy-ion collisions" (THOR) creates a theoretical community platforma counterpart to the ongoing vigorous exceptional potential in this field of theoretical research. THOR will pioneer novel approaches to the theoretical understanding of the properties of QCD from first principles and on the interpretations of these properties by effective models and numerical simulations of the system`s evolution. By this,

	THOR will provide new insights on the paramount questions of the field. Therefore THOR aims at bringing together excellent researchers in order to pinpoint and discuss the challenges that the field meets currently and in the near future for creating a vibrant, innovative and world-leading pan-European research environment.
Realization:	10/2016 - 16/2020
Coordinator:	Marcus Bleicher, Frankurt
Co-operators:	Ivan Melo (DPh)

CA17124: Digital forensics: evidence analysis via intelligent systems and practices	
Summary:	The objective of the COST action is to form a network for the exploration of artificial intelligence and automated reasoning applications in the field of digital forensics and creating a synergy between these areas.
Realization:	09/2018 – 09/2022
Coordinator:	Jesus Medina (Facultad de Ciencias, Campus Río San Pedro, Spain)
Co-operators:	Peter Holečko (DCIS)

Other International Research Projects

51910940: International Visegrad Fund, Optimization of hybrid structures to improve the efficiency of photovoltaic systems	
Summary:	The project is aimed at increasing the efficiency of hybrid solar cells with organic / inorganic active layer due to repeated studies of surface morphology and optical properties of layers and optimization of production process parameters. The thin film deposition technology of hybrid materials with properties suitable for use in a photovoltaic cell with a layered structure will be developed.
Realization:	09/2019 – 06/2020
Coordinator:	Jarmila Müllerová (IAS)
Co-operators:	Pawel Jarka (Silesian University of Technology, Gliwice)

22010345: Engineering platform and cooperation in area of nanocomposites	
Summary:	We are in an era of nanocomposites that can be used in almost any area and help conserve natural resources. In the field of electrical engineering, nanoparticles improve the electrical parameters of materials for the use of high-voltage cable lines and powerful direct current transformers (HVDC). The development of cooperation is based on pillars, exchange lectures of experts at each partner and the division of diagnostic methods and analyzes according to the equipment and focus of the workplace. The team's knowledge in this area will be applied in the industrial area.
Realization:	06/2020 – 10/2021
Coordinator:	Jozef Kúdelčík (DPh)
Co-operators:	Štefan Hardoň (DPh)

AO8673: SALSA - Stratospheric Autonomous Landing System Application	
Summary:	The objective of this “SALSA” project is to define, develop and test an autonomous landing system of our stratospheric probe, making use of on-board GPS receivers (and other motion sensors such as gyroscopes and accelerometers), a gliding parachute driven by servomotors and an on-board computer with proper controlling software. Such a system would significantly

	shorten payload recovery times and most importantly reduce the risk of landing in danger zones (e.g. lakes, mountains, densely populated areas, etc.), allowing stratospheric flights to be conducted with increased safety and applicability to time-sensitive payloads.
Realization:	03/2018 – 12/2020
Coordinator:	GOSPACE Ltd.
Co-operators:	Vojtech Šimák (DCIS), Benedikt Badánik, Branislav Kandera, Filip Škultéty (FPEDAS)

Other International Non-research Projects

EPPCN Agreement KE3202	
Summary:	The EPPCN Member (Ivan Melo) acts as CERN`s communications point of contact in the Member State or Associate Member State in which he/she resides and cooperates in the promotion of CERN`s mission and the demonstration of its importance at the national level.
Realization:	01/2017-12/2020
Coordinator:	Arnaud Marsolier, CERN
Co-operators:	Ivan Melo (DPh)

Internationale Zusammenarbeit in Bildung und Forschung, Region Mittelost- und Südosteuropa (MOEL-SOE	
Summary:	The aim of this project is a long-term partnership with the leading research partners in the field of Energy 4.0 in the Czech Republic and the Slovak Republic. To achieve goal, several sub-steps are necessary: First, holistic presentations of the respective specialist competencies should convey a comprehensive picture of the skills, possibilities and strategies of the respective partners. A priority program and specific project topics are then worked out. A close link and early integration of German companies is particularly important and intended for the synthesis of the project topics.
Realization:	01/2019-12/2020
Coordinator:	Fraunhofer Institut IWU, Chemnitz, Germany
Co-operators:	Peter Brída (DMICT)

Project of the European physical society international physics MASTERCLASSES 2020	
Summary:	High school students spend one day with physicists of elementary particles during which they learn to evaluate real experimental data from the LHC accelerator.
Realization:	01/2020 - 12/2020
Coordinator:	Ivan Melo (DPh)
Co-operators:	Gabriela Tarjányiová, Mikuláš Gintner, Jozef Kúdelčík, Juraj Remenec (DPh)

PLSK.03.01.00-24-0181/18: GAME JAM as new didactic method. Improvement of quality of teaching in area of new technologies in region of polish-Slovak border	
Summary:	The goal of the project is to improve cross border teaching in the area of multimedia technologies by the creation of a forum for the presentation of the gaming industry and companies in the given area from the region around Polish-Slovak border. The main contribution of the project is the organisation of joint GAME JAMs, i.e. events where students from both universities can form

	teams and compete in game design, exchange experience and meet experts from the gaming industry.
Realization:	10/2019 – 09/2021
Coordinator:	Agnieszka Maj, Silesian university, Katowice
Sub-Coordinator from FEEIT:	Miroslav Benčo (DMICT)
Co-operators:	Peter Sýkora, Patrik Kamencay, Mariana Kazimirova (DMICT)

Study of spin effects in a few nucleon systems	
Summary:	Study of dp elastic scattering and dp fragmentation reaction in a few nucleon systems with polarized deuteron beam in the region of medium energies (300 MeV – 2000 MeV).
Realization:	01/2020 – 12/2020
Coordinator:	Marián Janek

Projects of National Programmes

Slovak Research and Development Agency (SRDA)

APVV-19-0214: Biocompatibility and objectification of the grid frequency electromagnetic field in densely populated areas (LIFE)	
Summary:	The modern age is characteristic with rapid expansion of new technologies and increasing densification of specific geographic locations. These features result in increased demands pertaining to power energy grids that bring also negative environmental impacts. Rapidly increasing electromagnetic background in the living environment and elevated awareness of general public evoke reasonable concerns connected to the potential health risks. International Agency for Research on Cancer (IARC) classified electromagnetic field as carcinogen type 2B in 2013. European Union policies call on national governments to ensure simple and feasible public access to information regarding the potential risks of electromagnetic field and environmental impact thereof and to apply the principle of "reasonable prevention" according to the international standard ALARA - "as low as reasonably achievable". In Slovakia, up to this day, there do not exist any verified and publicly available information on the levels (magnitudes) of artificial electromagnetic fields, any assessment of possible biological effects and impact thereof on population health, and any effective preventive measures. Implementation of the present multidisciplinary project expressively contributes to the realisation of the European policies at national level. The activities are focused on: 1) objectification of the 50 Hz electromagnetic background levels in select, densely populated areas, also extending beyond the designated protection zones; 2) a qualitative and quantitative analysis of potential biological effects of grid frequency electromagnetic field and 3) suggestion of effective preventive measures for decreasing the effects. Keystone for the project realization is synergy of research capacities of partners' institutions, complementarity of their competences and unique research infrastructure. The main project outcome is creating a unique web portal that will provide information pertaining to the levels of artificial electromagnetic low-frequency background in selected densely populated areas, to

	the related potential health risks and to the recommendations for appropriate preventive measures.
Realization:	07/2020 – 06/2023
Coordinator:	Milan Smetana (DEBE)
Co-operators:	Ján Barabáš, Mariana Beňová, Ladislav Janoušek, Zuzana Pšenáková, Roman Radil, Maroš Šmondrk (DEBE)

APVV-19-0290: Research and development of lower limb prosthetic sockets manufactured by additive technologies (PSAMBS)	
Summary:	The aim of the present project is the digitisation and improvement of the current empirical procedure for the design of sockets in the technological process of the current orthopaedic practice using the digital of amputation stump, modelling of sockets in the system CAD/CAM, analysis of the performance of the socket at different settings in thickness and the fill and finally the manufacture of sockets of the lower limbs using additive technology of 3D printing.
Realization:	07/2020 – 06/2023
Coordinator:	Jozef Žifčák (Technical University of Košice)
Co-operators:	Ladislav Janoušek, Branko Babušiak, Štefan Borik, Michal Gála (DEBE)
APVV-17-0631: Co-existence of photonic sensor systems and networks within the Internet of things	
Summary:	With the development of Internet of Things (IoT) technology and systems, signal collection, processing and transmission requirements are increasing in virtually all areas of society. Photonic solutions play an important role in this. This is important both on the side of signal transmission - especially in backbone networks, as well as on the side of data collection systems, especially for machine to machine (M2M). The project is focused on the coexistence of photonic sensor systems and photonic communication networks with an emphasis on more efficient use of existing communication infrastructure for the purpose of sensing and detecting various physical quantities. The scientific knowledge from this part of the project will be used in the design of advanced photonic sensors and sensor systems and networks applicable in IoT solutions based on integrated sub-wave photonics and fiber optic systems.
Realization:	08/2018 – 06/2021
Coordinator:	Milan Dado (DMICT)
Co-operators:	Jarmila Müllerová, Michaela Holá, Gabriel Cibira (IAS), Jozef Dubovan, Miroslav Markovič, Ján Litvik, Michal Kuba, Michal Frniak (DMICT)

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 (DME)
Co-operators:	Branislav Dobrucký, Slavomír Kaščák, Michal Praženica, Michal Frivaldský, Roman Koňarik, Marek Paškala (DME)

APVV-17-0345: Research of the optimization procedures for improvement of transfer, safety and reliability characteristics of WET system	
Summary:	The project focuses on the research of the optimization methodology of the WET (Wireless energy transfer) operating parameters, representing a progressive solution for the transfer of energy to mobile and industrial equipment. The main aim of the project is the research of properties that influence it: • technical and hygienic properties (investigation of negative impact on living and non-living objects) and • relevant parameters of WET systems, such as efficiency, action radius, reliability, and environmental safety. The main reason for this research is the fact that the use of WET systems in terms of a variety of application uses can be expected within the power infrastructure of electric vehicles, cars (contactless charging, dashboard power supply, infotainment power supply, non-contact entertainment charging - smartphones, tablets etc. ...) in smart-grid systems in homes, industrial chargers for mobile and service robots, medical applications ... In the first step the solution will identify the interaction phenomena that affect the negative interference of WET systems with the environment. This is mainly about: • radiating EMI into the environment - modification of coil geometry and layout, • optimization of topology of the main circuit and compensating elements, • an appropriate way to manage energy transfer. Based on the results obtained, optimization of properties through multi-physical analyses and multi-level simulations will be carried out in order to significantly improve the efficiency of the process of receiving and controlling the flow of energy on the load side. Another task will be to investigate interactions of WET systems with biological systems. A very important step will be to suppress undesirable impacts by topological optimization of the WET system, while the primary method will be computer simulation realized through circuit and block simulators, respectively. 3D Field Analysis Systems (COMSOL) using models with a wide range of validity
Realization:	08/2018 – 06/2022
Coordinator:	Pavol Špánik (DME)
Co-operators:	Michal Frivaldský, Viliam Jaroš, Miroslav Pavelek, Marek Paškala, Ján Morgoš, Michal Pipíška, Branislav Hanko (DME)

APVV-17-0218: Investigation of biological tissues with electromagnetic field interaction and its application in the development of new procedures in the design of electrosurgical instruments	
Summary:	The aim of this research is to investigate the interaction of the radio frequency electromagnetic field with biological tissues, with an emphasis on the investigation of the effects of vaporization, fulgurisation and desiccation of tissues. These tissue effects will be investigated in connection with the design of the optimal electrosurgical unit, which is one of the most commonly used devices in medical practice.. The aim of the project will be to investigate the phenomena of a major impact on the effectiveness of electrosurgical instruments. An important aspect will be the implementation and correct

	interaction of progressive solutions to assess the frequency and temperature dependence of tissue impedance with different dielectric properties.
Realization:	07/2017 – 06/2022
Coordinator:	Dagmar Faktorová (DMAEE)
Co-operators:	Pavol Špánik, Miroslav Pavelek, Marek Paškala, Michal Frivaldský, Rastislav Štefún (DME)

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 (DME)
Co-operators:	Dušan Koniar, Peter Šindler, Anna Simonová, Pavel Pavlásek, František Jablončík, Tomáš Uriča, Michal Taraba (DME)

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 (DME)
Co-operators:	Pavol Špánik, Anna Simonová, Ondrej Hock, Jozef Šedo, Boris Kozáček (DME)

APVV-15-0441: Measurement system with optical sensor for systems Weight In Motion	
Summary:	Proposed project of applied research will be focused on design, optimalization and creation of a device for weight measurement of a vehicle (or its axle) in movement according to the currently valid traffic regulations on the road or highway. Project will discuss the selection of proper sensor hardware for the system, its mounting into existing solutions Measure-in-Motion® previously designed by project partner and compatibility of the used optical sensor output with the interface of the existing processing unit.
Realization:	07/2016 – 06/2020
Coordinator:	Daniel Káčik (DPh)
Co-operators:	Norbert Tarjányi (DPh), Aleš Janota, Juraj Spalek, Marián Hruboš, Rastislav Pirník, Peter Vestenický, Vojtech Šimák, Dušan Nemec, Jozef Hrbček (DCIS)

APVV-16-0129: Photonic nanostructures prepared by 3D laser lithography for biosensing applications	
Summary:	Project focuses on research and realization of specific 2D and 3D photonic structures and devices for biophotonic applications using new 3D laser lithography system. In the frame of project, the photonic devices as Mach-Zehnder interferometer, ring-resonator and 3D photonic crystal structures will be realized and implemented in LOC (Lab-on-a-chip) device. In the second part of project, nanostructures will be 3D arranged on surface of semiconductor microcone for surfaces with enhanced Raman scattering and their will be implemented in LOC device.
Realization:	07/2017 – 12/2020
Coordinator:	Dušan Pudiš (DPh)
Co-operators:	Ivan Martinček, Ľuboš Šušlik, Daniel Jandura, Ivana Lettrichová, Peter Gašo, Jana Ďurišová, Matej Goraus, Petra Urbancová, Tomáš Mizera (DPh)

APVV-19-0602 3D photonic polymeric microsensors integrated with optical fibers	
Summary:	The main goal of the project is to acquire latest knowledge in design, preparation and characterization of polymer photonic microsensors, which will be designed to integrate with optical fibers for the preparation of optical fiber microsensors for measuring pressure, temperature, elongation, magnetic and electric fields. Utilizing innovative design approaches for specific 3D photonic structures, simulating their optical transmission properties and changing of the properties depending on changes in the structural parameters and properties of the external environment, in which the structures will be placed, will provide a competitive advantage and potential of commercial use.
Realization:	07/2020 – 06/2023
Coordinator:	Ivan Martinček (DPh)
Co-operators:	Daniel Káčik, Norbert Tarjányi, Matej Goraus, Daniel Jandura, Ľuboš Šušlik, Petra Urbancová (DPh), NanoDesign s.r.o.

APVV-16-0006: Automated robotic assembly cell as an instrument of concept Industry 4.0	
Summary:	Global aim of the project is design of new modern concept of automated robotic assembly cell consisted of mobile manipulator, whereby manipulation task is performed by compliant manipulator. This aim is divided into partial tasks - design of mobile platform with capability of autonomous movement in unknown environment, concept of compliant manipulator with enhanced sensorial systems, which allows the manipulator better modelling of environment and interactions with human, and finally mutual cooperation of both modules to ensure the safe and stabile manipulation with objects also during the movement of robot. A suitable design of hardware and development of software will lead to construction of such unique concept, which combines actual trends in R&D in robotics.
Realization:	07/2017 – 06/2020
Coordinator:	František Duchoň (FEI STU)
Co-operators:	Aleš Janota, Juraj Spalek, Vojtech Šimák, Emília Bubeníková, Michal Gregor, Dušan Nemec, Jozef Hrbček (DCIS)

APVV-16-0190: Research of Integration of functional system of TEXtiles for monitoring of BIO data for achievement of synergy of health, comfort and human safety	
Summary:	Main objective of the interdisciplinary project is fundamental innovation and enlargement of assortment of smart textile structures on the European market with using progressive technologies in the form low-temperature plasma and subsequent application of nano-technologies and with integrated smart system for biomedical data monitoring. Result of the solution will be a prototype of smart mattress topper ECG-SmartSheet with increased hygienic properties, designed for human biomedical data monitoring in real time. Implementation of the project will create material suppositions for improvement and assurance of suitable a health and social conditions for post-productive generation in the frame of the Slovak Republic and EU. The proposed project is a response to forecast of negative social development in the Slovak Republic and Europe in the course of coming 20-30 years with the aim to build up suppositions for preservation of health and life quality of a considerable portion of population.
Realization:	07/2017-06/2020
Coordinator:	Dana Rástočná Illová (VÚTCH - CHEMITEX,spol. s r.o.)
Sub-coordinator from FEEIT:	Ladislav Janoušek (DEBE)
Co-operators:	Branko Babušiak, Ján Barabáš, Štefan Borik, Michal Gála, (DEBE), Róbert Hudec, Slavomír Matúška, Martin Paralič (DMICT)

APVV-18-0167: Smart clothing for E-health applications (E-clothing)	
Summary:	The intent of the project is reacting to long-term forecasts of social development in Slovakia and Europe over the next 20-30 years. It is clear that cardiovascular diseases are among the top 21st century civilization diseases and the percentage of people with this disease type will increase steadily. Health impacts of cardiovascular diseases can be reduced through early diagnosis, appropriate disease management, rehabilitation and prevention. The main goal of this project is to contribute to the specific prevention and diagnostics of cardiovascular diseases via multifunctional biotelemetric intelligent clothing for E-health applications. The project is intended to prepare and verifying the production of these garments with centralized integrated circuit and own mobile

	application designed for sensing, transmitting, recording and evaluating bioelectric signals in the form of an electrocardiogram (ECG), body temperature and real-time human position monitoring.
Realization:	07/2019 – 06/2021
Coordinator:	Ladislav Janoušek (DEBE)
Co-operators:	Branko Babušiak, Štefan Borik, Michal Gála, Maroš Šmondrk (DEBE), Hudec Róbert, Markovič Miroslav, Paralič Martin (DMICT)

APVV-16-0505: The short-term PREDICtion of photovoltaic energy production for needs of pOwer supply of Intelligent BuildiNgs – PREDICON	
Summary:	The proposed project is aimed at the developing of method for a very short-term prediction of photovoltaic (PV) power plant output with timescale ranging from 5 to 30 minutes. To forecast the intensity of solar irradiance, as the main factor affecting the performance of PV power plant, the algorithm using analysis of recorded image data representing cloudiness motion above the installation site of PV power plant will be proposed. To achieve the best accuracy of output prediction of PV power plant, local factors affecting solar irradiance and PV power plant operation will be identified. The analysis will be done in order to define correction factors for the adaptation of predicted values of solar irradiance determined by the proposed algorithm to current local conditions at the installation site of PV power plant. The functionality and accuracy of proposed method will be verified by the help of created PV power plant mathematical model as well as by measurements performed on real PV power plant.
Realization:	07/2017-06/2020
Coordinator:	Róbert Hudec (DMICT)
Co-operators:	Miroslav Benčo, Patrik Kamencay, Peter Sýkora, Slavomír Matúška, Martin Paralič, Martin Vestenický, Daša Tichá, Ján Hlubík, Miroslav Uhrina, Martin Šinko (DMICT), Peter Braciník, Marek Novák (DPSED)

APVV-15-0464: Efficiency Improvement of Electrical Power Transmission in Slovakia	
Summary:	The project deals with research and development of power losses caused by asymmetrical impedance of selected electric components (transformers, catenary, compensation chokes) of electrical power grid in Slovakia. The aim is to develop a series of steps and technology needed to determine impedance and admittance matrixes and to minimize the power losses due to the asymmetry of the components. Power losses optimization is still the most effective way of improving the energy resources utilization. Importance of such subject is supported by European Commission statement from 10/23-24/2014 aiming to the climate and energy policies frame, which expresses minimum 27% improvement of energy efficiency by 2030.
Realization:	1/2016 – 12/2020
Coordinator:	Juraj Altus (DPSED)
Co-operators:	Marek Roch, Marek Höger, Alena Otčenášová (DPSED)

APVV-17-0014: Smart tunnel: telematic support for emergencies in the traffic tunnel	
Summary:	The objective of the project is to design of a unique and competitive system, which will enable to decrease safety risks resulting from the operation of a road tunnel. The system design and functional specification will be provided in a proper form for realisation of commercial solutions. The consumer will be

	provided by integrated UML software specification with focus on identification and classification of safety critical events in tunnels.
Realization:	07/2018 – 12/2021
Coordinator:	Rastislav Pirník (DCIS)
Vice-coordinator	Jozef Svetlík (Faculty of Security Engineering UNIZA)
Co-operators:	Emília Bubeníková, Peter Holečko, Aleš Janota, Peter Nagy, Juraj Spalek, Kamila Kršíková (DCIS), Lenka Siváková, Vladimír Mózer, Tomáš Loveček, Stanislava Gašpercová (FBI UNIZA)

APVV SK-IL 2018-0005: ICT and smart cars for efficient emergency response and traffic management SENECA	
Summary:	The role of efficient emergency response systems is critical for supporting speedy rescue actions and improvement of citizens lifesaving rates. Typically, actions that are taken in the first minutes following the emergency event have the largest impact. Thus, quick and safe arrival of emergency vehicles to the affected destination is of utmost importance. The goal of the project is to evaluate how ICT installed in smart vehicles and road infrastructure will eliminate unnecessary transport delays and the risk of incidents that are either experienced by emergency vehicles or induced by emergency response. The focus will be on urban areas, which are particularly vulnerable, not only because of the concentration of population but also due to the interplay between humans, vehicles, infrastructure and technological systems. The nature of delays will be analysed using available data and video recordings. Requirements coming from the emergency management to the traffic management will be defined and used as an input for dynamic management of urban traffic flows. In the next step, optimization algorithms for traffic signal control will be developed to evaluate the likely future scenario of mixed traffic flow generated by conventional vehicles, Connected and Autonomous vehicles (CAVs). Three main inputs for algorithms will be considered: requirements of the emergency response system, situational data gathered by CAVs and sensors built-in traffic management infrastructure. To ensure feasibility of the proposed solutions, selected scenarios will be assessed by a federated simulator that combines realistic simulation of road traffic flows with realistic simulation of communication protocols. The project will combine the expertise of the Slovak partner in the traffic incident management methods, emergency response systems and ICT with the unique expertise of the Israeli partner in transport modelling and in developing the traffic signal control and navigation algorithms.
Realization:	2018 – 2021
Coordinator:	Milan Dado (DMICT)
Co-operators:	Peter Počta (DMICT)

PP-COVID-20-0100: DOLORES.AI: The pandemic guard system	
Summary:	The main idea of the project proposal is to create an intelligent guard system for conditional access to monitored locations in critical virologic situations. The system will be able to analyze three states of facemask (no facemask, face mask, incorrect facemask), contactless temperature measurement with real body temperature estimation based on a deep learning model that will analyze temperatures from forehead, eyes and other face parts in combination with actual weather conditions. Furthermore, the count of incoming and outcoming people will be implemented. All data processing and analysis will be provided by developed hardware. The main aim is to develop cheap and affordable solutions

	even for small businesses. An extension to the hardware solution and another benefit in the project will be the creation of a centralized system for the collection, evaluation, and visual display of the collected data.
Realization:	09/2020-12/2021
Coordinator:	Patrik Kamencay (DMICT)
Co-operators:	Miroslav Benčo, Róbert Hudec, Roman Jarina, Peter Sýkora, Martina Radilová, Slavomír Matúška,. Martin Paralič, Daniel Benedikovič, Miroslav Markovič, Jozef Dubovan, Michal Chmulík, Lukáš Ševčík (DMICT)

Scientific Grant Agency of the Slovak Ministry of Education, Science, Research and Sport and the Slovak Academy of Sciences (VEGA)

VEGA 1/0840/18: Research of means to achieve high resistance of optical networks to signal damage	
Summary:	The project is focused on the issue of multichannel optical transmission systems with regard to achieving high resistance to degradation phenomena caused by high density of transmitted optical power in the fiber core and a large number of optical channels transmitted in one optical fiber. Prevention of signal damage in the WDM optical channel and regeneration of operation by switching to backup channels are addressed by two principal schemes investigated to achieve increased resilience. These two schemes analyze the effects of degradation mechanisms, solitone transmission, incoming optical signal signaling properties, the use of advanced multi-state optical modulation formats even under coherent reception conditions, and optimizing RWA burst switching with innovative multi-channel fully optical switching structures at network nodes.
Realization:	01/2018 – 12/2020
Coordinator:	Jarmila Müllerová (IAS)
Co-operators:	Michaela Holá, Gabriel Cibira, Matúš Vaňko (IAS), Milan Dado, Jozef Dubovan, Ján Litvik, Miroslav Markovič, Michal Kuba (DMICT)

VEGA 2/0016/17: Macroscopic anisotropic composities based on liquid crystals an magnetic nano-particles	
Summary:	Project aims to study composite materials composed of liquid crystals and various magnetic nanoparticles. Combination of anisotropic properties of liquid crystals with magnetic properties of nanoparticles enables to prepare composites with unique magnetic and optic properties. Proposed experiments aim at increased sensitivity of these composite systems to magnetic field and preparation of materials with unique dielectric, magnetic and optic properties.
Realization:	01/2017 – 12/2020
Coordinator:	Institute of Experimental Physics SAV Košice
Co-operators:	Peter Bury, Jozef Kúdelčík, Štefan Hardoň, Marek Veveričík (DPh)

VEGA 1/0069/19: Polymeric photonic structures for sensor applications	
Summary:	Project aims to apply theoretical knoledge towards the design, preparation and characterization of polymeric photonic structures integrated with optical waveguides or with optical fibres for sensor applications.
Realization:	01/2019 – 12/2022
Coordinator:	Ivan Martinček (DPh)
Co-operators:	Dušan Pudiš, Daniel Káčik, Norbert Tarjányi, Ivana Lettrichová, Jana Ďurišová, Peter Gašo, Daniel Jandura, Ľuboš Šušlik, Matej Goraus (DPh)

VEGA 1/0348/18: Theory of ultrarelativistic nuclear collisions and matter in extreme conditions	
Summary:	The goal is a theoretical study of matter created in nucleus-nucleus collisions. A Monte Carlo generator will be improved to take into account spacial anisotropy and a possibility of fragment formation.
Realization:	01/2018 – 12/2021
Coordinator:	Kolomeytsev Evgeny, UMB Banská Bystrica
Co-operators:	Ivan Melo (DPh)

V- 1/0471/20: Degradation analysis of insulating elements of high-voltage transformers	
Summary:	The aim of the project will be to analyze the insulation state of various high-voltage transformers with respect to the degradation effects of operation and environment. The main attention will be devoted to diagnostics of insulating state of transformer, where for the dry devices they are mainly epoxy resins and in the oil devices it is oil-paper insulation. The effects of short-circuit and inrush currents, overload, overvoltage, environmental effects and other operating factors on the degradation effects of insulating elements will be analyzed. Subsequently, the effect of partial discharges in the transformer insulation, which has a direct impact on the degradation of the insulating state, will be analyzed. The process of their formation, extension and influence on the insulation of the transformer will be described. New measurement procedures, diagnostic methods and systems will be proposed, the results of which will be used to determine the degree of degradation of insulating elements of the transformers.
Realization:	01/2020 – 12/2022
Coordinator:	Miroslav Gutten (DMAEE)
Co-operators:	Milan Chupáč, Daniel Korenčiak, Matej Kučera, Milan Šebök, Milan Šimko (DMAEE)

VEGA 1/0626/19: Research of mobile object localization in IoT environment	
Summary:	The number of Location Bases Services is growing rapidly with the deployment of IoT networks, however, these services have various requirements on localization accuracy. Service providers should provide access to services in all environments. Therefore, positioning systems have to utilize all available technologies and data for position estimation. However, it is important to take into account the effectivity of the system. High accuracy localization is not required by all provided services. The goal of the project is to propose a localization system for IoT, which will integrate available data to estimate the position of devices and users. Data assumed to be used for positioning are signals from wireless networks and data from sensors implemented in devices connected to IoT. The project will be focussed on the research of algorithms based on fingerprinting as well as ad-hoc networks with the use of data from sensors. Proposed algorithms will allow optimal use of data for localization while securing the required quality of service.
Realization:	01/2019 – 12/2021
Coordinator:	Brída Peter (DMICT)
Co-operators:	Vladimír Wieser, Juraj Machaj, Darina Jarinová, Peter Počta, Bohumil Adamec, Tomáš Bielik, Tomáš Mižd oš (DMICT) Peter Vestenický (DCIS)

VEGA 1/0113/18: Interactions of relativistic nuclei, eta-meson nuclei and spin physics	
Summary:	Research in the area of interactions of relativistic nuclei, eta-meson nuclei and spin physics.
Realization:	01/2018 – 12/ 2020
Coordinator:	Janka Vrláková, UPJŠ Košice
Co-operators:	Marián Janek (DPh)

VEGA 1/0540/18: 3D photonics based on polymers for integrated optics and optoelectronics prepared by laser lithography	
Summary:	Project is focused on preparation of photonic structures and elements for integrated optics and optoelectronics using maskless optical lithographic techniques. The key technology is the 3D laser litography. The goal is to prepare original 3D photonic structures with a period of the order of a few hundred nanometers and various functional 3D photonic elements (Mach-Zehnder interferometer and a circular resonator in 3D arrangement).
Realization:	01/2018 – 12/2021
Coordinator:	Dušan Pudiš (DPh)
Co-operators:	Ivan Martinček, Daniel Káčik, Ľuboš Šušlik, Daniel Jandura, Ivana Lettrichová, Peter Gašo, Jana Ďurišová, Matej Goraus, Petra Urbancová, Tomáš Mizera (DPh)

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:	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. 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.
Realization:	01/2017 – 12/2020
Coordinator:	Soňa Fraňová, Institute of Pharmacology JLF UK Martin
Co-operators:	Libor Hargaš, Dušan Koniar, Anna Simonová (DME)

VEGA 1/0547/18: Research of possibilities for system optimization of WET technology	
Summary:	The core of the project is research of a method designed to investigate phenomena that affect the efficiency of contactless charging. The proposed method will serve also for optimizing of efficiency of the transmission characteristics of systems depending on the application use. The method is based on an analysis of existing WET systems solutions for different applications, while the output will be a set of knowledge about structural design of individual nodes of the system. The following procedure will lie in the preparation of reference physical sample and its simulation model. The simulation model will be based on a system of multi-level simulation. This model will be after process

	of calibration used to research of possibilities of efficiency increasing of WET systems. Running of multiple simulation programs will be the basis of the model. Each simulation program is used for individual investigation of a partial problem. The global result is then represented as the intersection of partial results.
Realization:	01/2018 – 12/2020
Coordinator:	Michal Frivaldský (DME)
Co-operators:	Peter Drgoňa, Anna Simonová, Marek Paškala, Michal Praženica, Miroslav Pavelek, Matúš Danko, Peter Sojka (DME)
VEGA 1/0119/18: Methods research for optimization of electromagnetic compatibility of systems for wireless energy transfer (WET)	
Summary:	The project focuses on the optimization of the EMC properties of wireless energy transfer (WET) systems. The project is related with the research of the significant phenomena of EMC features of WET systems. First of all, it is identification of the phenomena that affect negatively EMC properties during wireless energy transfer (EMI emissions to the environment)-the appropriate coil geometry suitable - circuit topology, method of energy transfer. The second area of research will deal about optimization of the EMC through multi-physics analyzes and multi-level simulations, in the way to not significantly affect the efficiency of the transmitting process and control process of energy at the load side. A very important step is to just suppress undesirable phenomena through optimizing individual circuit elements of WET system, while the primary method will be implemented through computer simulation of circuit simulators. For verification purposes the partially physical models will be used, and final verification of the WET.
Realization:	01/2018 – 12/2020
Coordinator:	Michal Praženica (DME)
Co-operators:	Branislav Dobrucký, Dušan Koniar, Libor Hargaš, Marek Paškala, Slavomír Kaščák, Roman Koňarik, Michal Pipíška, Miroslav Pavelek, Tomáš Uriča (DME)

VEGA 1/0774/18: Research of high speed and high efficiency electric drive	
Summary:	The main aim of the present project is a research and design of compact high-speed electric drive. The electric drive represents a set of equipment (electric motor, power converter and control system with an appropriate control structure) that provide energy conversion with some efficiency. Therefore, the project addresses the individual parts of the electric drive focusing on the overall efficiency of the high-speed drive. The project is divided into three key parts. The first part deals with the high-speed electric motor. It is about designing the electro-mechanical motor structure, minimizing the losses in the machine, size proposition, design and verification of mechanical strength and stiffness of the rotor. The second part of the project is focused on the power converter design which is intended to supply the electric motor. The third part of the project discusses the design and implementation of appropriate control algorithms for high speed drive.
Realization:	01/2018 – 12/2020
Coordinator:	Pavol Makyš (DPSED)
Co-operators:	Pavol Rafajdus, Vladimír Vavrúš, Lukáš Gorel, Marek Štulrajter, Ján Vittek, Valéria Hrabovcová, Pavol Lehocký, Juraj Makarovič, Ľuboš Struharňanský, Pavel Sovička (DPSED), Slavomír Kaščák, Jozef Šedo (DME)

VEGA 1/0593/20: Research of energy flow control in the network using a smart transformer	
Summary:	The project is focused on the design of the topology and control system of an electronic "smart transformer" in a smart grid network. The primary area of application is within small and medium-sized networks, consisting of households, renewable energy sources and storage. The aim of the project is to select the topological configuration and design the energy flow control of the electronic intelligent transformer. The smart transformer will be designed to control the flow of energy between renewable energy sources, load (batteries), micro grid systems and the distribution network. The methodology will be divided into several parts, the first part will be the selection of a suitable topology for the electronic transformer, the second step is the design of active control of the smart transformer with emphasis on minimizing power supply back to the distribution system and maximizing energy use within the node with smart transformer. In order to obtain information about the state of the network and individual elements, a detailed design of methods and systems for measuring energy flow will be needed.
Realization:	01/2020 – 12/2022
Coordinator:	Peter Drgoňa (DME)
Co-operators:	Michal Frivaldský, Ondrej Hock, Pavol Špánik, Peter Šindler, Ján Morgoš, Peter Sojka (DME)

VEGA 1/0615/19: Scientific research of high-speed drive with minimal torque ripple	
Summary:	The presented project deals with the scientific research of high-speed drive from point of view of reducing torque ripple and minimizing vibrations. The entire electric drive consists of three important components: a high-speed motor, a power inverter and a control system with a suitable control structure. Base on this, the project is divided into the design and optimization of a high speed motor and a power inverter with a suitable control algorithm for sensor and sensorless control of the electric drive. The project will deal with the electromechanical motor design in terms of minimizing the torque ripple, designing and checking the mechanical strength and stiffness of the rotor. Another part of the project solves the power supply of an electric motor via a power inverter. The last part of the project focuses on the design and implementation of high speed drive control.
Realization:	01/2019 – 12/2021
Coordinator:	Pavol Rafajdus (DPSED)
Co-operators:	Pavol Makyš, Valéria Hrabovcová, Vladimír Vavruš, Lukáš Gorel, Pavel Lehocký, Marek Štulrajter, Juraj Makarovič, Martin Sumega, Patrik Varecha, Simon Zoššák (DPSED)

VEGA 1/0371/19: Societal vulnerability assesment due to the failure of important systems and services in electricity sector	
Summary:	Reducing the level of social vulnerability is one of the main principles of the functioning of society. Social vulnerability is part of the disaster risk assessment and key information needed to assess relevant threats and measures to mitigate their adverse effects. Identifying key dimensions of vulnerability forms the basis for reducing risk and improving the society's preparedness for various risk and crisis situations. Part of the vulnerability assessment is the identification of the resources necessary to deal with an adverse event. The project focuses on research into the possibilities of quantifying the vulnerability of a society due to the failure of important systems and services in the electricity sub-sector. The

	main output of the project will be a hierarchical model and methodology of assessing social vulnerability, with practical application for a particular selected area, considering the failure of a part of the electricity system.
Realization:	01/2019 – 12/2021
Coordinator:	Mária Lusková (FBI, UNIZA)
Co-operators:	Peter Braciník (DPSED)

VEGA 2/0015/18: Mezo- and micro-meteorology detection of hydrometeors in lower part of troposphere based on passive detection of changes in electromagnetic radiation from anthropogenic sources.	
Summary:	Mezo- and micro-meteorology detection of hydrometeors in lower part of troposphere based on passive detection of changes in electromagnetic radiation from anthropogenic sources.
Realization:	01/2018 – 12/2020
Coordinator:	Pavol Nejedlík (SAV)
Co-operators:	Michal Kuba (DMICT)

Cultural & Education Grant Agency of the Slovak Ministry of Education, Science, Research and Sport (KEGA)

KEGA 008KU-4/2020: Comprehensive Innovation and Educational Support of Study Program "Teaching Informatics" with the "Internet of Things"	
Summary:	The basic aim of the project is to fundamentally innovate and modernize the current study program "Teaching Informatics" for the 1st and 2nd degree of higher education based on the content integration of the "Internet of Things" issue across the program and with close links to creative use in practical life. By introducing the issue of "Internet of Things" into the teaching process, the support of creativity and analytical thinking of students is monitored, which is reflected in the meaningful integration of new information into already acquired skills and habits in accordance with current development trends. At the same time, the curriculum will become more attractive, the profile will be improved and the graduates' ability to work in practice in a difficult to predict future.
Realization:	01/2020 – 12/2022
Coordinator:	Daša Tichá (DMICT)
Co-operators:	Michal Kuba, Martin Vestenický (DMICT)

KEGA 029ŽU-4/2018: Creation of innovative teaching materials from the field of applied physics and experimental measurements for technical subjects of newly accredited study programs	
Summary:	The goal is to create a comprehensive study material for physical and technical subjects of the newly accredited study programmes for the bachelor and master degree at the Technical University in Zvolen and University of Žilina.
Realization:	01/2018 – 12/2020
Coordinator:	Peter Hockicko (DPh)
Co-operators:	Gabriela Tarjányiová, Štefan Hardoň (DPh)

KEGA 011UCM-4/2018: The education games impact on the cognitive process	
Summary:	Nowadays, the problem of the implementation of advanced and virtual reality technologies into the teaching process, which should extend the classical teaching of new experiential forms, is becoming increasingly important.

	However, the effectiveness of this deployment for the learning process is still questionable. The goal of the project is to map the principles needed to create an educational game so that the game with the support of virtual reality develops the cognitive abilities of the involved game participants as well as to set the minimum requirements that are needed to implement the educational platform. For this purpose, with the support of virtual reality, a prototype test-based serious game for pupils/ students in the field of mathematics oriented to spatial imagination will be developed. The key criterion of the game performance in terms of developing of cognitive abilities will be a detection of brain waves activation at the beta wave level. This data will be measured by means of an electroencephalograph (EEG). Beta waves are brain waves that are activated when the subject is concentrated to solve a task or a problem. Activating beta waves through the game has a significant impact on the cognitive process of the learner.
Realization:	01/2018 – 12/2020
Coordinator:	Ladislav Huraj, UCM Trnava
Co-operators:	Branko Babušiak (coordinator of FEEIT), Milan Smetana, Michal Gála, Štefan Borik, Maroš Šmondrk (DEBE)

KEGA 016ŽU-4/2018: Modernization of teaching methods of management of industrial processes based on the concept of Industry 4.0	
Summary:	The project is primarily focusing on the modernisation of education in the field of automation a process control with the use of the Industry 4.0 concept. A workplace will be created integrating the latest object identification technologies used in industrial praxis and object scanning technologies based not only on classic sensors, but also on image information. Using object identification and by providing the data to cloud, it will be possible to evaluate the data from distinct aspects.
Realization:	01/2018 – 12/2020
Coordinator:	Emília Bubeníková (DCIS)
Co-operators:	Karol Rástočný, Aleš Janota, Juraj Spalek, Peter Holečko, Alžbeta Kanáliková, Rastislav Pirník, Dušan Nemec, Milan Medvedík (DCIS)

KEGA 008ŽU-4/2019: Modernization and expansion of educational possibilities in the field of safe controlling of industrial processes using the safety PLC	
Summary:	The project is focused on building and modernizing of the laboratory allowing the safe industrial process control using the safety PLC. The laboratory was successfully built within the previous KEGAproject. It includes six full-featured workplaces with safety PLC and physical models allowing the simulation of real situations from industry. The aim of the present project is to extend this laboratory to enable the realization of the complex distributed control systems with safety PLC and safe control of actuators. This will allow the extension of the related subject "Control Systems with Safety PLC" and the subsequent solution of bachelor, diploma and dissertation works, as well as the realization of workshops, the creation of teaching materials and sample examples. Due to the great interest of practice in this area, the aim of the project is to maintain and develop well-functioning co-operation with practice, particularly in the field of consultation on achieving the required safety integrity level (SIL) of realized applications.
Realization:	01/2019 – 12/2021
Coordinator:	Juraj Ždánsky (DCIS)

Co-operators:	Karol Rástočný, (vice-coordinator), Jozef Hrbček, Peter Nagy, Vojtech Šimák, Jozef Valigurský (DCIS)

026ZU-4/2019: Implementation of GPS specification of products into the teaching process of mechanical engineering study programs and into the technical practice	
Summary:	The goal of the project is modernization, improving, and supplementing of teaching content and form within the study programs of bachelor's and master's studies at the technical universities. The project deals with the implementation of the knowledge's introduced in the latest International Technical Standards from the field of Geometric Product Specification (GPS) into the teaching plans of such subjects as Technical/Engineering Drawing, Methodology of Design, Engineering Metrology, Quality Management in Engineering and Measuring Methods and Instruments. The outcome of the project will be the creation of an educational program that will include the publication of two university textbooks. The project is also focused on internationalization in education, increasing skills and flexibility in technical specializations as well as on increasing university student's linguistic skills.
Realization:	2019 – 2021
Coordinator:	Jozef Broncek (FME UNIZA)
Co-operators:	Ivan Litvaj (DPSED)

011ZU-4/2020: Implementation of on-line education in the field of bearing production technologies with emphasis on the educational process to increase the skills and flexibility of mechanical engineering students	
Summary:	The amount of information that needs to be mastered by students is constantly growing. The processing of teaching material into multimedia courses and their interactive study increases the quality and speed of acquiring knowledge and skills, allows the student to move from the passive role of the listener to the role of an active participant in the educational process. Learning through e-learning is an increasingly preferred method, which is also the focus of the present project. It focuses on the modernization of education and the online approach to the teaching of bearing production technologies, which are an integral part of mechanical engineering. The outputs of the project in the form of multimedia and internet applications in the form of websites can be used not only for the active education of students at the university but also on a national scale and for the general public. In addition, the outputs of the project should serve as important materials in solving research projects and final theses of students in bachelor's and master's study programs.
Realization:	2020 – 2022
Coordinator:	Dana Stancekova, (FME UNIZA)
Co-operators:	Ivan Litvaj (DPSED)

KEGA 027ŽU-4/2018: Modelling, Design and Implementation of the Modern Method in the Educational Process of the Technical Faculties Focusing on Discrete Control of Power Systems	
Summary:	The project is focused on digital learning environment for technical and technological education at technical schools with a focus on electrotechnics to support the development of knowledge and skills of graduates of technical schools. The main objectives of the project include the development of modern research and educational aids in the creation of study materials, university textbooks and didactic means, for the needs of teaching discrete control of power electronic systems and the integration of the content of education into

	the real environment of the labour market. Based on the results of the project is also expected further innovative research in the scientific field. The aim of the project are research activities associated with the advanced method of creating and tuning algorithms for various application in the field of power electronics and the use of research results in the educational process within the field of electrical engineering and related study programs focusing on control and power electronic systems such as Mechatronics, Automation and Electric Drives. In addition, companies carrying out development in power electronics require students which possess the knowledge not only from a hardware point of view (knowledge of the converter topologies, electronic component, making printed circuit boards, i.e.), but also to have a deeper knowledge of programming of the power systems. It follows that the teaching process of the study program must be focused on the control of the advanced converters structure using the latest technical equipment not only in hardware but also in the software level. Students using the proposed teaching resources that are compatible with flexible learning environment (eContent, eLearning, Blended Learning, Connected Learning) acquire knowledge necessary for success in the labour market. The individual outputs of the project will be modified and offered to high school teachers to increase their qualifications and to high school students to improve their knowledge in the field of Electrical Engineering. The project responds to the outputs of the National project "Universities as Drivers of the Knowledge Society" and the projects "Centre of Excellence of Power Electronic Systems and Materials for Their Components", which contributed to a significant improvement of the knowledge and technological base of the research workplace. The main benefit of the project is to design flexible learning; the solution is to design and create open "online" learning modules to support the competence development of students in a specific area of engineering. The project also envisages the creation of modules in the English language, which will contribute to the improvement of the teaching of the mobility programs and will contribute to the better use of graduates in the Slovak and world market. The other goal includes edition of the university textbook on topic of the control method of the power electronics systems and about methods in process of the tuning the algorithms. Finally, it will be created 6/12 workplaces in the existed Laboratory of... Accordingly, it is the assumption of utilization teaching aids in related study program or among general professional public.
Realization:	01/2018 – 12/2020
Coordinator:	Slavomír Kaščák (DME)
Co-operators:	Michal Frivaldský, Michal Praženica, Jozef Šedo, Peter Šindler, Miroslav Pavelek, Matúš Danko, Juraj Adamec (DME)

KEGA 014ŽU-4/2018: Broadening the content in a field of study with respect to the current requirements of the industry as regards artificial intelligence methods and IT	
Summary:	The objective of the project is to facilitate implementation of high-quality education it these areas – i.e. in the area of AI, ML and IT – with regard to the actual requirements of the industry. The second goal is to promote the transfer of progressive and innovative methods into industrial practice. The project reflects a feedback from the commercial sector (primarily within the Ready for Continental initiative and from other department industrial partners) and the feedback from international academic partners such as University of Patras, Greece; UC Berkeley, California, USA; Tongji University, Shanghai and others. The

	output of the project include new study materials, proper HW/SW education support and a catalogue of AI tasks and methods.
Realization:	01/2018 – 12/2020
Coordinator:	Aleš Janota (DCIS)
Co-operators:	Michal Gregor, (vice-coordinator), Juraj Spalek, Alžbeta Kanáliková, Emília Bubeníková, Vojtech Šimák, Jozef Hrbček, Marián Hruboš, Rastislav Pirník, Roman Michalík, Kamila Kršíková (DCIS)

KEGA 045ŽU-4/2019: Innovation of the educational process by modernization of Electrical Machines Laboratory	
Summary:	The aim of the project is a complex modernization of the Electrical Machines Laboratory, where the measurements of electrical machines are done by the Department of Power Electrical Systems at the Faculty of Electrical Engineering of the University of Žilina in bachelor and master studies. The result of the modernization of the laboratory is to reach the national and international standards and industrial standards in terms of further application of graduates. Innovative studding texts on measuring points will be introduced and automated measurements on electric machines will be created. It can be said that study of the field of electric machines is not easy. This subject is an integral part of the study fields for which this issue is a complete foundation without which the understanding of other contexts is very problematic. Its quite clear, that the most proper way how to be success, is to work in practice and various measurements, to simulate different operating states at test benches. For this purpose, three modern measuring instruments will be constructed as a result of the project, where each station includes electrical machine able to work as a motor or generator, variable power sources with appropriate power levels, variable electronic loads, measuring instruments, recording and computing equipment, mechanical equipment for appropriate fixation and mechanical attachment of the measured electrical machine. This technical part of the project will be complemented by lecture scripts - guides for each measurements, which will be processed according to relevant applicable standards and international standards. The measurement test benches thus allow to individual students to realistically measure the relevant electrical machines, and apply the theoretical knowledge in practice where is a huge request for so skilled and erudite experts in the field of electric machines and drives.
Realization:	01/2019 – 12/2021
Coordinator:	Pavol Rafajdus (DPSED)
Co-operators:	Pavel Lehocký, Juraj Makarovič, Rudolf Madaj, Stefan Kocan, Marek Furmanik (DPSED)

Structural Funds

313012N944: Research and development of the new PLASMABIT BHA plasma milling system for efficient and ecological closure of wells and introduction of a new product into the production process	
Summary:	The main objective of the project is to carry out research and development of the PLASMABIT BHA plasma milling system (Bottom Hole Assembly), to perform functional tests of the prototype and subsequently to introduce a new product into the production process. BHA refers to a device that is located in a borehole and is intended for a specific activity or operation (milling, drilling, cleaning, etc.). Our new product is designed for plasma milling of production pipes (steel pipes)

	with the aim of a more efficient, economical and especially environmentally friendly way of tight closing of exhausted oil and gas wells. PLASMABIT BHA will be able to remove contactless parts of the production line intended to close the well and thus prevent leakage of residual oil fractions or gas. In order to eliminate environmental impacts, there is a growing demand for new efficient technologies used in oil and gas extraction. Tight closure of wells encounters problems such as clean removal of the production line, tightness and seal life, which will make our product significantly eliminate. A comprehensive system that will solve these problems and meet market requirements has a highly export character with a global reach and would significantly increase the competitiveness of Slovakia. The project is divided into several activities that logically follow up. Their mission is to research the plasma milling system together with the research of a new power supply system and a new generation of high-resistance electrodes for the plasma milling system. The research will be followed by a development phase where the prototype will be intensively tested until the final parameters are debugged. The applicant shall also carry out the activity of protection of the rights of created intellectual property. In the innovative part of the project, we plan to purchase the infrastructure needed to introduce the new PLASMABIT BHA product into the production process.
Realization:	6/2019 – 2/2022
Coordinator:	Pavol Špánik (DME)
Co-operators:	Pavol Rafajdus, Vladimír Vavruš, Marek Höger (DPSED), Branislav Dobrucký, Michal Frivaldský, Michal Praženica, Slavomír Kaščák (DME)

312010F057: IT academy – education for 21st century	
Summary:	Project will support development of IT sector by changes in education systems at primary schools, secondary schools and universities, mainly by increased quality of education in informatics, mathematics, science and technology with focus on ICT, motivation of students to study ICT and development of scientific competences of students.
Realization:	03/2017 – 10/2020
Coordinator:	Pavel Segeč (Faculty of Management Science and Informatics UNIZA)
Co-operators:	Ivan Dolnák, Peter Kortiš (DMICT)

ITMS 313011V334 Innovative Solutions for Propulsion, Power and Safety Components of Transport Vehicles	
Summary	Industrial research into the service life of automotive components of the next generation of vehicles. Research and development of hydrodynamic converters for streamlining the hybridization of propulsion systems. Research of electric drive control methods and development of new topological arrangements of traction converters. Research in optimizing the dynamics and energy of electric traction. Research and development in the field of optimal operation of battery systems. Development of ICT for increasing the safety of operational characteristics and increasing intelligence through self-learning algorithms. Analysis of mechanical properties of modern systems for vehicles in the form of HIL and PIL simulations and through test benches.
Realization:	09/2019 – 12/2023
Coordinator:	Michal Frivaldský (DME)
Co-operators:	Daniel Káčik, Ivan Martinček (DPh), Pavol Špánik (DME), Pavol Rafajdus (DPES)

Other National Research Projects

Phenomenology and Outreach (FEPO), Agreement between Ministry of Education SR and University of Žilina	
Summary:	Department of Physics will collaborate with CERN in the area of research and outreach in particle physics. In the research part we will collaborate with the Theory Department in the area of Heavy Ion Physics and mechanism of Electroweak Symmetry Breaking. Our department will coordinate Particle Physics Masterclasses at the national level (Masterclasses, http://fyzika.uniza.sk/mc/) at 6 Slovak universities, will co-organize international competition Beamline for Schools and develop portal svetcastic.sk for outreach and communication of particle physics.
Realization:	01/2017 – 12/2020
Coordinator:	Ivan Melo (DPh)
Co-perators:	Mikuláš Gintner, Gabriela Tarjányiová, Jozef Kúdelčík (DPh)

GRANT UNIZA: Research into the possibility of using electric vehicle batteries in the form of storage system for an electrical power system regarding the preferences and needs of electric vehicle owners	
Summary:	The main goal of the project is to research the possibilities of using electric vehicle batteries in the form of a storage system for the electrical power system, taking into account the preferences and needs of electric vehicle owners. The project will define a mechanism that will socially divide the required charging/discharging power between electric cars based on the needs of the power system and electric car owners. At the same time, the mechanism will define incentives for EV owners in a way that the participation in this mechanism and a true definition of their needs is the optimal strategy for each of owners. The proposed mechanism will be verified by the simulation and a recommendation for its implementation in practice will be defined based on the obtained results.
Realization:	09/2020 – 08/2021
Coordinator:	Martina Kajanova (DPSED)

GRANT UNIZA: Sound modulated Tesla coil for presentation purposes	
Summary:	The project is focused on the construction of a sound modulated Tesla coil, which will be used for presentation purposes. This device will produce electrical discharges, whose sound will change depending on the audio input signal. The functional prototype of the device is ready, but it is not portable and suitable for presentation. The project will address the fine-tuning and improvement of the existing structure so that the resulting device is portable, easy to operate, and safe. The provided funds will be used for the purchase of parts, components, external construction, or for the source of the sound signal, e.g. electronic piano. The tuning of the individual components will be performed by methodical measurements to determine the effect of the different settings on the final audio output. In addition to presentation purposes, the Tesla coil can also be used to test the equipment's tolerance to electromagnetic interference.
Realization:	09/2020 – 08/2021
Coordinator:	Marian Tomasov (DPSED)
Co-operators:	Peter Bracinik, Jural Altus (DPSED)

GRANT UNIZA: Platform stabilization using flywheels	
Summary:	The project focuses on the popularization and attractiveness of subjects with a focus on electric drives, for university and high school students. The aim of the project is to create a functional sample that will use the most advanced control techniques

	designed for motors with permanent magnets. The functional sample will be in a form of a cube-shaped frame. There will be several motors with permanent magnets with the attached flywheels inside the cube. The functional sample will be able to independently balance on one of its edges and maintain an equilibrium position on one of its corners. The whole platform with several degrees of freedom will form a 3D nonlinear system, controlled by a parallel control structure. The behavior of the functional sample will resemble a 3D inverted pendulum. The design and subsequent implementation of stabilization algorithms will form a scientific benefit of the project.
Realization:	09/2020 – 08/2021
Coordinator:	Lukas Gorel (DPSED)
Co-operators:	Vladimir Vavrus (DPSED)

GRANT UNIZA: Photoplethysmography imaging as instrument of contactless cardiovascular diagnosis	
Summary:	The project goal is the design and realisation of the PPGI system based on the MVC cameras. The system is intended to evaluate blood volume changes in subcutaneous area using contactless acquisition of signals and their further processing by specific algorithms.
Realization:	09/2020 – 08/2021
Coordinator:	Štefan Borik (DEBE)
Co-operators:	Maroš Šmondrk (DEBE)

GRANT UNIZA: 8008: Monitoring of ECG with active electrodes	
Summary:	The project focuses on the design of contactless systems employed for monitoring of electrical cardiac activity through usual clothing. The project goal lies in development of several active electrodes for ECG monitoring, their testing in real environment and comparison. Integral part of the project is a design and construction of an acquisition unit for the bioelectric signal digitalisation.
Realization:	09/2020 – 08/2021
Coordinator:	Tadeáš Bednár (DEBE)
Co-operators:	Branko Babušiak, Ladislav Janoušek (DEBE)

GRANT UNIZA: Cardio-stimulator testing device	
Summary:	The project aims at the design and realisation of a testing device intended to generate excitation signal,and to acquire,transfer,record and evaluate the cardio-stimulator signal.
Realization:	09/2020 – 08/2021
Coordinator:	Filip Vaverka (DEBE)
Co-operators:	Milan Smetana, Ladislav Janoušek (DEBE)

GRANT UNIZA: Multi-channel EMG for mapping and monitoring of local muscle loading	
Summary:	The aim of the project is to design and realise 8-channel EMG for monitoring of local muscle activity. Such device would be able to determine local muscle load and direction of muscle fibres activation.
Realization:	09/2020 – 08/2021
Coordinator:	Michal Labuda (DEBE) (DEBE)
Co-operators:	Michal Gála, Ladislav Janoušek

GRANT UNIZA: Focused on a cell with electromagnetic signal II	
Summary:	The project focuses on the design, construction, and implementation of exposition system with high homogeneity for irradiation of S. Cerevisiae cells. The purpose is to identify biologically active frequency of low frequency electromagnetic field and to realise sensitivity analysis around the resonance point.
Realization:	09/2020 – 08/2021
Coordinator:	Zuzana Judáková (DEBE)
Co-operators:	Roman Radil, Ladislav Janoušek (DEBE)

GRANT UNIZA: Use of virtual reality for propagation and teaching	
Summary:	The presented project is focused on research, development and testing of games in the virtual reality environment (referred to as VR). Individual activities and research activities are aimed at creating and improving laboratory conditions for students, in which they can work, develop and test their own computer games in their chosen game development environment. The first stage of the project will be devoted to improving the conditions for students to develop VR games. The second phase of the project will be devoted to the actual implementation of VR games in individual environments and to familiarizing themselves with the laws in their creation. The overall output of the project will be finished VR games to promote FEIT and university activities such as DOD, Researchers' Night, FEIT presentations at secondary schools, Uniza Day, Uniza Masters and so on.
Realization:	09/2020 - 08/2021
Coordinator:	Peter Sýkora
Co-operators:	Martina Radilová, Róberta Vršková

GRANT UNIZA: Use game peripherals to promote and learning	
Summary:	Presented project is focused on research, development and testing of games in 2D, 3D environment and in augmented reality. Individual and research activities are aimed at creating and improving laboratory conditions for students, in which they can work, develop and test their own computer games in their chosen gaming development environment. The first phase of the project will be devoted to improving the conditions for students to develop games. The second phase of the project will be devoted to the realization of games in individual environments and familiarization with the laws in their creation. The overall output of the project will be ready-made games to promote FEIT activities and universities such as DOD, Researchers' Night, FEIT presentations at secondary schools, Uniza Day, Uniza Masters and so on.
Realization:	09/2020 - 08/2021
Coordinator:	Martina Radilová (DMICT)
Co-operators:	Róberta Vršková, Peter Sýkora (DMICT)

GRANT UNIZA: Classification of dynamics of image behavior	
Summary:	The project intention responds to the need to classify the dynamics of image behavior, as today there is an increased rate of aggression and terrorist attacks in public spaces as well as in the vicinity of private buildings. Nowadays, the security services and the police are in charge of the security of the population and they obtain information from the cameras. Workers respond to camera recordings and attention is greatly influenced by fatigue and other artifacts. While a system capable of classifying behavioral dynamics would be able to eliminate the level of inattention and would alert the security officer or police to suspicious behavior. The result of the project should therefore contribute to the classification of non-standard

	behavior, using an algorithm. The aim of the project is the design and implementation of a classifier capable of differentiating the dynamics of image behavior. The classifier is based on the necessary algorithm, which has no problem to distinguish and classify the dynamics of behavior in the image.
Realization:	09/2020 - 08/2021
Coordinator:	Róberta Vršková (DMICT)
Co-operators:	Martina Radilová, Peter Sýkora (DMICT)

Other National Non-research Projects

Hybrid education in area of artificial intelligence, machine learning and cybernetics at UNIZA	
Summary:	Development project in area of support of education in artificial intelligence and cybernetics in English language at UNIZA.
Realization:	12/2020 – 12/2022
Coordinator:	Róbert Hudec (DMICT)
Co-operators:	Patrik Kamencay, Peter Sýkora, Miroslav Benčo, Miroslav Uhrina, R. Jarina (DMICT)

V3 Žilina Childrens University 2020 - online	
Summary:	Goal of the project is to focus the attention of school age children from Žilina area on STEM subjects and show them applications of research for everyday life.
Realization:	02/2020 – 11/2020
Coordinator:	Peter Hockicko (DPh)
Co-operators:	Teachers from UNIZA

Submitted Proposals of International Research Projects in 2020

Type / call	**Name of the project**	**Outcome of evaluation**
H2020-LC-SC3-EE-2020-2	Smart Intelligent Solutions Facilitating Powerful Performances of Your Sustainable Energy Requests	Not supported
H2020 MSCA-RISE-2020	Smart Services for Sustainable Operation and Management of the Electric Vehicle Ecosystem	Not supported
H2020 MSCA RISE	Smart services for sustainable operation and management of the EV ecosystem	Not supported
Erasmus+ KA2 Higher Education - International Capacity Building	Research-Innovative Skills for Master and Phd students of Telecommunication speciality	Not supported
H2020-ICT-2018-20	Smart community-based photonic sensing for environmental pollution detection	Not supported

Research for Practice; the Most Important Realized Outputs

DMICT:

Name of the project: Implementation of new generation communication systems for improved safety in rail transport
Coordinator: Vladimír Wieser
Summary / Achievement:
The project was granted Ministry of Transport and Construction of the Slovak republic as a national project in operation programme integrated infrastructure 2014-2020. The project is implemented by the Slovak Rail operator. Within the project study "Štúdia pokrytia terénu signálom LTE na úseku železničnej trate GALANTA - ŠTÚROVO" was prepared. The study was realised based on a request from the University Science Park at the University of Zilina as a tool for placement of e-NodeB transmitters of LTE system on rails track between Galanta and Štúrovo.

Name of the project: National plan in the area of broadband connection
Coordinator: Milan Dado
Summary / Achievement:
The goal was to define the strategy of Slovakia in the deployment of electronic communication networks with high capacity with the aim to provide ultra-fast wideband connection and fulfil goals defined by the European Union for the European gigabit society as well as strategic goals of Slovakia in the area of further development of communication infrastructure. The document consists of the goals and vision of Slovakia in 2030, strategic selection of infrastructure, intervention strategy and strategic selection of financing.

Name of the project: Activities of expertise, research and consultation related to measurements of bridge objects at highway section D1 Hričovské Podhradie – Lietavská Lúčka
Coordinator: Peter Brída
Summary / Achievement:
Realization of expertise, research and consultation tasks related to measurements of bridge objects at highway section 1 Hričovské Podhradie – Lietavská Lúčka. Definition of bridge objects according to SO: 201-10, 201-20, 201-30, 202-00, 203-00, 204-00, 205-00, 206-00, 207-00, 208-00, 209-00: earth resistance, continuity, electrical resistance NK, measurements of mean and max. values of measured voltages, determination of size as well as the direction of the directional component of measured voltages and their conversion to current density, measurements of earth current field density in individual measurement axes, measurements of electrical voltage, bridging electrical current and resistance.

DME:

Name of the project: Research and development of a functional electricity metering device
Coordinator: Michal Frivaldský, Jozef Šedo
Summary / Achievement: Research and development of the software part based on the circuit solution of the electricity meter. Development of a program for the TMS320F28379D processor series designed for an electricity meter according to the customer's specifications. Electricity meter software programming. Options for changing the parameters of the meter metering settings. Display of measured data on the OLED display of the electricity meter. Implementation of a watchdog system in an electricity meter.
Name of the project: Research and development of "Embedded Systems" of electrical measuring devices
Coordinator: Jozef Šedo
Summary / Achievement: Methodology for calculating active and reactive energy. Design of electrical diagrams and connections. Implementation of calibration and type tests. Consultations in the field of electromagnetic compatibility.

DCIS:
Project number: O-538/2210/2019 (Slovak road administration Bratislava)
Name of the project: Technical requirements – Fire safety of road tunnels
Coordinator: Vladimír Mózer (FSE UNIZA)
Summary / Achievement: Revision of existing documentation on fire safety and based on it to elaborate new Technical requirements and a detailed proposal of updating the Template letters (VL) 5/2016 Tunnels, MDVRR SR: 2017.

DEBE:
Project number: S-103-0010/17
Name of the project: Realisation of smart clothing and their evaluation
Coordinator: Ladislav Janoušek
Summary / Achievement: Design and evaluation of connections of active textile parts with implemented electro-conductive yarns with external electronic circuits.

Conferences and seminars

The Faculty of Electrical Engineering organized, or participated in preparation of the following scientific events in 2020:

- ELEKTRO 2020, international conference 25. 05. – 28. 05. 2020, Taormina, Italy, organizer: Peter Hockicko;
- ADEPT 2020, international conference, 14. 09. - 17. 09. 2020, Nový Smokovec, SK, Chair of the Programme committee: Dušan Pudiš (DPh);
- International Masterclasses 2020 for high schools 25. 03. – 31. 03. 2020, online on Facebook www.svetcastic.sk, organizer: Ivan Melo (DPh);
- Coorganisation of Summer machine-learning school 2020, 07. 09. – 11. 09. 2020, Žilina, coordinator: Michal Gregor (DCIS);
- Competition for secondary school students: The Technical Idea of the Year, 11. 05. 2020, Ondrej Hock (DME);
- Competitoin: IoT design challange, 12. 06. 2020, Michal Frivaldský (DME);
- Solid State Surfaces and Interfaces 2020, 23. 11. – 26. 11. 2020, Online - Cisco Webex Meetings, coordinators: Stanislav Jurečka (IAS), Emil Pinčík;
- Virtual visit of experiment ATLAS at the LHC (Week of Science and Technology), 11. 11. 2020, online (zoom and Facebook), organizer: Ivan Melo (DPh).

Publication activities

The permanent task of the Faculty is to increase the publication activity in quality journals which are indexed in international professional databases.

Tab. 11: Publication activities at FEEIT (based on registration at the University Library up to February/March of the relevant year)

Year	Monographs and university textbooks	Scientific works in journals	Scientific publications in Conference pub.	Patents, Utility Models	Others (Scripts, etc.)
2010	4	76(12*)	246	3	49
2011	4	86 (13*)	219	2	70
2012	4	76 (12*)	223	8	65
2013	12	107 (18*, 36**)	198	1	94
2014	5	89 (24*, 23**)	257	7	28
2015	10	84 (16*, 45**)	209	3	25
2016	4	61 (24*, 27**)	243	12	36
2017	6	98 (52*, 24**)	175	8	52
2018	5	78 (34*, 22**)	218	5	32
2019	4	94 (28*, 31**)	227	14	21
2020	7	91 (43*, 32**)	159	26	24

* out of which indexed in Current Contents Connect database

** out of which indexed in SCOPUS or Thomson Scientific Master Journal

In the following Tab. 12 we present in detail the publishing activities of the Faculty in 2020 (based on registration at the University Library up to February, 2020)

Category	Category name	Number
AAB	Scientific monographs published by domestic publishers	4
ACA	University textbooks published by foreign publishers	1
ACB	University textbooks published by domestic publishers	2
ADC	Scientific papers in foreign journals	43
ADE	Scientific papers in other foreign journals	6
ADF	Scientific papers in other domestic journals	8
ADM	Scientific papers in foreign journals registered in the WoS or SCOPUS databases	23
ADN	Scientific papers in domestic journals registered in the WoS or SCOPUS databases	9
AEC	Scientific works in foreign peer-reviewed scientific proceedings, monographs	2
AED	Scientific work in domestic reviewed scientific proceedings, monographs	2
AFC	Published papers at foreign scientific conferences	142
AFD	Published papers at domestic scientific conferences	12
AGJ	Applications of patents, utility models, ...	1
AFH	Abstracts of papers from domestic conferences	26
AFG	Abstracts of contributions from foreign conferences	1
BAA	Professional book publications published by foreign publishers	2
BCI	Scripts and textbooks	1
BEE	Professional work in foreign proceedings (conference and non-conference)	1
BEF	Professional work in unrecognized domestic proceedings (both conference and non-conference)	16
DAI	Dissertation and habilitation works	2
FAI	Editorial and compilation work	1
GHG	Papers published on the Internet	1
GII	Various publications and documents that cannot be included in any of the previous categories	1

Monographs (Chapters in monographs)

[1]	OTČENÁŠOVÁ, Alena – REPÁK, Michal: Estimácia vybraných parameterov kvality elektrickej energie v distribučnej sieti, Žilina: EDIS, 2020, ISBN 9788055416458, 180 pp.
[2]	GUTTEN, Miroslav – KÚDELČÍK, Jozef – KORENČIAK, Daniel: Analýza stavu transformátorov a ich materiálov, In: Žilina: Žilinská univerzita v Žiline, 2020, ISBN 978-80-554-1648-9, p. 187.
[3]	RÁSTOČNÝ, Karol – BALÁK, Jozef: Kvantitatívne hodnotenie integrity bezpečnosti elektronických systémov súvisiacich s bezpečnosťou, Žilinská univerzita, 2020, ISBN 978-80-554-1646-5, 159 pp.
[4]	HOCKICKO, Peter – TARJÁNYIOVÁ, Gabriela: Analýza konceptuálneho myslenia a postojov študentov technickej univerzity [print] /. 1. vyd. Žilina : Žilinská univerzita v Žiline, 2020. - 125 s. ISBN 978-80-554-1739-4

Books, Textbooks and Lecture Notes

[1]	HRABOVCOVÁ, Valéria – RAFAJDUS, Pavol – MAKYŠ, Pavol: Analysis of Electrical Machines, IntechOpen, 2020, ISBN 978-1-83880-208-0, s. 225.
[2]	HRBČEK, Jozef – NEMEC, Dušan: Bezpečné riadenie procesov s využitím safety technológie B&R, 1. vyd. - Žilina: Žilinská univerzita v Žiline, 2020, ISBN 978-80-554-1618-2, p. 145
[3]	ČÁP, Ivo – ČÁPOVÁ, Klára – SMETANA, Milan – BORIK, Štefan: Vlnové procesy: využitie vlnových procesov v medicíne, EDIS, 2020, ISBN 978-80-554-1642-7, počet 279 pp.
[4]	HOCKICKO, Peter: Video, analýzy a modelovanie reálnych dejov : podporný elektronický materiál . 1. vyd. Žilina : Žilinská univerzita v Žiline, 2020. - 94 s. [USB-key]. ISBN 978-80-554-1670-0.
[5]	TARJÁNYIOVÁ, Gabriela – HOCKICKO, Peter: Úvod do fyziky [electronic] / 1. vyd. Žilina : Žilinská univerzita v Žiline, 2020. 106 s. [USB-key]. ISBN 978-80-554-1741-7.

Current Content Journals

[1]	VARECHA, Patrik – PÁCHA, Matěj. – SUMEGA, Martin – FURMANIK, Marek: INFLUENCE OF POWER LINES ARRANGEMENT ON QUALITY AND RELIABILITY OF DC-LINK CURRENT SENSING, In: Electrical Engineering, Archiv für Elektrotechnik, Vol. 102, Iss. 1, 2020, ISSN 0948-7921.
[2]	GINTNER, Mikuláš – JURÁŇ, Josef: A case study about the mass exclusion limits for the BSM vector resonances with the direct couplings to the third quark generation [electronic] In: The European Physical Journal C [print, electronic] : Particles and Fields. ISSN 1434-6052 (online). Roč. 80, č. 2 (2020), s. [1-21] [print, online].
[3]	KAJANOVÁ, Martina – BRACINÍK, Peter – ROCH, Marek: Utilization of Finite State Machine Approach for Smart Region Modelling, In: Electrical Engineering, Archiv für Elektrotechnik, Vol. 102, Iss. 1, 2020, ISSN 0948-7921.
[4]	SOVICKA, Pavel – RAFAJDUS, Pavol – VAVRUS, Vladimir: Switched Reluctance Motor Drive with Low speed performance improvement, In: Electrical Engineering, Archiv für Elektrotechnik, Vol. 102, Iss. 1, 2020, ISSN 0948-7921.
[5]	SUMEGA, Martin – RAFAJDUS, Pavol – ŠTULRAJTER, Marek: Current Harmonics Controller for Reduction of Acoustic Noise, Vibrations and Torque Ripple Caused by Cogging Torque in PM Motors under FOC Operation, In: MDPI Energies, Vol. 13, No. 10, ISSN: 1996-1073.
[6]	BORIK, Štefan – LYRA, Simon – PAUL, Michael – ANTINK, Christoph Hoog – LEONHARDT, Steffen – BLAZEK, Vladimir: Photoplethysmography imaging: camera performance evaluation by means of an optoelectronic skin perfusion phantom, In: Physiological Measurement, Vol. 41, No. 5, 2020, ISSN 1361-6579. Dostupné z: doi:10.1088/1361-6579/ab87b3.

[7]	MÍŠEK, Jakub – VETERNÍK, Marcel – TONHAJZEROVÁ, Ingrid., JAKUŠOVÁ, Viera – JANOUŠEK, Ladislav – JAKUŠ, Ján: Radiofrequency electromagnetic field affects heart rate variability in rabbits, In: Physiological Research, Vol. 69, No. 4, 2020, ISSN 1802-9973. Dostupné z: doi:10.33549/physiolres.934425.
[8]	SMETANA, Milan – BEHÚŇ, Lukáš – GOMBÁRSKA, Daniela – JANOUŠEK, Ladislav: New Proposal for Inverse Algorithm Enhancing Noise Robust Eddy-Current Non-Destructive Evaluation, In: Sensors, Vol. 20, No. 19, ISSN 1424-8220. Dostupné z: doi:10.3390/s20195548.
[9]	ZUKOWSKI, Pawel – KIERCZYŃSKI, Konrad – KOLTUNOWICZ, Tomasz N. – ROGALSKI, Przemysław – SUBOCZ, Jan – KORENČIAK, Daniel: AC conductivity measurements of liquid-solid insulation of power transformers with high water content, In: Measurement: journal of the International Measurement Confederation, Vol. 165, 2020, ISSN 0263-2241, p. 1-10.
[10]	HARDOŇ, Štefan – KÚDELČÍK, Jozef – GUTTEN, Miroslav: Dielectric spectroscopy of two concentrations of magnetic nanoparticles in oil-based ferrofluid, In: Acta Physica Polonica A, Vol. 137, No. 5, ISSN 0587-4246, p. 961-963.
[11]	VOLÁK, Jozef – BAJZÍK, Jakub – JANIŠOVÁ, Silvia – KONIAR, Dušan – HARGAŠ, Libor: Real-Time Interference Artifact Suppression in Array of ToF Sensors, In: Sensors MDPI, 2020, 20, 3701, ISSN 1424-8220.
[12]	KINDL, Vladimír – ZAVREL, Martin – FRIVALDSKÝ, Michal – PAVELEK. Miroslav: Generalized Design Approach on Industrial Wireless Chargers, In: Energies 2020, 13 (11), 2697, ISSN 1996-1073.
[13]	ŠPÁNIK, Pavol – FRIVALDSKÝ, Michal – ADAMEC, Juraj – DANKO, Matúš: Battery Charging Procedure Proposal Including Regeneration of Short-Circuited and Deeply Discharged LiFePO4 Traction Batteries, In: Electronics 2020, 9(6), 929, ISSN 2079-9292.
[14]	FRIVALDSKÝ, Michal – KAŠČÁK, Slavomír – MORGOŠ, Ján – PRAŽENICA, Michal: From Non-Modular to Modular Concept of Bidirectional Buck/Boost Converter for Microgrid Applications, In: Energies 2020, 13, 3287, ISSN 1996-1073.
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[16]	FRIVALDSKÝ, Michal – PAVELEK, Miroslav – ŠPÁNIK, PAVOL: Multilevel simulation of the influence of magnetic shield geometric alternatives on the quality factor of the wireless power transfer coils, In: Electrical Engineering - Archiv für Elektrotechnik, SPRINGER, Vol. 102, Issue 1, 2020, pp. 85-96, ISSN 0948-7921, ISSN(e) 1432-0487.
[17]	FRIVALDSKÝ, Michal – PRÍDALA, Michal – ŠPÁNIK, Pavol: Study of LCCT converter topology for the use within modular architecture of power supply, In: Electrical Engineering - Archiv für Elektrotechnik, SPRINGER, Vol. 102, Issue 1, 2020, pp. 141-156, ISSN 0948-7921, ISSN(e) 1432-0487.
[18]	FRIVALDSKÝ, Michal – JAROŠ, Viliam – ŠPÁNIK, Pavol – PAVELEK, Miroslav: Control system proposal for detection of optimal operational point of series–series compensated wireless power transfer system, In: Electrical Engineering - Archiv für Elektrotechnik, SPRINGER, Vol. 102, Issue 3, 2020, pp. 1423-1432, ISSN 0948-7921, ISSN(e) 1432-0487.
[19]	FRIVALDSKÝ, Michal – ŠEDO, Jozef – PIPÍŠKA, Michal – DANKO, Matúš: Design of measuring and evaluation unit for multi-cell traction battery system of industrial AGV, In: Electrical Engineering - Archiv für Elektrotechnik, SPRINGER, Vol. 102, Issue 3, 2020, pp. 1579-1591, ISSN 0948-7921, ISSN(e) 1432-0487.
[20]	JOŠKOVÁ, Marta – DURDÍK, Peter – ŠÚTOVSKÁ, Martina – GRENDÁR, Marian – KONIAR, Dušan – HARGAŠ, Libor – BÁNOVČIN, Peter – FRAŇOVÁ, Soňa: Negative impact of anesthesia with midazolam, sufentanil, and propofol used in pediatric flexible bronchoscopy on the tracheal ciliary

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[41]	KÚDELČÍK, Jozef – HARDOŇ, Štefan – BURY, Peter – TIMKO, Milan – KOPČANSKÝ, Peter – MITRÓOVÁ, Zuzana: Acoustic spectroscopy of functionalized carbon nanotubes in magnetic fluid [electronic]. In: Journal of Magnetism and Magnetic Materials [print, electronic]. ISSN 0304-8853. Roč. 502 (2020), s. [1-5] [print, online].
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[43]	PAPÁN, Jozef - SEGEČ, Pavel - YEREMENKO, Oleksandra - BRÍDOVÁ, Ivana - ZUZEITDEK; HODOŇ, Michal: Enhanced multicast repair fast reroute mechanism for smart sensors IoT and network infrastructure. In: Sensors. Bazilej (Švajčiarsko): Multidisciplinary Digital Publishing Institute. ISSN 1424-3210. ISSN (online) 1424-8220. Roč. 20, č. 12 (2020), s. [1-27] [online] [tlačená forma]

Patents, Utility Models, Designs, Trade Marks

Submitted patents in 2020:

[1]	Application number: 39-2020 Authors: Medvecký Štefan, Hajdučík Adrián, Babušiak Branko, Klarák Jaromír, Madaj Rudolf Title: Steering wheel monitoring the driver's vital functions
[2]	Application number: PP 65-2019

	Authors: Praženica Michal, Kaščák Slavomír, Resutík Patrik Title: Hardware protection of modular inverter systems
[3]	Application number: PP 67-2019 Authors: Praženica Michal, Kaščák Slavomír, Jarabicová Miriam Title: Connection for bidirectional current measurement
[4]	Application number: PP163-2019 Authors: Praženica Michal, Kaščák Slavomír Title: Complementary mode connection of multiphase bidirectional DC / DC converter control
[5]	Application number: PP 164-2019 Authors: Praženica Michal, Kaščák Slavomír Title: Connection for the power flow control of the traction drive
[6]	Application number: PP166-2019 Authors: Praženica Michal, Kaščák Slavomír Title: Connection for the direct mode control of a multiphase bidirectional DC/ DC converter
[7]	Application number: PP 72-2020 Authors: Praženica Michal, Pavelek Miroslav, Frivaldský Michal Title: Chamber for irradiation of biological samples with electromagnetic radiation
[8]	Application number: PP 139-2020 Date of publication of the application: 16.12.2020 Authors: Hruboš Marián, Nemec Dušan, Pirník Rastislav, Janota Aleš, Tichý Tomáš, Bubeníková Emília Title: Emergency telematics support equipment
[9]	Application number: PP 114-2020 Date of publication of the application: 21.10.2020 Authors: Hruboš Marián, Pirník Rastislav, Nemec Dušan, Gregor Michal, Bujňák Marek Title: Equipment for measuring critical environmental parameters
[10]	Application number: PP 71-2020 Date of publication of the application: 25. 6. 2020 Authors: Gregor Michal, Hruboš Marián, Janota Aleš, Nemec Dušan Authors: Intelligent audiovisual interface of a flexible robot
[11]	Application number: 30-2020 Authors: Hudec Róbert, Matuška Slavomír, Radilová Martina, Šinko Martin, Sýkora Peter, Kamencay Patrik, Benčo Miroslav Title: Advanced IoT meteostation
[12]	Application number: 103-2020 Authors: Hudec Róbert, Matuška Slavomír, Radilová Martina, Šinko Martin, Sýkora Peter, Kamencay Patrik, Benčo Miroslav Title: Title: Device for measurement of air quality
[13]	Application number: 54-2020 Autor: Adamec Bohumil Title: Multiobvodový mikrovlnový filter s koaxiálnymi rezonátormi v paralelnom usporiadaní

Submitted industrial designes in 2020:

[1]	Application number: PUV 119-2020 Date of publication of the application: 25. 6. 2020 Authors: Gregor Michal, Hruboš Marián, Janota Aleš, Nemec Dušan Title: Intelligent audiovisual interface of a flexible robot
[2]	Application number: PUV 229-2020

	Date of publication of the application: 16.12.2020 Authors: Hruboš Marián, Nemec Dušan, Pirník Rastislav, Janota Aleš, Tichý Tomáš, Bubeníková Emília Title: Emergency telematics support equipment
[3]	Application number: PP 180-2020 Date of publication of the application: 21.10.2020 Authors: Hruboš Marián, Pirník Rastislav, Nemec Dušan, Gregor Michal, Bujňák Marek Title: Equipment for measuring critical environmental parameters
[4]	Application number: 56-2020 Authors: Medvecký Štefan, Hajdučík Adrián, Babušiak Branko, Klarák Jaromír, Madaj Rudolf Title: Steering wheel monitoring the driver's vital functions
[5]	Application number: PUV 67-2020 Authors: Praženica Michal, Hock Ondrej, Šedo Jozef, Danko Matúš Title: Robotic arm linkage controlled by movements
[6]	Application number: PUV 121-2020 Authors: Praženica Michal, Pavelek Miroslav, Frivaldský Michal Title: Device for reconfigurable electromagnetic shielding of wireless power transmission
[7]	Application number: 44-2020 Authors: Hudec Róbert, Matuška Slavomír, Radilová Martina, Šinko Martin, Sýkora Peter, Kamencay Patrik, Benčo Miroslav Title: Advanced IoT meteostation
[8]	Application number: 163-2020 Authors: Hudec Róbert, Matuška Slavomír, Radilová Martina, Šinko Martin, Sýkora Peter, Kamencay Patrik, Benčo Miroslav Title: Device for measurement of air quality

Granted patents in 2020:

[1]	Application number: US10615737B1 Authors: Pácha Matěj, Zigmund Branislav, Vasquez Goyarzu Carlos, Martin Bode Hubert, Varecha Patrik, Zuczek Bretislav Title: System and method of estimating temperature of a power switch of a power converter without a dedicated sensor
[2]	Application number: PP 4-2018 Authors: Praženica Michal, Dobrucký Branislav, Kaščák Slavomír Title: Connection for alternating power transmission of a hybrid electric vehicle
[3]	Application number: PP 58-2018 Authors: Praženica Michal, Frivaldský Michal, Pavelek Miroslav, Hanko Branislav Title: Interleaved step-up converter with high gain, coupled inductors and magnetic flux reset
[4]	Application number: PP 82-2018 Authors: Praženica Michal, Kaščák Slavomír Title: Connection for common current measurement of the interleaved converter
[5]	Application number: PP 83-2018 Authors: Praženica Michal, Kaščák Slavomír Title: Connection for phase current measurements of the interleaved converter
[6]	Application number: PP 84-2018 Authors: Praženica Michal, Kaščák Slavomír Title: Connection for switched current measurement by a differential amplifier on virtual ground

[7]	Application number: PP 85-2018 Authors: Praženica Michal, Kaščák Slavomír Title: Connection for switched current measurement by a differential amplifier on common ground
[8]	Application number: PP 86-2018 Authors: Praženica Michal, Kaščák Slavomír Title: Connection for current measurement by current measuring amplifier on virtual ground
[9]	Application number: PP 87-2018 Authors: Praženica Michal, Kaščák Slavomír, Pipiška Michal Title: Connection for current measurement by current measuring amplifier on common ground
[10]	Application number: PP 89-2018 Authors: Koňarik Roman, Šedo Jozef Title: Connection of modified current phase shift control by switched capacitor
[11]	Application number: PP 91-2018 Authors: Koňarik Roman, Dobrucký Branislav, Šedo Jozef Title: Connection for controlling the phase shift of current by a switched capacitor
[12]	Application number: PP 92-2018 Authors: Praženica Michal, Kaščák Slavomír, Koňarik Roman Title: Connection of two-phase electric motor controlled on the common current
[13]	Application number: PP 93-2018 Authors: Koňarik Roman, Dobrucký Branislav Title: Connection of two-phase electric motor by using switched capacitor
[14]	Application number: PP 94-2018 Authors: Praženica Michal, Kaščák Slavomír Title: Single-leg matrix converter control
[15]	Application number: PP 137-2018 Authors: Praženica Michal, Dobrucký Branislav, Kaščák Slavomír Title: Modified alternating power transmission connection of hybrid electric vehicle
[16]	Application number: PP 18-2019 Authors: Praženica Michal, Kaščák Slavomír, Dobrucký Branislav Title: Traction transmission connection with current cycloconverter and multiphase motors
[17]	Application number: PP 19-2019 Authors: Praženica Michal, Kaščák Slavomír, Koňarik Roman Title: Connection of a two-phase drive with a switched capacitor in an open loop
[18]	Application number: 168-2019 Authors: Kúdelčík Jozef, Hardoň Štefan, Černobila František Title: Device for the measurement of the parameters of ultrasound waves in liquid dielectrics
[19]	Application number:15-2020 Authors: Martinček Ivan, Káčik, Daniel, Goraus Matej Title: Optical element for water-repellent camera endoscopic module
[20]	Application number: 86-2019 Dátum zverejnenia prihlášky: 03.03.2020 Dátum sprístupnenia verejnosti: 15.07.2020 Authors: Babušiak Branko, Borik Štefan Title: Wireless temperature and humidity sensor
[21]	Application number: 50-2019 Authors: Borik Štefan, Babušiak Branko, Hikel Milan Title: Impedance analyser

[22]	Application number: 88-2019 Authors: Veľas Andrej, Boroš Martin, Kučera Matej Title: Wiring for reliability testing of alarm transmission systems

Granted industrial designes in 2020:

[1]	Application number: PUV 212-2018, UV. 8639 Authors: Praženica Michal, Jaroš Viliam, Frivaldský Michal, Drgoňa Peter, Pipiška Michal Title: Wireless power transmission connection using the efficiency correction
[2]	Application number: PUV 13-2019, UV. 8741 Authors: Praženica Michal, Kaščák Slavomír, Resutík Patrik, Kellner Jakub Title: Connection of modified traction battery disconnector / connector with current fuse
[3]	Application number: PUV 14-2019, UV. 8748 Authors: Praženica Michal, Kaščák Slavomír, Čuboň Peter, Frivaldský Michal Title: Connection of traction battery disconecter / conecter
[4]	Application number: PUV 15-2019, UV. 8742 Authors: Praženica Michal, Kaščák Slavomír, Koňarik Roman, Pavelek Miroslav Title: Wireless power transmission system connection with controlled capacity
[5]	Application number: PUV 16-2019, UV. 8773 Authors: Praženica Michal, Kaščák Slavomír, Dobrucký Branislav Title: Connection of traction transmission with current cycloconverter and multiphase motors
[6]	Application number: 18-2019, UV. 8772 Authors: Praženica Michal, Kaščák Slavomír, Koňarik Roman Title: Connection of a two-phase drive with a switched capacitor in an open loop
[7]	Application number: PUV 81-2019, UV. 8820 Authors: Praženica Michal, Kaščák Slavomír, Jarabicová Miriam Title: Connection for bidirectional current measurement
[8]	Application number: PUV 51-2019, UV 8849 Authors: Praženica Michal, Koniar Dušan, Hargaš Libor, Taraba Michal Title: Connection of microscope illumination system with color LEDs and intelligent control
[9]	Application number: PUV 52-2019 Authors: Praženica Michal, Koniar Dušan, Hargaš Libor, Taraba Michal Title: Connection of stroboscopic illumination system of the microscope using the high-power LEDs
[10]	Application number: PUV 79-2019, UV 8931 Authors: Praženica Michal, Kaščák Slavomír, Resutík Patrik Title: Hardware protection of modular inverter systems
[11]	Application number: PUV 53-2019, UV 8862 Authors: Praženica Michal, Kaščák Slavomír, Koňarik Roman, Šedo Jozef Title: Connection of an intelligent illumination system for a fluorescence microscope
[12]	Application number: PUV 14-2020 Authors: Koniar Dušan, Hargaš Libor, Šindler Peter, Bulava Jaroslav, Praženica Michal Title: Connection for diagnostics of rotating objects using a camera with a low scanning frequency
[13]	Application number: PUV 16-2020 Authors: Koniar Dušan, Hargaš Libor, Šindler Peter, Jablončík František, Praženica Michal Title: Connection for contactless measurement of microscopic object parameters in offline mode
[14]	Application number: PUV 78-2020 Authors: Praženica Michal, Kaščák Slavomír

	Title: Universal protection circuit connection of multiphase inverter
[15]	Application number: PUV 120-2020 Authors: Praženica Michal, Pavelek Miroslav, Frivaldský Michal Title: Device for wireless transmission testing of power with positioning
[16]	Application number: PUV 68-2020 Authors: Praženica Michal, Koniar Dušan, Hargaš Libor, Pavelek Miroslav Title: Stage heating connection of inversion microscope

Awards

- Maroš Šmondrk, Štefan Borik, Tadeáš Bednár: 3rd place – best projects in the category of young scientists within the pilot call of the UNIZA Grant system, Project name: HealthCube;
- Peter Hockicko: ISER Excellent Paper Award for the paper entitled "Increasing of the knowledge using video and video-analysis of motions by program Tracker" for the category Best Presentation/ Best Content at the ISER International Conference held in Saint Petersburg, Russian Federation on 09th – 10th January 2020;
- Daniel Káčik: Acknowledgement for Referee work for Elsevier;
- Michaela Holá: Commemorative letter from the mayor of Liptovský Mikuláš.

Habilitations and Inaugurations

Tab. 13: Number of habitations and inaugurations within last twelve years

Year	Habilitation		Inauguration	
	Internal	External	Internal	External
2008	2	5		3
2009			1	1
2010			2	
2011	3		2	
2012	5			
2013	2			1
2014	6	1	3	
2015			2	
2016	2		1	
2017	1		1	
2018	2		2	
2019	1		1	
2020	6			

FOREIGN ACTIVITIES

Foreign activities at the Faculty of Electrical Engineering and Information Technology in 2020 were unfavourably affected by the pandemic situation caused by the coronavirus COVID-19. In particular, activities related to the realization of international projects summarized in the previous section, mutual mobility of teachers, researchers and students at foreign institutions were developed. Active participation in foreign scientific and professional events was weakened.

The Faculty successfully participates in the "Double degree program" in the study field "Electrical Engineering" for the study programs "Power Electronic Systems" and "Electric Drives" with the partner University of Catania in Sicily, Italy. Four students from the partner university studied at FEEIT already for the second semester and another students were accepted.

Dean's office gets information from various agencies and institutions about offered study stays, government scholarships, summer schools, excursions, work offers, foundations and so on. The information is effectively disseminated using modern communication means to the faculty staff as well as to the students.

Programmes supporting educational activities

Program ERASMUS+

Within the frame of Erasmus+ programme, bilateral agreements with 67 foreign universities were approved for students / teachers / other staff exchanges for the academic year 2019/2020, as follows:

1. TU Wien (AT)
2. Todor Kableshkov Higher School of Transport (BG)
3. University of Telecommunications and Post (BG)
4. "NikolaVaptsarov" Naval Academy (BG)
5. University of Hradec Králové (CZ)
6. University of West Bohemia (CZ)
7. Czech Technical University in Prague (CZ)
8. VŠB-Technical University in Ostrava (CZ)
9. Technical University of Liberec (CZ)
10. Brno University of Technology (CZ)
11. Silesian University in Opava (CZ)
12. Tomas Bata University in Zlín (CZ)
13. University of Central Lancashire (CY)
14. RWTH Aachen (DE)
15. TU Dresden (DE)
16. Hochschule für Technik und Wirtschaft Dresden (DE)
17. Hochschule fuer Telekommunikation Leipzig (DE)
18. RUHR Bochum (DE)
19. University of Applied Sciences Aschaffenburg (DE)
20. Technische Universität Ilmenau (DE)
21. Deggendorf Institute of Technology - Technische Hochschule Deggendorf (DE)
22. Universitat Autonoma de Barcelona (ES)
23. Tampere University of Technology (FIN)
24. Tampere University of Applied Sciences (FIN)
25. University of Jyväskylä (FIN)

26. Aalto University (FIN)
27. University of Vaasa (FIN)
28. Lappeenranta University of Technology (FIN)
29. Télécom SudParis (FR)
30. Télécom Ecole de Management (FR)
31. Université de Picardie "JulesVerne" (FR)
32. Université de Technologie de Compiègne (FR)
33. Polytech Orléans (FR)
34. Lille 1 University Science and Technology, Polytech Lille (FR)
35. Ecole d'ingénieurs ECE Paris (FR)
36. Pole Universitaire Leonard De Vinci (FR)
37. University of Patras (GR)
38. University of Zagreb (HR)
39. Budapest University of Technology and Economics (HU)
40. University of Catania (IT)
41. Universita degli Studi di Palermo (IT)
42. Dublin Institute of Technology (IRL)
43. Transport and Telecommunication Institute (LV)
44. Riga Technical University (LV)
45. Kaunas University of Technology (LT)
46. Universidade da Beira Interior (PT)
47. Universidade de Lisboa (PT)
48. Universidade do Porto (PT)
49. Polytechnic Institute od Beja (PT)
50. Kazimierz Pulaski University of Technology and Humanities in Radom (PL)
51. Lublin University of Technology (PL)
52. Silesian University of Technology (PL)
53. West Pomeranian University of Technology (PL)
54. Gdansk University of Technology (PL)
55. Uniwersitet Technologiczno Przyrodniczy w Bydgoszczy (PL)
56. Warsaw University of Technology (PL)
57. Gdynia Maritime University (PL)
58. Wroclaw University of Science and Technology (PL)
59. Transilvania University of Brasov (RO)
60. Universitatea Technica din Cluj-Napoca (RO)
61. Universitatea "POLITEHNICA" din Bucuresti (RO)
62. University of Maribor (SI)
63. University of Strathclyde (UK)
64. Uludağ University (TR)
65. Istanbul Arel University (TR)
66. Biruni University (TR)
67. Karabuk University (TR)

Erasmus+ stays

In the academic year 2019/2020 20 students (thence 10 students for Erasmus+ practical placement) and 16 teachers from FEEIT participated in the Erasmus+ programme.

The Faculty accepted 24 students and 11 teachers from partner universities.

Other scholarship programmes

In the academic year 2019/2020, the following mobilities were relized:

- one student from FEEIT studied at the University of Oxford Centre for Clinical Magnetic, UK within the National Scholarship Programme of the Slovak Republic,
- one student at the NTT Basic Research Laboratories, Japan within the program VULCANUS in Japan;
- one student studied at the Universidad Technologica de la Habana José Antonío Echeverría, Cuba within the scholarship basen on the cooperation with the Ministries of Education of the Slovak Republic and Cuba,
- one student took place at the Ramboll UK Ltd., UK within the project Horizon 2020 – SENSIBLE (RISE).

The Faculty accepted in the academic year 2019/2020:

- one student from Moscow Power Engineering Institute, Russia within the scholarship of the President of the Russian Federation,
- one student from the Southoural State University, Russia within the scholarship provided by the Ministry of Education, Youth and Sports of the Slovak Republic,
- two students from the National University of Kaohsiung, Taiwan within the Student exchange agreement between UNIZA and the National University of Kaohsiung, Taiwan,
- two students - Freemovers from the Btno University of technology, Czech Republic.

Other activities

The Faculty of Electrical Engineering cooperates in the frame of bilateral agreements with the following institutions:

- Ryazan State Radio Engineering University (RU),
- Universita degli Studi di Catania (IT),
- Tohoku University, School of Engineering (JP),
- Fakulta dopravní ČVUT Praha (CZ),
- Univerzita Pardubice (CZ),
- ELTODO EG, a. s., Praha (CZ),
- ELTODO dopravní systémy s. r. o., Praha (CZ),
- Výzkumný ústav železničný, a. s., Praha (CZ),
- VÚKV, a. s., Praha (CZ),
- Technický a zkušební ústav stavební Praha, s. p. (CZ),
- Fraunhofer IWU Chemnitz (DE),
- University of Strathclyde (UK),
- Agencia Estatal Consejo Superior de Investigaciones Cientificas (ES),
- University of Novi Sad (RS),
- Ramboll UK Ltd. (UK),
- PanonIT (RS),
- Universityu of Sydney (AU),
- Tongji University (CN),
- MC Gill University (CA),
- Simon Fraser University (CA),
- York University (CA).

Purpose of these agreements is to enhance academic exchange and co-operation in the field of education and research. The co-operation programme involves especially the following activities:

- exchange of students,
- exchange of faculty members and staff,
- exchange of scientific materials, publications and information,
- joint research and research meetings,
- cooperation within the Doctoral study (mainly with University of Catania (IT)).

In addition, FEEIT cooperates with many other international institutions, in particular:

- University of Strathclyde, Glasgow (UK),
- National Research Council, Ottawa (CA),
- Technische Universitaet Ilmenau, Faculty of Computer Science and Automation (DE),
- Moscow Technical University of Communications and Informatics (RU),
- Moscow Power Engineering Institute (RU),
- Budapest University of Technology and Economics (HU),
- Tokyo University, Tokio (JP),
- Tohoku University, Sendai (JP),
- Silesian University of Technology (PL),
- Politechnika Lubelska, Faculty of Electrical Engineering and Informatics (PL).

A detailed list of institutions is presented in the annual reports of departments.

Foreign stays, visits and conferences

Employees and doctoral students of the Faculty performed in 2020 several short or long stays in foreign countries at partner universities or institutions, and on the contrary, FEEIT and its departments accepted students and teachers from abroad. Compared to previous years, e.g. in 2019, when the Faculty accepted 36 and sent 75 employees, the year 2020 was much weaker in this respect, which was caused by the situation caused by COVID-19.

Picture of mobility at FEEIT within foreign stays, conferences and visits can be seen in the following table. The data are summarized according to countries and departments.

The table contains also long stays of employees and doctoral students abroad, and long stay visits of foreign participants at the departments of FEEIT.

Employees of the FEEI published and/or took part in many international conferences, workshops and symposiums. Detailed information about particular names of employees, titles of papers and conferences, activities performed during the study stays and purposes of foreign visits are presented in annual reports of the departments of FEEIT for 2020.

Tab. 14: Foreign stays, conferences and visits in 2020

IN/OUT	DPh	DMAEE	DEBE	DME	DPSED	DCIS	DMICT	IAS
Czech Republic			2 / 3			0 / 2		
Italy						0 / 1		
Germany			1 / 1					

Poland		0 / 2						
Russian Federation	0 / 1							
Total	**0 / 1**	**0 / 2**	**3 / 4**			**0 / 3**		
Total all	**3 / 10**							

Membership in International Institutions/Committees

Employees of the Faculty of Electrical Engineering and Information Technology, respectively the departments as a whole, are members of many national and international institutions/organizations/committees of international journals, conferences, in scientific boards and trade committees, and so on.

Detailed information about memberships are presented in annual reports of the departments of FEEIT for 2020.

MAIN TASKS OF THE FACULTY FOR THE YEAR 2021

The development of FEEIT will be realized in accordance with the framework program of the Faculty for the period 2021-2027, which was approved by the Scientific Board of FEEIT on 15th May 2021, while in the process will be incorporated knowledge obtained from the practical implementation of the activities proposed in the framework program. The basic strategic aim is permanent developing of the Faculty as a prestigious educational and research institution with a prominent place among Slovak faculties, which has a significant international recognition in the most offered study programmes and fields of research and development.

Field of education

- preparing for new accreditation standards and the resulting accreditation in provided fields of study;
- get better feedback from students about their satisfaction with the education provided at the Faculty;
- organize a meeting of the faculty management with the academic community of the faculty once a year;
- to continue with marketing activities towards primary and secondary schools to increase students' awareness of the possibilities of studying at FEEIT;
- within the marketing activities, continue the implementation of at least one action directed towards primary schools and twenty actions directed towards secondary schools in order to inform students of schools about study possibilities at FEEIT;
- organization of two open-door actions towards secondary school students;
- in the context of improving the cooperation with secondary schools, to offer individual visits of secondary school students to the Faculty in the form of specialized laboratory exercises.

Field of science and research

- active participation in the organization of conferences/seminars/events;
- in accordance with plans to realize the qualification growth of faculty members;
- organization and promotion of Student Scientific Competitions for all three study degrees and to focus attention on the possibility of participation of the faculty students at the organized national and international students' competitions;
- monitoring and at least twice a year evaluation of accreditation criteria;

- evaluation of the submitted project proposals to national and international funding agencies twice a year;
- improve the cooperation with industrial partners and other institutions;
- define areas of relevant scientific and research activities at the Faculty, including the staff;
- monitoring and control of scientific research activities and related outputs;
- Preparaton of grant calls for young researchers and other FEIT researchers.

Field of international cooperation

- development of tools for more efficient engagement of research groups in the EU Framework Programme for Research and Innovation HORIZON 2020 and other European programs as COST, cross-border cooperation and cooperation with foreign industrial partners;
- improve the propagation and support of students' and teachers' mobility within the framework of the internationalization of education in order to increase the quality and number of mobilities;
- create conditions for more effective international cooperation in terms of accreditation standards;
- attractiveness of the faculty's educational system for international students;
- more prominent presentation of study opportunities in Eastern European countries.

Contacts and Address

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