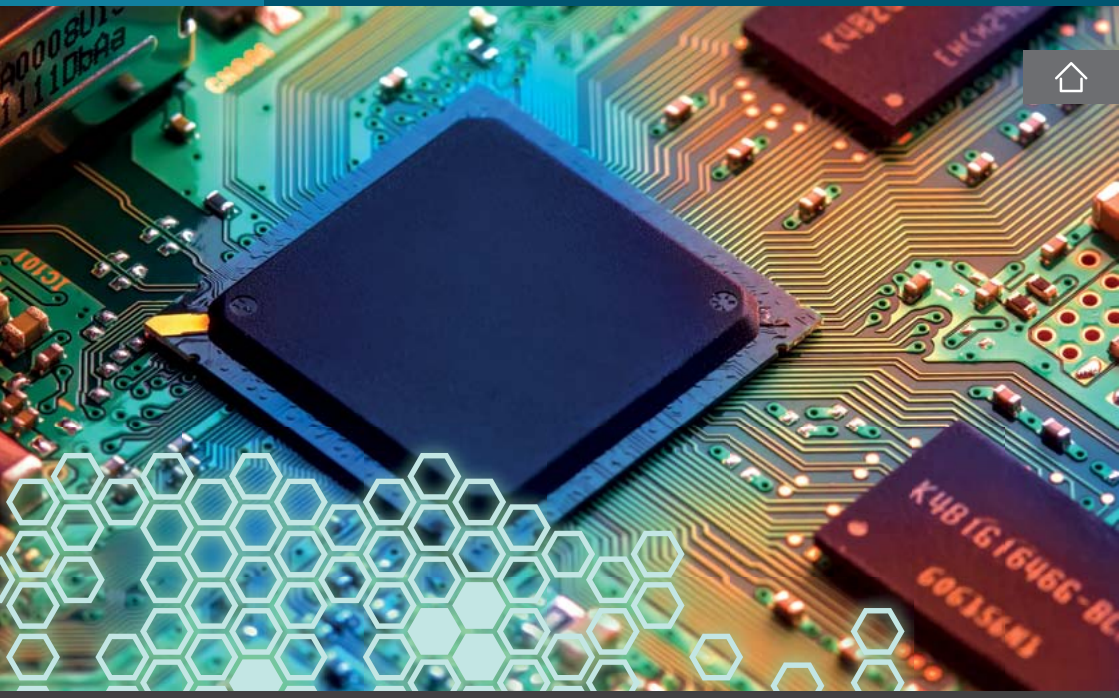
University of Žilina
FACULTY OF ELECTRICAL ENGINEERING



Annual Report 2014

Faculty of Electrical Engineering

University of Žilina

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2015

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ŽILINSKÁ UNIVERZITA
ELEKTROTECHNICKÁ FAKULTA
UNIVERSITY OF ŽILINA

Faculty of Electrical Engineering

Foreword

The Faculty of Electrical Engineering 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.

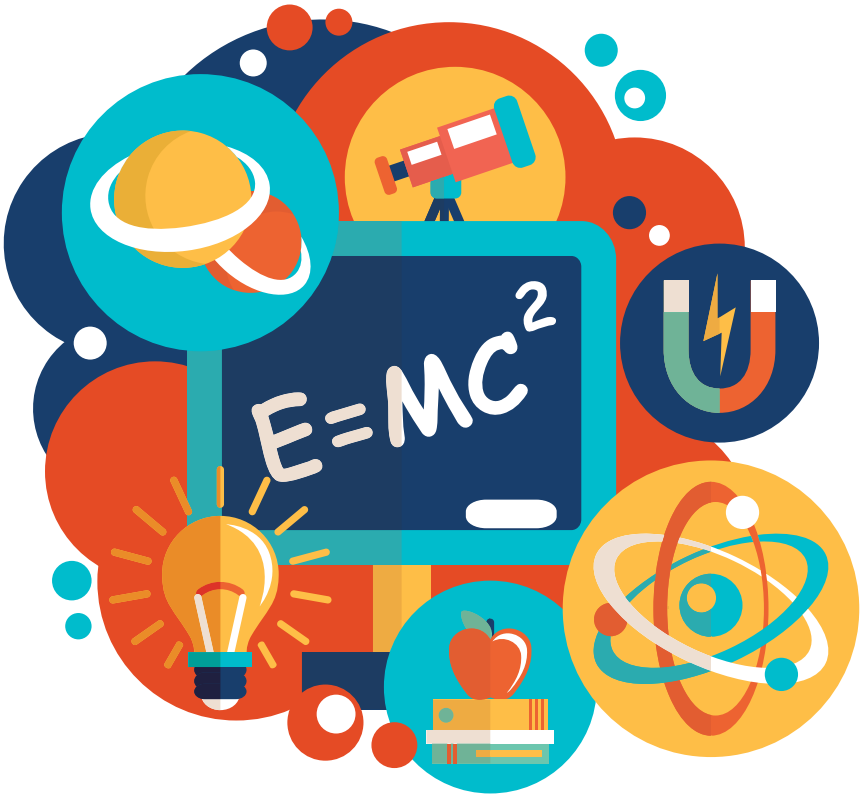
Nowadays, the University of Žilina consists of 7 Faculties (important dates of their establishing and/or transformation are indicated in parentheses):

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 (1953; 1992)
Faculty of Mechanical Engineering (1953; 1992)
Faculty of Operation and Economics of Transport (1953)
Faculty of Civil Engineering (1990)
Faculty of Management Science and Informatics (1996), the former Faculty of Management Science (1990)
Faculty of Security Engineering (2014), the former Faculty of Special Engineering (1998), transformed from the former Military Faculty (1952)
Faculty of Humanities (2010), transformed from the former Faculty of Natural Science (1998)

In addition to the Faculties, the University also involves the following 15 Institutes:

- Institute of Physical Education,
- Institute of Continuing Education,
- The Institute of Foreign Languages,
- Institute of Information and Communication Technologies,
- Institute of Forensic Engineering of the University of Žilina,
- CETRA – Centre for Transportation Research,
- University Library,
- Editorial Centre of University of Žilina,
- Flight Training Organization – Air School of the Univ. of Žilina,
- National Training Centre of Security in Civil Aviation,
- Institute of Competitiveness and Innovations,
- Centre for Further Education of Teachers,
- Science Park of the University of Žilina,
- Research Centre of the University of Žilina,
- Institute of High Mountain Biology.


E=MC²

Profile and structure of the Faculty of Electrical Engineering

As mentioned above, history of the Faculty of Electrical Engineering 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. It 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 occurred (2007; 2010, and 2013).

Structure of the Faculty

From a structure point of view, the Faculty of Electrical Engineering (FEE) 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 following table 1 shows the distribution of the pedagogical and the research positions at particular FEE's departments as of 31.12.2014.

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

The FEE'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 Electrical Systems (DPES)
Department of Control and Information Systems (DCIS)
Department of Telecommunications and Multimedia (DTM)
Institute of Aurel Stodola situated in Liptovský Mikuláš (IAS)

Tab. 1: Number of pedagogical and research employees at the departments of the FEE as of 31.12.2014

Department	Pedagogical staff		Research staff	
	Full-time	Part-time	Full-time	Part-time
DPh	13	-	3	1
DMAEE	10	-	-	-
DEBE	10	1	1	-
DME	13	4	3	1
DPES	15	1	1	2
DCIS	13	2	-	1
DTM	24	1	5	-
IAS	10	-	-	1
Total	**108**	**9**	**13**	**6**

Highlights

The most important events in 2014 can be summarized as follows:

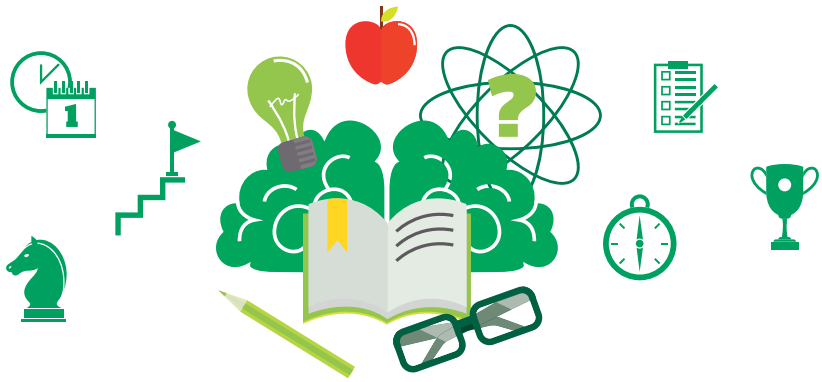
- successful negotiation phase and signature of the Grant Agreement of the 7th Framework Programme project under the pilot call FP7-ERAChairs-Pilot-Call-2013;
- implementation of the ERAdiate project and realization of the selection process for "ERA Chair Holder" position;
- submission of four project proposals within respective calls of the EU framework programme for research and innovations HORIZONT 2020, three proposals in the role of coordinator;
- completion of all required materials and documents for the complex accreditation 2014;
- preparation of three new study programmes, Autotronics in bachelor degree study, Telematics and Photonics in master degree study, within the complex accreditation 2014;
- in the area of personal policy, continuing graduation growth of the faculty staff - 5 new associate professors and 3 new full professors were appointed and two new procedures for full professors are open;
- important hardware and software upgrading of research and teaching facilities at the FEE financed from the faculty resources and from the Structural funds;
- successful realization of numerous national and international research projects (APVV, VEGA, KEGA, 7.RP, ERASMUS, EUREKA, COST);
- the 7th position between the Slovak technically oriented faculties based on the assessments made by the Academic Rating and Ranking Agency (ARRA) (2014:7, 2013:4, 2012:4, 2011:5, 2010:7, 2009:13, 2008:17);
- organization or co-organization of several scientific events, e.g. ELEKTRO 2014, CPEE 2014, ADEPT 2014, 22nd international symposium ŽEL2014, ALER 2014, APCOM 2014, DESAM 2014, 9th International particle Physics Masterclasses 2014;

Tab. 2: Number of employees at the FEE according to the categories 2008-2014

	2008		2009		2010		2011		2012		2013		2014	
	FT	PT	FT	PT	FT	PT	FT	PT	FT	PT	FT	PT	FT	PT
Prof.	15	-	15	-	16	-	17	1	17	2	18	-	18	-
Guest Prof.	-	1	-	1	-	1	-	1	-	1	-	1	-	2
Assoc. Prof.	31	-	31	-	28	-	28	-	25	1	28	1	36	1
Senior Lecturer	51	18	56	8	57	13	58	8	55	6	54	6	49	6
Lector	1	1	1	-	1	1	1	2	2	-	3	-	5	-
Tech. Admin. Staff	38	1	37	1	38	1	37	1	32	1	32	3	31	3
Research Staff	11	8	17	9	20	5	22	2	26	3	21	5	16	6
Total	147	29	157	19	160	21	163	15	157	14	156	16	155	18

FT - Full Time, PT - Part Time

- successful re-certification of quality management system according to ISO 9001 for activities: education, research and development, services and activities for public;
- enhanced cooperation between the departments and industrial partners and high schools in preparing and increasing quality of graduates, enrolment into national project "Universities as drivers for society development".



Educational activities

The evaluation of teaching quality and the main goals of educational activities

- The FEE regularly (annually) prepares and offers to the faculty students' anonymous inquiries realized in electronic form within e-learning system asking for feedback on quality of educational process and teachers. However, despite the co-operation with a Student Association there is still relatively small interest of students in filling in the inquiries and evaluating the educational quality. Therefore, in selected courses, the old paper-form inquiry system has been kept too. On the basis of processing of the questionnaires results, the heads of departments in the presence of competent teachers have carried out an evaluation of the teaching quality and defined next progress for the improvement of teaching in complex annual evaluation of the staff.
- The FEE has been a holder of the Quality Certificate for quality control system according to STN ISO 9001 since June 2003. The Certificate evaluates all processes at the faculty, mainly the education. It was renewed in 2010 and again on the 30th of September 2013. The certification body has confirmed that FEE has built a quality management system in educational and research activities, and services and activities to the public in accordance with the requirements of standard STN EN 9001: 2009. The validity of the certificate is until the 4th of October 2016.
- The courses in social sciences, psychology, economics and law are offered to the students in all study programs at Bachelor and Master degree study.
- The FEE 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).
- Considerable attention is paid to students of the 3rd degree study. The FEE supports them mainly in preparing a quality publication outputs, fulfilment of curricula, defending the dissertation thesis, therefore conditions of Doctoral study and partially curricula were modified (after approval by the Scientific Council of the FEE). Between 2012 and 2013, within the framework of the project in the EU operational program Education, lectures and consultations were held with Doctoral student at the FEE with 17 professors from the world's top universities and research institutes.
- Since 2004 the FEE has used complex software system for supporting e-learning, which enables access into e-learning blocks, test and examination, organizational provision of study. The FEE claims from pedagogical staff active usage of e-learning system and at the same time

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					
Control Engineering	Control Engineering	FT	3 years	Bc.	Franeková
Biomedical Engineering	Biomedical Engineering	FT	3 years	Bc.	Čáp
Electrical Engineering	Electrical Engineering	FT	3 years	Bc.	Altus
Telecommunications	Digital Technologies	FT	3 years	Bc.	Müllerová
Telecommunications	Digital Technologies	PT	3 years	Bc.	Műllerová
Telecommunications	Multimedia Technologies	FT	3 years	Bc.	Vaculík
Telecommunications	Telecommunications	FT	3 years	Bc.	Tichá
2nd study degree					
Control Engineering	Process Control	FT	2 years	Ing.	Spalek
Biomedical Engineering	Biomedical Engineering	FT	2 years	Ing.	Čáp
Electrical Engineering	Electric Power Systems	FT	2 years	Ing.	Altus
Electrical Engineering	Electrical Power Systems	PT	2 years	Ing.	Altus
Electrical Engineering	Electrical Drives	FT	2 years	Ing.	Pokorný
Electrical Engineering	Power Electronic Systems	FT	2 years	Ing.	Špánik
Telecommunications	Multimedia Engineering	FT	2 years	Ing.	Wieser
Telecommunications	Telecomm. and Radio-comm. Eng.	FT	2 years	Ing.	Dado
3rd study degree					
Control Engineering	Process Control	FT	3 years	PhD.	Rástočný
Control Engineering	Process Control	PT	5 years	PhD.	Rástočný
Electric power systems	Electric power systems	FT	3 years	PhD.	Pokorný
Electric power systems	Electric power systems	PT	5 years	PhD.	Pokorný
Electrotechnologies and Materials	Electrotechnologies and Materials	FT	3 years	PhD.	Bury
Electrotechnologies and Materials	Electrotechnologies and Materials	PT	5 years	PhD.	Bury
Power Electrical Engineering	Power Electrical Engineering	FT	3 years	PhD.	Špánik
Power Electrical Engineering	Power Electrical Engineering	PT	5 years	PhD.	Špánik
Telecommunications	Telecommunications	FT	3 years	PhD.	Dado
Telecommunications	Telecommunications	PT	5 years	PhD.	Dado
Theory of Electrical Engineering	Theory of Electrical Engineering	FT	3 years	PhD.	Čápová
Theory of Electrical Engineering	Theory of Electrical Engineering	PT	5 years	PhD.	Čápová

FT - Full Time, PT - Part Time

it makes conditions for e-learning development.

- The FEE participates in a student mobility system. Number of outgoing students is currently higher than number of incoming students.
- The FEE supports the development of interdisciplinary, multidisciplinary, distance and lifelong learning; and education of foreign languages mainly by young employees and Doctoral students.
- Since 1994 the FEE has had the credit system for Bachelor and Master study degrees. Since 2005 it has had the credit study system for all study degrees at the FEE. 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. According to the Regulations of the Ministry of Education of the Slovak Republic, the faculty came in the academic year 2008/2009 to the evaluation system of students load during the semester without "pre-credits".
- At the FEE there is a contact person responsible for help and life coordination of disabled students.
- The FEE has elaborated a system for provision of courses with suitable study literature (textbooks, lecture notes), for creation of e-books and e-materials, and for providing courses with quality teaching staff.
- The FEE has elaborated practises and principles of recognition of study results achieved by study mobility at other higher education institutions. These principles are oriented so as to promote interest and mobility for students and not to create an excessive burden and possible delays in the study.

Tab.4: Overview of the faculty students' number since 2009 (as of 31.10.2014)

Full-time study					
2009	2010	2011	2012	2013	2014
1st study degree					
1106	1198	1171	1118	1037	864
2nd study degree					
433	406	426	477	507	428
3rd study degree					
67	73	76	71	59	58

Part-time study					
2009	2010	2011	2012	2013	2014
1st study degree					
26	52	49	48	47	
2nd study degree					
	23	23			31
3rd study degree					
24	19	29	22	20	15

Tab.5: Number of the faculty students in academic year 2014/2015 (as of 31.10.2014)

Field of study/Study program	Number of students			
	Full-time study		Part-time study	
	Nationals	Foreigners	Nationals	Foreigners
1st study degree				
Control Engineering	102			
Biomedical Engineering	111	1		
Electrical Engineering	273	8		
Digital Technologies	77			
Multimedia Technologies	114			
Telecommunications	177	1		
Total	**854**	**10**		
2nd study degree				
Biomedical Engineering	51			
Electric power systems	59	4	31	
Electrical Drives	24	2		
Multimedia Engineering	54	1		
Process Control	58	1		
Telecomm. and Radio-comm. Eng.	115	1		
Power Electronic Systems	58			
Total	**419**	**9**	**31**	
3rd study degree				
Electrical Engineering	7		3	
Electrotechnologies and Materials	7			
Process Control	6		1	
Power Electrical Engineering	18		6	
Telecommunications	13	1	4	
Theory of Electrical Engineering	6		1	
Total	**57**	**1**	**15**	

- The FEE has elaborated practises of active propagation of offered study programs at selected grammar-schools and secondary schools. Traditionally in the beginning of the calendar year in the year 2014 it was on February 7, the FEE regularly organizes so called "Open Door Day at the FEE". Other instruments promoting the study are significantly upgraded (in collaboration with students) materials on the faculty website and on the social network.
- The FEE supports realization of pedagogical training, especially for young and

new teachers of the University of Žilina and Doctoral students.

- Excellent results of the employees and students of the faculty are continuously published on the faculty website.
- The FEE publishes for students and graduates job offers from companies (including the faculty web site) and organizes company presentations at the faculty premises.
- The FEE within the frame of the Alumni Club (KAP EF) helps graduates to integrate into the work process and maintain contact with them.

Admission for study

a) Form of the admission procedure in 2014 and a brief assessment:

Admission to the Faculty of Electrical Engineering is based on a selection process according to the Law about Universities No. 131/2002. When selecting and admitting new students for the 1st study degree, the main emphasis is paid to the type of graduated secondary school and results achieved during study, including results from the leaving examinations. Graduates of secondary grammar schools and secondary electro-technically oriented industrial schools with average results from mathematics and physics at the year-end and/or school-leaving certificates up to 2.00 are accepted without entrance examination. The others, i.e. the graduates of other types of secondary vocational schools and the graduates of secondary grammar schools and secondary electro-technically oriented industrial schools with average results above 2.00 have to go through the selection process according to the order list created based on marks from mathematics and physics taking into account a type of secondary school.

Selection process for the 2nd study degree is based on results of previous Bachelor study of an applicant. Those applicants who completed the Bachelor degree with honours, or reached the weighted average up to 2.00 including are accepted without the selection process. The other applicants are accepted according to a ranking list established on the basis of weighted averages for the whole Bachelor study.

Selection procedure for the 3rd study degree takes the form of a personal interview with each applicant separately in front of an admission committee. One part of the interview is focused on finding the outline 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 secret voting.

b) Faculty activities that promote learning:

The FEE motivates talented students for independent and creative activities in forms of student scientific technical competition (ŠVOS) and by participating in solving of research projects and projects associated with development of pedagogical and research activities of departments.

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

Tab.6: Statistical review of the admission procedure in 2014

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	93	86	57			
Biomedical Engineering	84	78	50			
Digital Technologies	38	35	23			
Electrical Engineering	232	205	136			
Multimedia Technologies	83	66	58			
Telecommunications	152	140	80			
Total	**682**	**610**	**404**			
2nd study degree						
Biomedical Engineering	21	21	19			
Electric power systems	47	46	35	31	31	31
Electrical Drives						
Multimedia Engineering	40	40	30			
Process Control	35	35	32			
Telecomm. and Radio-comm. Eng.	53	53	46			
Power Electronic Systems	46	46	38			
Total	**242**	**241**	**200**	**31**	**31**	**31**
3rd study degree						
Electrical Engineering	3	2	2			
Electrotechnologies and Materials	2	2	2			
Process Control	3	2	0			
Power Electrical Engineering	6	6	6	1	1	1
Telecommunications	9	6	6			
Theory of Electrical Engineering	3	3	3	1	1	1
Total	**26**	**21**	**19**	**2**	**2**	**2**

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

Tab.7: Number of graduates of the faculty in the academic year 2013/14

Field of study/Study program	Number of graduates			
	Full-time study		Part-time study	
	Nationals	Foreigners	Nationals	Foreigners
1st study degree				
Control Engineering	25			
Biomedical Engineering	19			
Digital Technologies	16			
Electrical Engineering	70	8	47	
Multimedia Technologies	28			
Telecommunications	42			
Total	**200**	**8**	**47**	
2nd study degree				
Biomedical Engineering	26			
Electric power systems	25			
Electrical Drives	12			
Multimedia Engineering	37			
Process Control	50			
Telecomm. and Radio-comm. Eng.	59			
Power Electronic Systems	24			
Total	**233**			
3rd study degree				
Electrical Engineering	2		1	
Electrotechnologies and Materials				
Process Control	3		4	
Power Electrical Engineering	4			
Telecommunications	4		2	
Theory of Electrical Engineering	1			
Total	**14**		**7**	

Tab.8: Overview of the faculty graduates' since 2009 (as of 31.12.2014)

Full-time study				
2009/10	2010/11	2011/12	2012/13	2013/14
1st study degree				
232	239	264	246	208
2nd study degree				
218	184	173	194	233
3rd study degree				
15	11	26	17	14

Part-time study				
2009/10	2010/11	2011/12	2012/13	2013/14
1st study degree				
26				47
2nd study degree				
		23		
3rd study degree				
9	1	2	2	7

Graduate employment

Bachelor study programmes

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 also has practical experience in application of safety critical control and communication systems performed mainly based on PLC and industrial networks. He/she will operate successfully 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.

Biomedical 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 equipments under the 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 operate successfully as an expert in medical and biological laboratories, in

the operation of biomedical technique, in business and service organisations.

Electrical engineering

The graduate will acquire knowledge from the subjects of the 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 equipments in compliance with international standards. He/she will successfully operate 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.

Digital technologies

The graduate will acquire knowledge from the basic disciples of the field oriented to general professional knowledge in the area of digital technologies, electronics, optoelectronics, communication systems, networks and services, transmission media to be connected with obtaining practical experience in the field of digital technologies, mainly information processing, transmission and communication systems. He/she will gain experience and skills in the field of digital system operation. Apart from that, he/she will acquire basic legal, economic and managerial knowledge to be utilised in the field of digital system services, digital security and language skills including specific terms. The graduate will operate successfully as a technician, technologist or manager of technician team, administrator of digital devices and systems.

Multimedia technologies

The graduate will acquire knowledge in collection, processing and presentation of digital signal at an adequate technical, aesthetical, ethical and art level. 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.

Telecommunications

The graduate will acquire necessary theoretical and specific knowledge, information on technologies and methods from the field of transmission and processing of all information types, on the structure and operation of respective equipment and systems of fixed and mobile networks. He/she has knowledge in information technology utilisation in the given field, as well as knowledge in economics, management, psychology and legal regulations. He/she may successfully operate in companies focused on the area of communication and information technologies as an executive and managing employee.

Master study programmes

Biomedical 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 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 operate 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.

Electric power systems and electrical drives

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 command 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.

Power electronic systems

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 ener-

Tab.9: 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				
264	258	131	34	4
Master thesis				
240	237	127	22	12
Dissertation thesis				
22	22	15		

getic 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 the project, produce and apply power electronic and/or mechatronic systems and industrial automation. They may successfully operate also in specialised machinery companies working in the fields of automobile industry, chemical and petrochemical industry, gas industry, paper mill and transportation.

Process control

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 for the study programme Process Control specialise 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, safety critical production applications, intelligent buildings, security systems for personal and property protection, security of information systems and modern computer networks.

Telecommunication and radiocommunication engineering

The education is focused on the topic of telecommunication and information networks with aspect 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 operate 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.

Multimedia engineering

The student of the Multimedia Engineering study programme in the telecommunications 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 mandatorily optional subjects he/she may more closely specialise in the field of processing image, graphic or audio information. A significant element of knowledge is knowledge 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 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 student 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.

Students' awards

a) National, international level

- Student of Master study, Bc. Peter Kajan, was awarded a honourable mention at the annual meeting of IT SUMMIT 2014 in competition Engineering price for a Master thesis entitled: Facial Motion Capture;
- Doctoral student Ing. Daniel Benedikovič - Best Student Poster - 11th International Conference on Group IV Photonics Paris, France;
- Student of the 3rd year Bachelor study of the study programme Control Engineering, Miroslav Pivovarský, was placed on the 3rd place in section S1 - Theory and application of systems management at the 19th international competition STOČ 2014 (Student creative and professional activities) organized at the VŠB Ostrava;
- Student of the 2nd year Master study of the study programme Control Engineering, Bc. Tomáš Juščák, was placed on the 1st place in section S3 - Computer control with the support of PLC and SCADA/HMI at the 19th international competition STOČ 2014 (Student creative and professional activities) organized at the VŠB Ostrava;
- STOČ works of students Miroslav Pivovarský and Tom Juščák were also awarded by the Section of scientific and technical literature and computer programs of Literary Fund of the Slovak Republic. Along with them, STOČ work of Bc. Miroslav Jakab, a student of the 2nd year Master study, was awarded;
- Doctoral student Ing. Juraj Koscelník won the price for the best student contribution to the conference – IEEE - IECON 2014 –29.10. – 1.11. 2014, Dallas, TX, USA;
- Doctoral student Ing. Adrián Peniak won the 1st place at the 18th International Student Conference on Electrical Engineering at Faculty of Electrical Engineering, CTU Prague, POSTER 2014 on May 15, 2014. Title of work: Optimization of Switched Reluctance Motor Design Procedure for Electrical Vehicles;
- Ing. Miroslav Kováč, PhD. won the 2nd place in the category Raw materials, energy, health and environment in the 2nd round of the Competition for the best doctoral thesis defended in the year 2013 within universities in the consortium PROGRESS 3 (FP7), which was held 28. 2. 2014 at VŠB-TU Ostrava. Theme: Autonomous Control of 22 kV Electrical Power Distribution Network;
- Ing. Miroslav Dubovský, PhD. won the Aurela Stodola price for doctoral thesis titled Power quality in distribution system.

b) Award of students within university

Student scientific technical competition (ŠVOS) – FEE, 2014, placing of students:

1st place:

- Miroslav Pivovarský, DCIS
- Bc. Miroslav Jakab, DCIS
- Bc. Tomáš Juščák, DCIS
- Ing. Adrián Peniak, DPES

2nd place:

- Václav Králík, IAS
- Bc. Marta Masárová, DEBE
- Ing. Slavomír Matúška, DTM
- Ing. Marián Hruboš, DCIS

3rd place:

- Michal Vician, DME
- Michal Kasala, Pavel Sovička, DPES
- Bc. Milan Diko, DPES
- Ing. Tomáš Fedor, DPES

Support for students in 2014

a) Scholarships (motivation, faculty)

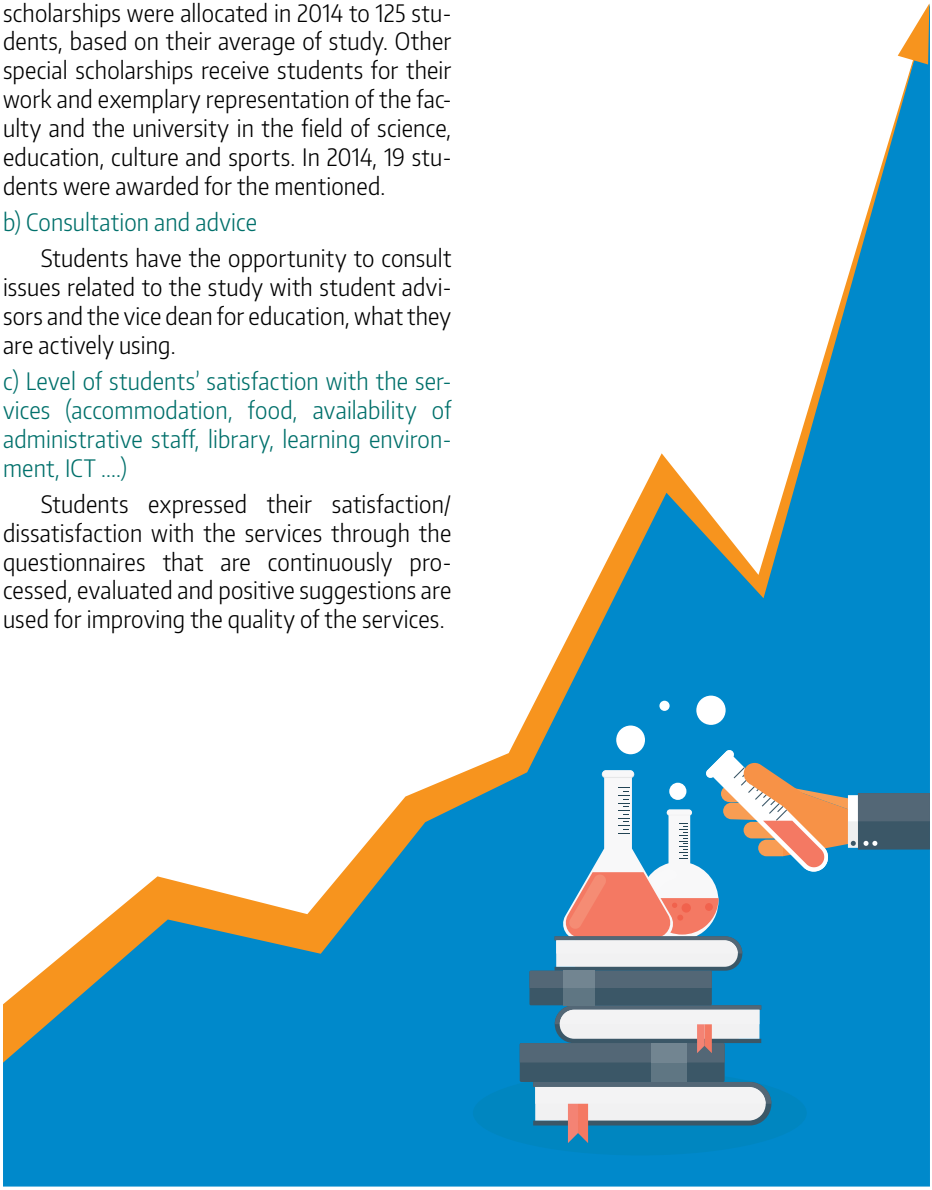
For excellent study results the faculty provides the scholarships to students. These scholarships were allocated in 2014 to 125 students, based on their average of study. Other special scholarships receive students for their work and exemplary representation of the faculty and the university in the field of science, education, culture and sports. In 2014, 19 students were awarded for the mentioned.

b) 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.

c) 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, evaluated and positive suggestions are used for improving the quality of the services.



Scientific research activities

In addition to education, the scientific research activity is 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 research activities are at the FEE 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 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, 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, 42 projects financed from national sources, 22 projects of Structural Funds and 2 other national projects have been realized at the FEE in 2014. 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

7th Framework Programme projects

7RP CSA, No. 621386, Acronym: ERAdiate

Summary:	The ERAdiate project is aimed at unlocking and strengthening the research potential and promoting excellence of the University of Zilina (UNIZA) as well as of the Zilina region in the field of Intelligent Transport Systems (ITS). Systematic development of human resources, effective exploitation of unique research infrastructures and advanced transformations of the institution steered towards enhanced competitiveness in the European Research Area (ERA) are the key instruments to reach the ERAdiate goals. The project focuses on sustainable development of human resources and key competences under leadership of an experienced scientist and manager, an ERA Chair Holder, and his/her team. Major challenges such as creating competitive environment, increasing of critical mass of excellent researchers, significant improvement of the UNIZA performance in competitive research funding, implementation of the ERA culture, contribution to growth and jobs based on the SMART specialization strategies, are addressed.
Realization:	07/2014 – 07/2019
Coordinator:	Milan Dado (DTM)

EUREKA projects

E! 6752 R&D For Integrated Artificial Intelligent System For Detecting The Wildlife Migration "DETECTGAME"

Summary:	Integrated artificial intelligent system for detecting the wildlife migration that will utilise video surveillance technology with computer vision technology, that will provide gov. structural and eco. organisations with accurate data about wildlife migration for optimising road network.
Realization:	09/2013 - 06/2016
Coordinator:	Róbert Hudec (DTM)

COST projects

Action TD1001: Novel and Reliable Optical Fibre Sensor Systems for Future Security and Safety Applications (OFSeSa)

Summary:	Optical fibre sensors offer finite solution for monitoring of extreme parameters associated with safety and safety applications. While advantages of these sensors are well known, there is the whole list of problems which need to be addressed.
Realization:	11/2010 - 11/2014
National delegate:	Daniel Káčik (DPh)

Action IC 1003: European Network on Quality of Experience in Multimedia Systems and Services (QUALINET)

Summary:	The goal of this Action is to establish a strong network on Quality of Experience (QoE) with participation from both academia and industry. Its main objective will be to develop and to promote methodologies to subjectively and objectively measure the impact in terms of quality of future multimedia products and services. This network will leverage on QoMEX, an already established international conference on Quality of Multimedia Experience. Observing that there are currently no European networks focusing on the concept of QoE, this Action also aims at bringing a substantial scientific impact on fragmented efforts carried out in this field, by coordinating the research under the catalytic COST umbrella, and at setting up a European network of experts facilitating transfer of technology and know-how to industry, coordination in standardization, and certification of products and services.
Realization:	11/2010 – 11/2014
National delegate:	Peter Počta (DTM)

Action IC 1106: Integrating Biometrics and Forensics for the Digital Age

Summary:	Goal of the Action is networking of European institutions focused on research of process for biometrics and forensics analysis with utilization of new progressive analysis technologies and processing of multimodal data. DTM research team is oriented in research of algorithms for persons identification and recognition their emotive status from acoustic data. They are also focused on detection and recognition of specific audio events from digital content.
Realization:	03/2013 – 03/2016
National delegate:	Roman Jarina (DTM)

Action IC 1304: Autonomous Control for a Reliable Internet of Services (ACROSS)

Summary:	Currently, we are witnessing a paradigm shift from the traditional information-oriented Internet into an Internet of Services (IoS). This transition opens up virtually unbounded possibilities for creating and deploying new services. Eventually, the ICT landscape will migrate into a global system where new services are essentially large-scale service chains, combining and integrating the functionality of (possibly huge) numbers of other services offered by third parties, including cloud services. At the same time, as our modern society is becoming more and more dependent on ICT, these developments raise the need for effective means to ensure quality and reliability of the services running in such a complex environment. Motivated by this, the aim of this Action is to create a European network of experts, from both academia and industry, aiming at the development of autonomous control methods and algorithms for a reliable and quality-aware IoS
Realization:	11/2013 – 11/2017
National delegate:	Peter Počta (DTM)

Action TU 1302: Satellite Positioning Performance Assessment for Road Transport (SaPPART)

Summary:	Global Navigation Satellite Systems (GNSS) have a significant potential in the development of ITS and mobility services, expected to deliver many benefits including reducing congestion, increasing capacity and improving safety. The road sector is estimated to rep-

	resent more than 50% of the GNSS market and 75% when we consider the mobility services on smartphones. However, the current lack of a pan-European certification process underpinned by agreed standards is impeding the realisation of the expected benefits. The main reason for this is the complexity of defining and assessing GNSS performance which is highly influenced by the environment and operational scenario. Although standardisation activities have been initiated in Europe on this topic, many scientific issues are still open and require a common agreement. This Action brings together experts in GNSS, ITS and mobility to address the open issues and guarantee the success of the standardisation for underpinning certification initiatives. The Action will provide 4 deliverables and will propose a unified framework for definition and assessment of performance for the GNSS-based positioning terminals. This framework is expected to pave the way for certified terminals, which is expected to result in a significantly accelerated use of GNSS-based ITS and mobility applications.
Realization:	11/2013 – 11/2017
National delegate:	Peter Brída (DTM)

TEMPUS Projects

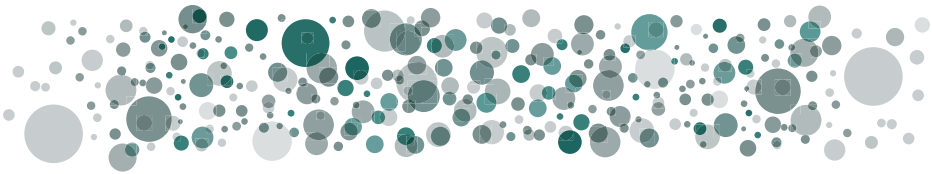
530632-TEMPUS-1-2012-1-SE-TEMPUS-JPCR: EU-EG-JO Joint Master Programme in Intelligent Transport Systems

Summary:	The project focuses on establishing a new study programme and equipment of ITS laboratories on target universities in Egypt and Jordan. The project will enable to organise a joint conference on the ITS area, realise a mutual exchange of students and teachers and deepen the bonds between universities and business.
Realization:	11/2012 – 10/2015
Coordinator:	Ghazwan Al-Haji, Linköping University, Finland
Subcoordinator from FEE:	Aleš Janota (DCIS)

ERASMUS projects

Erasmus+: Strategic Partnership: Early identification of STEM readiness and targeted academic interventions (readySTEMgo): grant Decision number: 2014-BE02-KA200-000462

Summary:	Goal is to identify causes of the first year university STEM (Science-Technology-Engineering-Mathematics) students drop-out and search for ways to help improve the current state.
Realization:	10/2014 – 09/2017
National coordinator:	Peter Hockicko (DPh)



International Scientific and Technological Co-operation Projects (MVTS)

RSF 14-49-00079: New methods and algorithms of combined signal and image processing with unknown parameters in promising radars and communication systems

Summary:	The project solves the issue at the Moscow Energy Institute at the National Research University within the Department of Radio Equipment and Antenna systems
Realization:	10/2014 – 12/2017
Co-operator:	Branislav Dobrucký (DME)

Other international projects

Visegrad/V4EaP Scholarship 51400321: The application of laser technology to shape properties and structure of the front side metallization of photovoltaic cells

Summary:	The aim of project is to use selective laser sintering to improve the quality of the metallization of the front contact on silicon substrates for photovoltaic cells. This method is expected to obtain a structure without micro-cracks and to improve its electrical properties contributing to the increased efficiency of the photovoltaic cell. The specific objectives of the project are aimed at forming metallized parts, the contact adhesion and substrate morphology.
Realization:	09/2014 – 07/2015
Researcher:	Malgorzata Musztyfaga-Staszuk, the Silesian University of Technology, Gliwice, Poland
Supervisor:	Jarmila Müllerová (IAS)

02-1-1097-2010/2015: Study of spin effects in few nucleon systems

Summary:	The project aim is to study the spin structure of the deuteron and three nucleon systems at short distances by measuring the polarization observables of reactions induced by deuterons at intermediate energies. The reason for such research is the lack of experimental data which aren't in good agreement with the theoretical calculations. Energy and angular distributions of the polarization observables can give us information about two and three nucleon correlations and effects associated with non-nucleonic degrees of freedom.
Realization:	03/2013 – 12/2015
Coordinator:	Marián Janek (DPh)

1/2013: Safety appraisal of track interlocking device VEAH-11

Summary:	Agreement of research activity cooperation between the companies SignalBau a.s., Přerov (CR) and University of Žilina in Žilina. The goal is to appraise the delivered documentation for VEAH-11 track interlocking system with defined interfaces to joint interlocking devices and elaboration of safety appraisal report of the VEAH-11.
Realization:	11/2013 – 08/2014
Coordinator:	Karol Rástočný (DCIS)

Z-14-101/0001-1404 00: ChemLog T&T Tracking and Tracing - Chemical Logistic Cooperation in Central and Eastern Europe

Summary:	Design and verification of system for monitoring of intermodal transport of dangerous goods in CEE within the project Nr. 4CE492P2 Chemical Logistic Cooperation in Central and Eastern Europe - ChemLog T&T - Tracking and Tracing solutions for improvement of intermodal transport of dangerous goods in CEE. The financial support has been provided by the Slovak chemical and pharmaceutical industry association, project Nr. 4CE492P2 ChemLog T&T, ERDF, INTERREG IV B.
Project period:	12/2013 – 12/2014
Coordinator:	Jozef Gnap (Faculty of Operation and Economics of Transport and Communications)
Co-operator:	Peter Vestenický (DCIS)

PROJECT OF EUROPEAN PHYSICAL SOCIETY INTERNATIONAL PHYSICS MASTERCLASSES 2013

Summary:	High school students spend one day with physicists of elementary particles during which they learn to evaluate real experimental data from LHC accelerator.
Realization:	annually
National coordinator:	Ivan Melo (DPh)

RRC/05/2013: Support of science and research in the Moravian-Silesian region 2013 DT 1 - International research teams

Summary:	Project goals include the development of application for telemedicine.
Realization:	01/2013 – 12/2014
Coordinator:	Marek Penhaker (Faculty of Electrical Engineering and Information Technology, VŠB-TU Ostrava)
Co-operators:	Michal Gála, Branko Babušiak (DEBE)

Projects of National Programmes

Slovak Research and Development Agency (SRDA)

APVV-0025-12: Mitigation of stochastic effects in high-bitrate all-optical networks

Summary:	The project is focused on the investigation in the area of linear and non-linear influences of the transmitted optical signals in the multichannel all-optical systems and networks. Main goal is to investigate origin of these effects and their impact on the transmission of various types of the high-order modulated optical signals and on mitigation of degradation mechanisms using switching and routing in all-optical multi-channel networks. The project has been solved in three phases. In the first phase the physical layer has been investigated considering different mainly stochastic effects. In the second phase also protocols for switching and routing in high-speed all-optical multichannel networks have been investigated. The third phase has been focused on the integration of the influences in the physical layer with the protocol design for switching and routing into one platform. It will be the main precognition for creation of the new properties of the reservation protocols which will meet basic requirements

for achieving most effective data transmission with the high-level quality of service through the nodes of the high-speed multichannel all-optical networks based on the OBS with next targeting into all-optical IP networks.
Within this project the IAS researchers cooperate with the Department of Telecommunications and Multimedia, Faculty of Electrical Engineering, University of Žilina, and the Department of Electronics and Multimedia Communications, Faculty of Electrical Engineering and Informatics, Technical University in Košice.

Realization: 10/2013 – 09/2016
Coordinator: Jarmila Müllerová (IAS)

APVV-0314-12: Research and development of new generation of power supplies based on converters with high power density, high efficiency, low EMI and circular energy

Summary: Project is focused on research and development of new generation of switched mode power supplies, which are based on LLC, LLCLC and LCTLC topology with high power density and multifunction output and with double half-bridge DC/DC converter characterized by low circulating energy and low EMI. Co-operation with Elteco.
Realization: 10/2013 – 09/2017
Coordinator: Branislav Dobrucký (DME)

APVV-395-12: Photonic structures for integrated optoelectronics

Summary: Project focuses on research and realization of active and passive elements with implemented photonic structures for integrated optoelectronics and optics. In the area of active elements the project focuses on research and realization of semiconductor LEDs and photodetectors with photonic structures. For passive elements, the project aims to the research of optical waveguides with integrated photonic structures inside the waveguide.
Realization: 10/2013-12/2016
Coordinator: Dušan Pudiš (DPh)

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

Summary: The project is focused on problem of systems for wireless energy transfer, representing progressive solution for supplying of mobile and industrial devices. Task of this project is research of major effects on efficiency of systems for wireless energy transfer, usable for realization of charging points in the area of electromobility.
Realization: 10/2013 – 09/2017
Coordinator: Pavol Špánik (DME)

APVV-0050-11: Strongly interacting matter in extreme conditions (SIMEX)

Summary: Project deals with open problems of behaviour of strongly interacting matter in extreme conditions i.e. at high temperatures and/or high densities of nuclear matter.
Realization: 07/2012 – 12/2015
Coordinator: Štefan Olejník, Institute of Physics, Slovak Academy of Sciences, Bratislava
Sub-coordinator: Ivan Melo (DPh)

APVV-0096-11: Defects role in organic semiconductors for solar cells

Summary:	The project is focused on the study of electrically active defects in organic semiconductors. Defects which act as traps and recombination states of charge carriers essentially influence the charge transport and recombination-generation mechanisms. The knowledge of the origin of defects and their control is therefore an important issue of organic electronics. The aim of the project is to obtain new knowledge on defects origin in thin films of selected organic semiconductors and its correlation with the structure and morphology of the films. This knowledge will be used in the study of the influence of intentionally introduced defects and degradation processes on the function of solar cells which will be prepared within the project. New knowledge will be obtained by the combination of standard experimental techniques suitable for electrical, optical and structural thin film characterization with transient techniques based on the charge measurement, developed by our research group.
Realization:	06/2012 – 12/2015
Coordinator:	Vojtech Nádaždy, Institute of Physics, Slovak Academy of Sciences, Bratislava
Sub-coordinator:	Jarmila Müllerová (IAS)

APVV-0888-11: Research of new passivation processes of Si-based structures

Summary:	Project is concerned with comprehensive investigation of two new, very effective passivation processes that enable to passivate surface defects and defect states of interfaces as well as volume defects in structures of the following Si-based semiconductors: crystalline Si, polycrystalline Si and a-Si:H. Investigated processes are: i) formation of ultrathin atomically high-dense SiO_2 layer (thickness of approx. 1.5 nm) on corresponding surface or at interface, and ii) passivation of structures by low-concentration solutions of HCN and KCH at low, or slightly increased temperatures. The second passivation process leads to the formation of structures or separately, applied to structures of three types of solar cells prepared on the basis of the three mentioned types of Si semiconductors, at which the relative increase of their conversion efficiency in the interval of 15 to 25 % in respect to the reference sample is expected. Next application is related to investigation of "high-k" structures of 4 nm HfO_2/1.5 nm SiO_2/Si where the interlayer is made of atomically dense layer. The atomic density of defect states will be below 5×10^{10} $eV^{-1}cm^{-2}$. Proposal of its application will be offered to a specific subject of interest in the frame of the project.
Realization:	06/2012 – 06/2015
Coordinator:	Emil Pinčík, Institute of Physics, Slovak Academy of Sciences, Bratislava
Sub-coordinator:	Jarmila Müllerová (IAS)

APVV-0138-10: Research and development of the small power drives with two-phase motors

Summary:	Development of two-phase low power electric drives concerning to home appliances and industrial low power applications.
Realization:	05/2011 – 10/2014
Coordinator:	Pavel Záskalický, Technical University of Košice
Sub-Coordinator:	Branislav Dobrucký (DME)

APVV-0349-10: Towards electromagnetic induction based methods to meet their true potential in non-destructive monitoring of conductive structures

Summary:	The project focuses on enhancing the potential of electromagnetic induction based methods in non-destructive monitoring of conductive materials. The aim is to increase rate of relevant information about an inspected structure and to effectively process the obtained information. Activities of the project are therefore oriented on research and development of new hardware and software means of non-destructive evaluation. The intention is to identify profile of a detected defect as well as its basic dimensional parameters with high preciseness and thus to decrease degree of uncertainty in evaluation.
Realization:	05/2011 – 10/2014
Coordinator:	Ladislav Janoušek (DEBE)

APVV-0703-10: Analysis and diagnostic measurements of power transformers using by sweep frequency response analysis

Summary:	The project focuses on diagnostics of power transformers using the method SFRA to determine the mechanical condition of the windings and core transformers. Application of diagnostic methods is appropriate for designation the aging of insulation system of transformers.
Realization:	05/2011 – 10/2014
Coordinator:	Ján Michalík (EVPÚ a.s. Nová Dubnica)
Co-operators:	Martin Brandt, Dagmar Faktorová (DMAEE)

SK–RO-0008-12: Resonant ultrasound spectroscopy - application for non-destructive testing of biomedical refunds

Summary:	The project aims is examine the possibilities of the use of resonant ultrasound spectroscopy for non-destructive testing of biomedical compensation and biocompatible materials
Realization:	01/2013 – 12/2014
Coordinator:	František Nový, Faculty of Mechanical Engineering, University of Žilina
Co-operator:	Dagmar Faktorová (DMAEE)

SK-RO-0011-12 Enhancing diagnosis of partially conductive cracks in eddy-current non-destructive evaluation

Summary:	The project focuses on enhancing the potential of electromagnetic induction based methods in the non-destructive diagnosis of metallic materials. The aim is to increase rate of relevant information about an inspected structure and to effectively process the obtained information for reliable diagnosis. Especially, the diagnosis of partially conductive cracks, such as stress corrosion cracking, is addressed in the project. Activities of the project are therefore oriented on research and development of novel hardware and software means for the eddy current non-destructive evaluation.
Realization:	01/2013 - 12/2014
Coordinator:	Ladislav Janoušek (DEBE)

SK-RO-0028-12: Switched reluctance machine analysis in automotive applications

Summary:	Project deals with scientific analysis of switched reluctance machines for automotive applications. It's focused on three main applications of drives for automotive, where conventional machines in motor or generator mode could be replaced, such as power steering, starter-generator, active damping. Analytic design of such machines will be introduced using modern design methods (e.g. Finite elements method). Static and dynamic elements of equivalent circuit will be designed to support the dynamic simulation model. The simulation model will represent a behaviour of such machine in real operation. Based on simulation results, a set of measurements on real machines will be established.
Realization:	01/2013 – 12/2014
Coordinator:	Pavol Rafajdus (DPES)

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

VEGA 2/0045/13: Sensitivity of liquid crystals with nanoparticles to external magnetic field

Summary:	Some processes in systems with nanoparticles are studied, in particular in magnetic fluids and magneto-optic films with significant Faraday effect. First part of the project is devoted to studies of the structure and dielectric properties, heat conduction, ageing process, partial discharges and both d.c. and a.c. hopping in new magnetic fluids based on transformer oils. The purpose is to prepare transformer oils with better dielectric and thermal properties as in the case of clean transformer oil, so they could be used as more effective cooling medium as a result of the magneto-convention. The purpose is to utilize them in various areas of high-power electronic. The second part of project is oriented towards the preparation of magneto-optical films in the form of polymeric, in magnetic field structuralized nanoparticles of various shape and to the study of their magneto-optic properties.
Realization:	01/2013 – 12/2015
Coordinator:	Peter Kopčanský, Institute of Experimental Physics, Academy of Sciences, Košice
Sub-Coordinator:	Peter Bury (DPh)

VEGA 1/0184/13: Research of indirect computing algorithms and tools for evaluation of power loss in power electronic device's component with support of physical model simulation postprocesing

Summary:	Design and verification of methodology for evaluation of power losses of individual components of power electronic device, on the basis of dynamical measurement of surface thermal field, with use of thermal camera and comparison of thermal field of physical model with dynamical injection of power into individual component of this device.
Realization:	01/2013 – 12/2015
Coordinator:	Peter Drgoňa (DME)

VEGA 1/0394/13: Research of mobile terminals localization by means of modular localization systems

Summary: At present time, many services provided by various operators need geographical position information about mobile terminals for its operation. Goal of providers is to provide these services regardless the environment around the user. This relatively difficult task is currently not feasible using one positioning system. For example, GNSS systems do not work well in indoor environment and on the other hand parameters of indoor positioning systems are not as good as GNSS parameters in outdoor environment. Goal of the project is to develop solution of localization system, which will utilize localization systems based on different wireless technologies to estimate position of mobile device. Solution should lie in proposal of modular positioning system, which will choose optimal positioning system to estimate position, based on actual conditions in the environment. Modular positioning system should consist of partial positioning systems based on GNSS, cell networks and Wi-Fi networks.

Realization: 01/2013 – 12/2015

Coordinator: Peter Brída (DTM)

VEGA 1/0624/13: Analyze of insulation state of oil distribution transformers with respect to investigation of adverse effects

Summary: The project is devoted to analysis of insulation state of oil distribution transformers with respect to investigation of adverse effects of operations and environment. The main attention is devoted to diagnostics of transformer insulation parameters. We will analyze the effect of short circuit, overvoltages, effect of environments and further operation factors for the effect on degradation insulation of transformer. Another aim will be devoted to the detailed study of the characteristics of partial discharges in transformer oil, which have direct effect on the degradation of insulating state. We will describe the process of their creation, development and impact on transformer insulation degradation. We will prepare new measurement techniques and diagnostic method for determination of the insulation state degradation of oil distribution transformers (oil, paper, bushings, winding insulation).

Realization: 01/2013 – 12/2015

Coordinator: Jozef Kúdelčík (DPh)

VEGA 1/0705/13: Image elements classification for semantic image description

Summary: The submitted scientific project deals with research of semantic image data analysis. It is extension of project "Research of algorithms for automatic multimedia analysis" (VEGA 1/0570/10). By using those information, the algorithms for semantic image-data description will be researched in submitted project. However the area of semantic image data description is huge, two basic areas were specified in this project. The first is area of intelligent transport and second area is classification of common images with specialization in animal class. The appropriate use of low-level features for the effective classification based on critical analysis for each area will be researched. The classification algorithms based on SVM (Support Vector Machine) will be proposed and optimized. For the image elements classification, the appropriate ontology and hierarchy will be proposed.

Realization: 01/2013 – 12/2015

Coordinator: Róbert Hudec (DTM)

VEGA 1/0846/13: Design and optimization of methods and materials for treatment of tumour diseases by applying electromagnetic field

Summary: The project is aimed at problem solving related to design of new approaches, methods and materials used for the treatment of tumour diseases by applying electromagnetic fields.
Realization: 01/2013 – 12/2015
Coordinator: Dagmar Faktorová (DMAEE)

VEGA 1/0853/13: Research of the microstructural, electrical and optical properties of the semiconductor/dielectric systems

Summary: In the project the influence of the microstructure of the semiconductor-dielectric system with thin oxide films onto the electrical and optical properties are solved. The sample microstructure changes during the technological operations and influences all physical properties of the structure. This is very remarkable in systems with ultrathin oxide layers. The theoretical models for the microstructure development, quantum charge states and optical properties are solved by the parallel algorithms in computer grid in connection with the experimental data.
Realization: 01/2013 – 12/2015
Coordinator: Stanislav Jurečka (IAS)

VEGA 1/0940/13: Research and development of switched reluctance machines for automotive applications

Summary: Project deals with scientific analysis of switched reluctance machines for automotive applications. It's focused on three main applications of drives for automotive, where conventional machines in motor or generator mode could be replaced, such as power steering, starter-generator, active damping. Analytic design of such machines will be introduced using modern design methods (e.g. Finite elements method). Static and dynamic elements of equivalent circuit will be designed to support the dynamic simulation model. The simulation model will represent a behaviour of such machine in real operation. Based on simulation results, a set of measurements on real machines will be established.
Realization: 01/2013 – 12/2015
Coordinator: Pavol Rafajdus (DPES)

VEGA 2/0076/12: Investigation of interaction of aqueous HCN solution with more types of Si-based structures

Summary: Project deals with interaction of 0.01M aqueous HCN solution with Si-based structures covered with ultrathin and very thin atomically high-dense SiO_2 layer. The first group of investigated semiconductors consists of c-Si, poly-Si and a-Si:H. The second one is composed of porous Si, hexagonal SiC (6H-SiC and/or 4H-SiC) and porous SiC. Investigation of properties of structures of the second group should help to explain results obtained on the first one which is more known exactly. Passivation of surfaces, interfaces and volumes of structures is dominant goal. Research should give response on more questions, e.g. which types of defect states in porous semiconductors can be passivated, how volume structural properties of a-Si:H, porous Si and porous SiC will be changed etc. The process of interaction is very important for photovoltaics. During the last phase of the project, the results will be applied on one type of MOS pn Si solar cell.
Realization: 01/2012 – 12/2014
Coordinator: Emil Pinčík, Institute of Physics, Slovak Academy of Sciences, Bratislava
Sub-Coordinator: Jarmila Müllerová (IAS)

VEGA 1/0388/12: Quantitative safety integrity appraisal of control systems for railway applications

Summary:	Safety functions and the related intensity of tolerable dangers are defined based on risk analysis as technical measures for decreasing of risk related with the particular dangers. To achieve an acceptable safety related control system it is not sufficient to state that the safety measures have been adopted, but it is necessary to approve that the adopted measures decreased the risk at least to the tolerable level. The risk beard by an individual while utilising railway transport for example, should be the same independently on current country location. The objectivisation of risk analysis and the related definition of safety requirements on control system is currently highly problematic.
Realization:	01/2012 – 12/2014
Coordinator:	Karol Rástočný (DCIS)

VEGA 1/0453/12: Study of interactions between motor vehicle, traffic flow and roadway

Summary:	The project is focused on examination of new methods for measuring dynamic properties of motor vehicle and its interaction with roadway and its surrounding based on step-monitoring. A part of the project is design of new and/or modification of existing measurement methods of chosen roadway parameters and its surrounding, design and implementation of new algorithms for experimental data processing, comparison of diverse approaches, identification of possible future applications.
Realization:	01/2012 – 12/2014
Coordinator:	Aleš Janota (DCIS)

VEGA 1/0457/12: Strongly interacting matter in nuclear collisions and compact stars

Summary:	Project deals with selected topics from physics of nuclear collisions and compact stars.
Realization:	01/2012 – 12/ 2014
Coordinator:	Boris Tomášik, Matej Bell University, Banská Bystrica
Sub-Coordinator:	Ivan Melo (DPh)

VEGA 1/0528/12: Research and development of optofluidic fibers for sensor and photonic applications

Summary:	The aim of the project is to acquire theoretical knowledge about optofluidic fibers based on optical glasses in combination with appropriate fluids and their implementation into practical application for design, preparation and characterization of this kind of fibers. The subject of the project is the design of optofluidic fiber structures composed of optical glass and fluid in order to the application in sensorial, photonic and optoelectronic application, as well as preparation and characterization of these optofluidic fibers with designed structures. Static and dynamic optical properties of optofluidic fibers will be examined in visible and near infrared region of electromagnetic spectrum. Gained knowledge will be employed for design of photonic devices based on optofluidic fiber properties, as tunable optical sensor attenuators, optical power limiters, optical fiber switches and sensors.
Realization:	01/2012 – 12/2014
Coordinator:	Ivan Martinček (DPh)

VEGA 1/0704/12: Radio resources management improvement in wireless ad hoc and mesh networks

Summary: Mobile communication networks Ad-hoc (communication among mobile nodes without infrastructure and without central control), or mesh networks (Ad hoc networks with access points connected together) are rapidly developing today. The quality of service (QoS) requirements increasing in these networks is very close connected to necessity for minimizing the mutual interference among network's nodes. One of methods how to minimize this parameter is to improve the efficiency of radio resources assignment by such a way, to ensure the fulfilment of requested transport parameters (throughput, delay, packet error rate). The project represents the graduation of finishing grant VEGA 1/0336/10 (QoS parameters enhancement in MANET and mesh networks) and is focused on development of algorithms for distributed channel selection by means of radio channel impulse response knowledge.

Realization: 01/2012 – 12/2014

Coordinator: Vladimír Wieser (DTM)

VEGA 1/0743/12: Gigacycle fatigue properties of nanostructured materials

Summary: The project is aimed at addressing the problems associated with the investigation of fatigue properties of new nanostructured materials in the process of periodic strain.

Realization: 01/2012 – 12/2014

Coordinator: Otakar Bokůvka, Faculty of Mechanical Engineering, University of Žilina

Co-operators: Dagmar Faktorová (DMAEE)

VEGA 2/1271/12: Study of the influence of the degradation effects in the physical layer of the high-speed optical networks on the transport mechanisms

Summary: The project aims at the numerical study of the transmission and the switching of optical signals and the creation of the comprehensive virtual environment for the different degradation impacts of linear and nonlinear optical phenomena in the physical layer of the optical backbone network with wavelength division multiplexing under different modulation formats in a coherent transmission system. Simulations of impairments (chromatic and polarization mode dispersion, nonlinear 2^{nd} and 3^{rd} order effects) on signal transmission are performed by computer modelling. The possible stochastic behaviour will also be taken into account. Results will be applied for the design of appropriate compensatory measures, such as the channel separation, location, payload and performance. Channel switching is modelled on a modular system of virtual optically-switched optical network with optical burst switching. Fast optical switching between channels unimpaired by wavelength-dependent degradation is numerically tested.

Realization: 01/2012 – 12/2014

Coordinator: Jarmila Müllerová (IAS)

VEGA 1/0491/14: Optoelectronical and optical devices with photonic structures

Summary: Project is focused on fabrication of photonic and optic structures for optoelectronical devices using maskless lithographic techniques. These lithographic methods and their combination with imprinting technique allow fabrication of photonic structures with period of order of few hundreds of nanometers and various optical structures. These will be patterned in the surface of optoelectronical and optical devices and in polydimethylsiloxane followed by direct application

	on light emitting diodes and waveguides. In combination with optimization of optical properties in simulation program, there is a great opportunity to develop unique optoelectronical and optical devices.
Realization:	01/2014 – 12/2017
Coordinator:	Dušan Pudiš (DPh)

VEGA 1/0794/14: Unconventional Actuators Control System Research and Development

Summary:	The research project is focused on the research and development of optimized motion control systems of rotary and linear motors as well as actuators exploiting electromagnets. The core of the project is based on the methods for optimization of actuators power components and their control systems, including the design of the corresponding sensors and if application allows then sensorless control (without controlled variables measurements). Developed intelligent motion systems will use variable structure control or forced dynamics control capable to reduce the order of control system, to achieve precise tracking of the prescribed trajectory with a defined accuracy. Speed and position control algorithms developed on the principles of motion systems parameters identification will be capable to achieve set-point for speed or position with prescribed responses.
Realization:	01/2014 – 12/2016
Coordinator:	Ján Vittek (DPES)

VEGA 1/0526/13: Modeling multilateral relations economic subjects and increasing quality of decision-making processes with the support of information and communication technologies

Summary:	The aim of the project is on the basis of research to identify, describe and with using of information and communication technologies to analyze and model the multilateral relations economic subjects at microeconomic as well as macroeconomic level in the context of the economic crisis and the current market conditions. Quality analysis of the current situation enable design of new approaches and methods, which are applicable for improving of quality of decision-making process of economic subjects with extensive support of information and communication technologies reducing risk of wrong decisions and stimulate economic and social development.
Realization:	01/2013 – 12/2015
Coordinator:	Emese Tokarčíková (Faculty of Management Science and Informatics)
Co-operator:	Ivan Litvaj (DPES)

VEGA 1/0579/14: Research of topological structures of segments of power electronic system for wireless energy transfer

Summary:	The basis of the project is optimization of the main circuit topology of power electronic converters, primarily designed to control of energy flow in wireless energy transfer systems, with anticipated application in charging stations for electric cars. It deals about systems with frequency from 500kHz to 1,5MHz at kW power range. The research will be focused on achieving the maximum efficiency of converter, and thus whole system, at required switching frequency. Baseline platform will be the analysis of properties of optimal energy transfer process, aimed on determination of the switching frequency. On the base of this platform, the research of possibilities of efficiency improvement will be realized, as well as their implementation through suitable technologies. During research of the project, verified scientific procedures, based on computer

simulations will be used, as in time domain, as well as in 3D analysis. Experimentally verified results will be used in process of further applied research.

Realization: 01/2014 – 12/2016
Coordinator: Pavol Špánik (DME)

VEGA 1/0558/14: Research of methodology for optimization of lifetime of critical components in perspective electronic appliances through the use of system level simulation.

Summary: The project fundamental is research of procedure serving for estimation and possible optimization of critical components lifetime in perspective electronic systems (photovoltaic, LED luminaries). Method is based on selection of suitable simulation instruments, by which the system of multilevel simulation can be realized. Basis of the proposal is simultaneous run of multiple simulation instruments, where each serves for individual investigation of the problem. Global result is subsequently represented as intersection of partial results. The investigation of operating condition itself (temperature, mechanical and electrical stresses, moisture, etc.), from the perspective of critical components aging (electrolytic capacitors, semiconductor devices), will be during multilevel simulation realized only by use of exact simulation models, with high degree of validity. The contribution of the project is in possible optimization of operation of electrical system, in order to increase the durability and economic return.

Realization: 01/2014 – 12/2016
Coordinator: Michal Frivaldský (DME)

VEGA 1/0165/14: Pharmacological modulation of oscillation frequency of the respiratory epithelium cilia

Summary: Mucociliary apparatus of the respiratory epithelium plays an important role in the cleansing of the respiratory tract from excessive amounts of mucus and other pathogens. Slowdown of the cilia motion leads to stagnation of phlegm in the respiratory tract, secondary infections, which require further treatment. Although there is more specialized information about the role of anti-asthmatics, expectorants and antitussives in the treatment of respiratory diseases, it is unknown how much the drug can pharmacologically affect the function of cilia in pathological conditions, in particular during respiratory tract inflammation. The results of our project would in future be applied in clinical practice in choosing the appropriate drug for the treatment of inflammatory respiratory diseases, which in addition to its primary role (bronchodilation, anti-inflammatory, antitussive and expectorant effect) also supported the defensive function of the mucociliary transport.

Realization: 01/2014 – 12/2016
Coordinator: Soňa Franňová (Jessenius Medical Faculty in Martin)
Co-operators: Miroslav Hrianka, Libor Hargaš, Dušan Koniar (DME)

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	conditions, in particular during respiratory tract inflammation. The results of our project would in future be applied in clinical practice in choosing the appropriate drug for the treatment of inflammatory respiratory diseases, which in addition to its primary role (bronchodilation, anti-inflammatory, antitussive and expectorant effect) also supported the defensive function of the mucociliary transport.
Realization:	01/2014 – 12/2016
Coordinator:	Soňa Franňová (Jessenius Medical Faculty in Martin)
Co-operators:	Miroslav Hrianka, Libor Hargaš, Dušan Koniar (DME)

VEGA 1/0485/12: Deformation characteristics, fatigue and rheology of classic, recycled and viscoelastic composite materials

Summary:	Improving the safety and quality of traffic engineering are targets for the development of road construction. Knowledge of the deformation properties and fatigue life expressed by dynamic module of elasticity and fatigue coefficients express preconditions for the building and reconstruction of quality and safe traffic engineering. The result of the solution will be exploitation of new, dynamic methods for measuring of deformation properties of asphalt mixtures. The possibility of using recycled and composite materials in the construction of the road is assumed. The aim is to enhance the safety, quality and creating of conditions for the establishment of functional tests viscoelastic materials based on asphalt binders used in road construction.
Realization:	01/2012 – 12/2014
Coordinator:	František Schlosser (Faculty of Civil Engineering)
Co-operators:	Pavol Špánik, Ondrej Hock, Peter Šindler (DME)

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

KEGA 010ŽU-4/2013: Modernisation of education technologies and methods with focus on the area of robotics

Summary:	The project aims on finishing the building of robotics laboratory by software and hardware means, which enables extension of practical knowledge in the area of robotic systems for final degrees students in the Automation branch.
Project period:	01/2013 – 12/2015
Coordinator:	Aleš Janota (DCIS)

KEGA 022ŽU-4/2013: Discovering the world of particles

Summary:	The goal is to mobilize high energy physics community in the area of outreach and informal education, to make a step towards a community formed by physicists, teachers, students and high school students. Another goal is to raise interest of the young generation in science using enquiry based learning and the creation of the web portal "The world of particles" - communication platform of the new community.
Realization:	01/2013 – 12/2015
Coordinator:	Ivan Melo (DPh)

KEGA 024 ŽU 4/2012: Modernisation of education technologies and methods with focus on the area of cryptology for safety critical applications

Summary: An inseparable part of security-oriented education is the area of secure communication including cryptography. The need of developing subjects with this scope in the Automation branch emerges from praxis requirements experiencing growth of applications demanding safety-relevant communication system (industrial applications, control systems in railway and road transport). The teachers of study programme Process control have sufficient theoretical and practical knowledge in the area of security principles which they will utilise in project for modernisation of laboratory education methods with the use of new cryptographic HW and SW means. This approach enables students to extend their theoretical knowledge and experiences by real applications of confidential and authenticated transmission and by cryptanalysis methods in standard applications. Moreover they gain skills in application of methods and tools for security evaluation of cryptographic modules in safety critical applications. It is a new perspective area of cryptography utilisation in applications with increased safety integrity level requiring knowledge transfer in the educational process using the latest e-learning technologies in Slovakia and on partner universities abroad.
Realization: 01/2012 – 12/2014
Coordinator: Mária Franeková (DCIS)

KEGA 035ŽU-4/2012: Forming of physical concepts using videoanalysis and videomeasurements with the aim to popularize physics and make it more attractive

Summary: The project is focused on the preparation of supplementary study materials for the subject physics that are intended for the grammar and high school students and could be also used for both one-term and two-term basic physics courses. By preparing video-experiments and through the realization of video-measurements we want to build in students the correct conception about processes and phenomena around us. The prepared set of video-experiments will be placed at the World Wide Web so that it will be accessible to all teachers and students at all levels of the educational process as an aid serving whether for a visual demonstration, explanation or a mathematical or a physical analysis of the given process.
Realization: 01/2012 – 12/2014
Coordinator: Peter Hockicko (DPh)

KEGA 036ŽU-4/2014 World of Waves

Summary: In 2007-2009 a permanent exhibition of interactive demonstrations of wave processes was created at the University of Žilina by members of the Department of Physics within the project APVV LPP-0098-006. On its basis it is possible to create an outreach material for students of all school levels from elementary to university. The material will include portable demonstrations, physics applets and films with selected demonstrations of wave processes. This material will be freely available and it can help raise interest of young generation in science.
Realization: 01/2014 – 12/2015
Coordinator: Norbert Tarjányi (DPh)

KEGA 030ŽU – 4/2014: The innovation of technology and education methods oriented to area of intelligent control of power distribution networks (Smart Grids)

Summary: The aim of project is to provide students with new forms and education methods, which will help

	them to build up required professional knowledge and technical skills, especially in the area of intelligent control of distribution networks. The innovated and newly created educational tools will be accessible for students from other universities (home and abroad) and public use through created interactive web page.
Realization:	01/2014 – 12/2016
Coordinator:	Juraj Altus (DPES)

KEGA 006ŽU – 4/2014: Advanced computer locomotive simulator for electric traction and railway based lectures

Summary:	The aim of project is to increase a practical education and the attractiveness of electric traction, rolling stock and rail transport fields of study for students of technical universities, as well as related disciplines for students of high schools. As shown in recent years, the practical training of students of electrical and mechanical engineering, as well as transportation engineering faces the legislative and organizational problems. Practical and interactive contact with such difficult fields of study is required, while denied to most of students. Development of advanced computer locomotive simulator we offer students this interactive, safe and access to the practical problems of railway and traction drives. The simulator will also contribute to the attractiveness of study fields, which are currently required by industry again.
Realization:	01/2014 – 12/2016
Coordinator:	Matej Pacha (DPES)

KEGA 003STU-4/2014: Advanced methods of image processing used in visual systems and their implementation to the educational process.

Summary:	Development of a new modern university textbooks and didactic tools requires innovative research in the scientific field. The effective usage of such research within the teaching process assumes a preparation on the methodology of this research in education process, creating of the modern didactic tools and teaching aids, and university textbooks. The aim of the project is research in the field of advanced image processing in visual systems and the usage of such research especially in subjects of 1st, 2nd and 3rd level of university education. The ambition of the project is to create such aids and textbooks, which can be used in several technical disciplines and study programs at Slovak universities. There is an assumption, that they will be also used in specialized secondary schools or in the professional public. The visual system as a sensory system is applied in a variety of technical areas, so this project has an interdisciplinary nature. With the development of visual systems hardware, it is needed to explore new and analyze existing image processing methods in these systems. The nature of the project presumes the employment of modern software and hardware resources into a teaching process. These resources will enable the students to better understand the possibilities of employment of visual systems in different technical areas. The content of the project is to explore advanced methods for filtering and image segmentation, identification of objects in the image, the reconstruction of 3D scenes from an image, and the detection of significant features in the image. The project will also focus on progressive trends in the visual systems, including high-speed imaging in mechatronic systems or 3D interpretation of the scene
Realization:	01/2014 – 12/2016
Coordinator:	František Duchoň
Co-operators:	Libor Hargaš, Dušan Koniar (DME)

Structural Funds

ITMS 26110230004: Systemisation of advanced technology and knowledge transfer between industrial sphere and university environment

Summary:	Strategic objective of the project is support of innovative forms of education at universities and development of human resources in research and development together with transfer of advanced technology and knowledge between the industrial sector and the university environment through conferences, seminars, workshops, excursions and foreign internships.
Realization:	05/2010 – 10/2014
Coordinator:	Milan Saga (Faculty of Mechanical Engineering)

ITMS 26220220153: Competence centre for research and development in diagnosis and therapy of carcinoma

Summary:	The project is based on cooperation of partners fulfilling their partial goals by activities: Establishment of Competence centre at the Jessenius Medical Faculty in Martin, establishment of basic research and development strategies, elaboration of diagnostic procedures related with RIMPT – Range Intensity Modulated Proton Therapy, research of advanced information processing methods acquired using gene analysis for the needs of treatment effectiveness for carcinoma diseases and their software support, elaboration of support algorithms and methods in the area of image analysis and processing, proteomic and biochemical analysis of blood and tissues of animals and patients, research and development of positional devices for patient stabilisation.
Realization:	09/2011 – 12/2014
Coordinator:	Dušan Mištuna (Jessenius Medical Faculty of the Comenius University in Martin)

ITMS 26220120028: Centre of excellence for intelligent transport systems and services I.

Summary:	The aim of the project is to create excellent research centre for R&D of systems and services of intelligent transport. Technical infrastructure will be implemented as tool for knowledge background stabilization of the new centre.
Realization:	05/2010 – 10/2014
Coordinator:	Karol Matiaško (Faculty of Management Science and Informatics)

ITMS 26220220134: Research on technologies and products for intelligent clothing and technical textiles

Summary:	This project is aimed at research of nanotechnologies and their application using low temperature plasma. Furthermore, textile human ecology and research of technologies used in the process of manufacturing intelligent textiles to transfer biomedical data are also considered.
Realization:	01/2011 – 12/2014
Coordinator:	Ján Šesták (VÚTCH-CHEMITEX, Žilina)

ITMS 26220220156: Brokerage aviation centre for technology and expertise transfer into transport and transport infrastructure

Summary:	Objective of the project is to establish competent centre of aviation technology. It will integrate research and development in field of aviation technology of particular Slovak regions. The centre will be equipped with the most modern technology. It will create assumption for joining of the partners to international research activities.
Realization:	09/2011 – 08/2014
Coordinator:	Andrej Novák (Faculty of Operation and Economics of Transport and Communications)

ITMS 26220120046: Centre of excellence of power electronics systems and materials for their components II.

Summary:	Completion and updating of workplaces of power electronic systems and materials for their components.
Realization:	09/2010 – 04/2014
Coordinator:	Pavol Špánik (DME)

ITMS 26220220078: Research of high-economic components of electric drive systems of driving traction vehicles and urban mass transportation vehicles

Summary:	Research of components of electric drive systems for electric locomotives and urban mass transportation vehicles using of latest principles, materials, circuit and construction solutions leading to primary energy savings, minimising of back influences onto supply system and emission minimising.
Realization:	09/2010 – 05/2014
Coordinators:	Martin Brandt (DMAEE), Pavol Špánik (DME)

ITMS 26110230052: Increasing the competitiveness of technical study programs reflecting the current needs of business practice

Summary:	The aim of project is the involvement of internationally recognized experts in the modernization of university educational process reflecting the needs of business practice.
Realization:	01/2012 – 05/2015
Coordinator:	Eva Tillová (Faculty of Mechanical Engineering)

ITMS 26220120050: Centre of excellence for intelligent transport systems and services II.

Summary:	The strategic objective of project is to complete the excellent centre of intelligent transport systems and services as a precondition of advancement of companies' infrastructure utilising knowledge technologies. Using of new technologies is a crucial requirement for implementation of progressive applications for current traffic problems examination. Intelligent transportation systems are sophisticated multimodal tools integrating advanced technologies and implement them in transportation with the goal to develop solutions improving quality of living.
Realization:	04/2011 – 05/2014
Coordinator:	Karol Matiaško (Faculty of Management Science and Informatics)

ITMS 26220220089: New measurement methods for physical dynamical parameters and interactions of traffic stream motor vehicles and roadway

Summary:	The objective of project is conception design and consequent realisation of proprietary laboratory mobile measurement platform intended for collection and pre-processing of sensoric and georeference data (portable and analysable within virtual reality) enabling integration and examination of distinct methods for measurement of chosen static and dynamic parameters of vehicle and roadway.
Realization:	06/2010-05/2014
Coordinator:	Aleš Janota (DCIS)

ITMS 26220220169: Transport telematic systems research centre

Summary:	Within the Activity 1.3 the establishment of telematic systems research at the University of Žilina is concerned utilising proper human resources and technical equipment within a specific goal of NFP Call „Support of existing and building of new common top-level centres of applied research and development of business/consumer sphere and academic sphere, i.e. research-development centres and also qualified activity "3." support of companies cooperation (MSP and enterprise companies) with academic sphere.
Realization:	07/2012 – 06/2015
Coordinator:	Rastislav Pirník (DCIS)

ITMS 26110230063: Human resources development with support of integrated information system for evaluation of scientific research results

Summary:	Current state analysis of evaluation of science and research results at University of Žilina. Next goal is to create new models for process evaluation.
Realization:	02/2012 – 06/2014
Coordinator:	Ján Čelko (Faculty of Civil Engineering)

ITMS 26110230107: Modern teaching methods of control and diagnostic systems of motor vehicles

Summary:	Reconciliation of the needs of the knowledge society and the labor market with higher education in automotive technology
Realization:	09/2013 – 08/2015
Coordinator:	Róbert Labuda (Faculty of Mechanical Engineering)

ITMS 26110230089: Universities as engines of knowledge society development

Summary:	Reform of educational system and professional training, modern education for a knowledge society
Realization:	05/2013 – 11/2015
Coordinator:	Helga Jančovičová (UIPŠ)

ITMS 26110230079: Innovation and internationalization of education – instruments to enhance quality of the University of Zilina in European Education Area

Summary:	The project focuses on innovations of international motilities of university teachers and students on the basis of identification of weak points of the current processes. Accordingly, new internal legislative documents, recommendations and instruments will be carried out in order to enhance the motilities and to increase competences of the teachers and students for effective engagement into mobility programmes.
Realization:	02/2013 – 06/2015
Coordinator:	Renáta Švarcová (rector's office)

ITMS 26220220184: Science park of the University of Zilina

Summary:	Aim of the project is to build up a unique excellent research infrastructure on the international level with emphasis on regional growth and development. The purpose of the science park is to increase competitiveness of Slovakia through application of innovations into praxis.
Realization:	06/2013 – 06/2015
Coordinator:	Michal Zábovský (UVP)

ITMS 26110230090: Quality educations with support of innovation forms, excellent research and international cooperation – successful graduates for needs of praxis

Summary:	Strategic aim of the project is development of quality of the University of Zilina through innovations of education and research processes in correspondence with needs of knowledge society and global labour market.
Realization:	11/2013 – 09/2015
Coordinator:	Renáta Švarcová (rector's office)

ITMS 2622020183: Research center of University of Zilina

Summary:	Building Research center of University of Zilina and improving the infrastructure of the university. Completion of the research infrastructure departments of applied R&D, build of a multipurpose building Research center as a regional center of applied research and development. Maximizing the potential of R&D and innovation culture at university through the incubator. Implementation of cutting-edge R&D in selected areas, expansion of innovation activities with the application results into practice and development of activities towards international R&D competitiveness of Slovakia by using transfer of research and innovation into practice.
Realization:	08/2013 – 07/2015
Coordinator:	Branislav Hadzima (Faculty of Mechanical Engineering)

ITMS 2621120021: Modernization of research infrastructure in the fields of electrical engineering, electrical materials and ICT

Summary:	Modernization of research infrastructure at the FEE.
Realization:	11/2012 – 2/2015
Coordinator:	Ivana Brídová (dean's office)

ITMS 22410320029: Cooperation between the University of Žilina and VSB-TU Ostrava on improving the quality of education and training of researchers in area of electrical engineering

Summary:	Developing human potential in research and innovation, in particular through post-graduate studies and training of researchers and cooperation activities of universities, research centers and businesses in the area of power quality and voltage supplied
Realization:	11/ 2012 – 04/2014
Coordinator:	Alena Otcenasova (DPES)

ITMS 26120130023: Creation of the National Qualification System

Summary:	Creating and updating cards of qualifications by Sectorial council Electrotechnics and cross-section cards of qualifications in application software the National Qualification System
Realization:	10/2014 – 10/2015
Coordinator:	Mgr. Monika Domenyova, Asseco Central Europe, a.s.

ITMS 22420320024: The creating of information portal for the improvement of cross-border area awareness to the field of intelligent network

Summary:	The goal of this project is the creation of an information portal with suitable e-content that should lead to the improvement of cross border area inhabitants understanding how renewable energy sources and intelligent networks can be used for electricity and heat generation as well as how the inhabitants can benefit from them in their education or business activities.
Realization:	09/2014 – 05/2015
Coordinator:	Peter Braciník (DPES)

Other National Projects

005ŽU-2/2013 Enhancing quality of key competences of graduates by internationalization of education based on common study programs

Summary:	The project is aimed on preparation of legislative and technical frames for providing double degree study programmes. It is focused on cooperation between the Faculty of Electrical Engineering, University of Zilina and Lappeenranta University of Technology in master and doctoral study programmes in this content. Impacts of the project realization are foreseen in increasing quality of the education process on international level and higher competitiveness of graduates at national and international labour market.
Realization:	12/2013 – 04/2015
Co-operator:	Ladislav Janoušek (DEBE)

04-KAP-EF/2014 Educational course for the Visteon Electronics Slovakia, Ltd. – Establishment Námestovo employees – basic course

Summary:	The course content was the education of Visteon Electronics Slovakia, Ltd. – Establishment Námestovo employees in fundamental electrotechnics and electronics finished by a final test.
Project period:	09/2014 – 12/2014
Coordinator:	Mária Franeková (DCIS)

Contract-based research activities for 2014

Valid from	Number of contract	Customer	Coordinator	Title
07/14	P-103-0002/14	SEPS, a.s. Bratislava	Juraj Altus (DPES)	Feasibility study of new 400kV distribution plant construction and of new transformation 400/100kV in Est Bystričany
10/14	P-103-0004/14	SEPS, a.s. Bratislava	Juraj Altus (DPES)	Possible changes in source base of the Slovak electricity supply system
11/14	P-103-0004/14	SEPS, a.s. Bratislava	Juraj Altus (DPES)	Impact of the electricity market deformation on transit flows through the Slovak high-voltage links
11/14	P-103-0004/14	SEPS, a.s. Bratislava	Juraj Altus (DPES)	Prediction of production from photovoltaic power stations in the Slovak electricity supply system

Contract-based non-research activities for 2014

Valid from	Number of contract	Customer	Coordinator	Title
05/14	P-103-0001/14	Siemens AG Wien	Karol Rástočný (DCIS)	Expertise for the system Simis W SK
09/14	P-103-0003/14	Hesia, s.r.o. Bratislava	Miroslav Gutten (DMAEE)	Transformer analysis in TR Duslo Šala
11/14	P-103-0005/14	Asbis SK s.r.o. Bratislava	Milan Dado (DTM)	Distribution of advertisement at the FEE internet page
09/14	P-103-0006/14	VUJE, a.s. Trnava	Juraj Altus (DPES)	Calculation of short/circuit ratio for the construction Sučany

Conferences and seminars

The Faculty of Electrical Engineering organized, or participated in preparation of the following scientific events in 2014:

- 10th International particle Physics Masterclasses 2014, University of Žilina, 27 March 2014. Coordinator: Gabriela Tarjányiová (DPh).
- International conference Advances in Electronics and Photonics (ADEPT) 2014, 1 – 4 June 2014, Tatranská Lomnica. Organizer: FEI STU Bratislava, co-organizer: DPh.
- 15th International Conference on Computational Problems of Electrical Engineering (CPEE 2014), 9 – 12 September 2014, Boboty Hotel, Terchová-Vrátna dolina, Slovakia. Local organizing committee: DEBE.
- Joint Research Seminar of ED&EM Department of Lublin University of Technology and DME focused on PhD Research Projects, 5th September 2014, University of Žilina. Responsible organiser: Pavol Špánik (DME).
- Real Life Experience in Power Engineering, 12th December 2014. Organizer: Matěj Pácha (DPES), IEEE / Young Professionals Program.
- Workshop on the occasion of KEGA 010ŽU-4/2013 project completion: Modernisation of education technologies and methods with focus on the area of cryptology for safety critical applications with the foreign partner from Todor Kableshkov University of Transport - TKU, 18th September 2014. Organisational board: chairperson: Mária Franeková (DCIS).
- Workshop to inform students of high schools on the project KEGA 010ŽU-4/2013: Modernisation of education technologies and methods with focus on the area of robotics 7th February 2014, UNIZA. Organisational board: chairman: Aleš Janota (DCIS).
- 10th International workshop Digital Technologies 2014, 9 – 11 July 2014, Daša Tichá (DTM).
- 10th Scientific-Expert Conference with International Participation ALER 2014 (Alternative Energy Resources), 1 – 3 October 2014, Liptovský Ján. Main organizer: Zdeněk Dostál (IAS).
- 20th International Conference on Applied Physics of Condensed Matter APCOM, 25 – 27 June 2014, Štrbské Pleso. Main organizer: Institute of Nuclear and Physical Engineering, Faculty of Electrical Engineering and Information Technology, Slovak University of Technology in Bratislava, Ján Vajda. Co-organization: IAS.
- 10th International conference ELEKTRO 2014, 19 – 20 May 2014, Rajecké Teplice. Main organizer: Pavol Rafajdus (DPES).
- 3rd International Conference DESAM 2014, 19 – 20 June 2014, Papradno – Považská Bystrica. Coordinator: Martin Brandt (DMAEE).

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.10: Publication activities at the FEE (based on registration at the University Library up to February of the relevant year)

Year	Monographs and university textbooks	Scientific works in journals	Scientific publications in Conference pub.	Patents, Utility Models	Others (Scripts, etc.)
2008	8	126 (8*)	196	0	69
2009	4	89 (11*)	231	1	29
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

* out of which indexed in Current Contents Connect database
** out of which indexed in SCOPUS/ Thomson Scientific Master Journal List database

Monographs

[1] RAFAJDUS, P.: Switched Reluctance Motor (Spínaný reluktančný motor), EDIS ŽU, Žilina, 2014, ISBN 978-80-554-0836-1, 189 pp. (in Slovak)

University Textbooks

[2] BARTŁOMIEJCZYK, Mikołaj - GUTTEN, Miroslav: Measurement of basic electrical quantities (Meranie základných elektrických veličín), VŠB - TU Ostrava, 2014, ISBN 978-80-248-3643-0, 100 pp. (in Slovak)

[3] GREGOR, Michal: Artificial Intelligence 1 (Umelá inteligencia 1), CEIT, UNIZA, 2014, ISBN 978-80-971684-1-4, 160 pp. (in Slovak)

[4] HOTTMAR, Vladimír – ADAMEC, Bohumil: Introduction to theory of electromagnetic waves propagation, antennas and radio receivers (Úvod do teórie šírenia elektromagnetických vĺn, antén a rádiových prijímačov), Žilina: EDIS, 2014, ISBN 978-80-554-0821-7, 315 pp. (in Slovak)

[5] HOCKICKO, Peter – KÚDELČÍK, Jozef: Video analysis, modelling and simulation of real processes (Videoanalýzy, modelovanie a simulácie reálnych dejov); Editor: Rafajdus Pavol. 1st edition. - Žilina : University of Žilina, 2014. - CD-ROM, ISBN 978-80-554-0961-0, 198 pp (in Slovak)

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[6] TARÁNYI, Norber - TUREK, Ivan – MARTINČEK, Ivan: Effect of mechanical stress on optical properties of plydimethylsiloxane II – Birefringence, In: Optical Materials, Vol. 37 (2014), ISSN 0925-3467, p. 798-803

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[9] TARJÁNYI, Norbert: Specially shaped negative lens produced in a lithium niobate crystal, In: Optical Engineering, Vol. 53 (5) (2014). ISSN 0091-3286, p. 057104-1-6

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[8] GINTNER, Mikuláš – JURÁŇ, Josef: Hiding the vector resonance signal, In: Communications 16 (1) (2014), ISSN 1335-4205, p. 50-54

[9] MELO, Ivan – TOMÁŠIK, Boris: Temperature and transverse expansion of fireballs in Pb+Pb collisions at the LHC, In: Communications 16 (1) (2014), ISSN 1335-4205, p. 55-58

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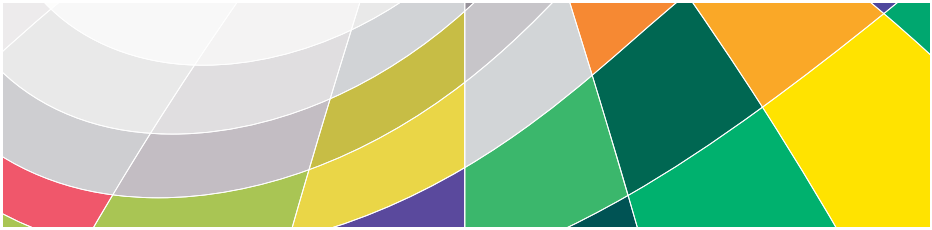

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[100] VAVRUŠ, Vladimír - DOBRUCKÝ, Branislav: Three Phase AC Cable Over-Voltages Analysis for Ultra-Deep Wells Supplying, In: 10th International Conference ELEKTRO 2014. Rajecké Teplice, Slovakia, 19-20 May, 2014, IEEE, Catalog number: CFP1448S-CDR, ISBN 978-1-4799-3720-2, p. 389-394

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[102] HARGAŠ, Libor - KONIAR, Dušan - HRIANKA, Miroslav – SIMONOVÁ, Anna - ĎURDÍK, Peter - BÁNOVČIN, Peter: Adjusting and Conditioning of High Speed Videosequences for Diagnostic Purposes in Medicine, In: 10th International Conference ELEKTRO 2014. Rajecké Teplice, Slovakia, 19-20 May, 2014, IEEE, Catalog number: CFP1448S-CDR, ISBN 978-1-4799-3720-2, p. 548-552

[103] HARGAŠ, Libor - KONIAR, Dušan - HRIANKA, Miroslav – ĎURDÍK, Peter - BÁNOVČIN, Peter: Integration of LabVIEW-based Virtual Instruments to Modern Respirology Diagnostics: In: 10th International Conference ELEKTRO 2014. Rajecké Teplice, Slovakia, 19-20 May, 2014, IEEE, Catalog number: CFP1448S-CDR, ISBN 978-1-4799-3720-2, p. 553-557

[104] FEDOR, Tomas - VITTEK, Ján, ŠINDLER, Peter: Influence of Variable Moment of Inertia in Robot Servo Motor Control, In: 10th International Conference ELEKTRO 2014. Rajecké Teplice, Slovakia, 19-20 May, 2014, IEEE, Catalog number: CFP1448S-CDR, ISBN 978-1-4799-3720-2, p. 165-169.

Patents, Utility Models, Designs, Trade Marks

[1] DRGOŇA, Peter - HANKO, Branislav: The drive system of a vehicle with switched reluctance motor and a double double-clutch gearbox, Utility Model No 6706

[2] DRGOŇA, Peter - HANKO, Branislav: The drive system of the vehicle with 3f synchronous motor and a double double-clutch gearbox, Utility Model No 6707

[3] DRGOŇA, Peter - HANKO, Branislav: The drive system of a vehicle with two 3f motors and modified double gearbox without clutches, Utility Model No 6708

[4] KONIAR, Dušan - HARGAŠ, Libor - ŠTOFAN, Stanislav - HRIANKA, Miroslav - ĎURDÍK, Peter - BÁNOVČIN, Peter: Automatic lighting system of inverted microscope for high-speed cinematography, Utility Model No. 6811

[5] FRIVALDSKÝ, Michal - DOBRUCKÝ, Branislav - ŠPÁNIK, Pavol: Bidirectional increasing boost / decreasing buck DC / DC converter with magnetically coupled coils, Utility Model No 6862

[6] PRAŽENICA, Michal - RADVAN, Roman - KAŠČÁK, Slavomír - DOBRUCKÝ, Branislav - ŠPÁNIK, Pavol: Two-way switch using inverse operation mode of MOSFET transistors, Utility Model No 6899

[7] KAŠČÁK, Slavomír - PRAŽENICA, Michal - DOBRUCKÝ, Branislav: Hardware spatial-vector PWM modulator, Utility Model No 6978

Habilitations and Inaugurations

Tab. 11: Number of habilitations and inaugurations within last seven 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	5	1	3	

Foreign activities

Foreign activities at the FEE in 2014 include realization of international projects summarized in the previous section, active participation in foreign scientific and technical forums, and mutual mobility of teachers, researchers and students at foreign institutions.

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 students.

Programmes supporting educational activities

Program LLP/ERASMUS

Within the frame of LLP/Erasmus programme 44 bilateral agreements were approved for students / teachers / other staff exchanges for the academic year 2013/2014, as follows:

1. TU Wien (AT)
2. Université de Mons (BE)
3. Todor Kableshkov Higher School of Transport (BG)
4. College of Telecommunications and Post (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. RWTH Aachen (DE)
13. TU Darmstadt (DE)
14. TU Dresden (DE)
15. Hochschule für Technik und Wirtschaft Dresden (DE)
16. TU Braunschweig (DE)
17. RUHR Bochum (DE)
18. Hochschule Mittweida (DE)
19. Universitat Autonoma de Barcelona (ES)
20. Universidad de Cantabria (ES)
21. Tampere University of Technology (FIN)
22. Aalto University (FIN)
23. University of Vaasa (FIN)
24. Lappeenranta University of Technology (FIN)
25. Universite Bordeaux I (FR)
26. Université de Picardie "JulesVerne" (FR)
27. Université de Technologie de Compiègne (FR)
28. University of Patras (GR)
29. University of Zagreb (HR)
30. Universita´degli studi di Catania (IT)
31. Transport and Telecommunication Institute (LV)
32. Kaunas University of Technology (LT)
33. Universidade da Beira Interior (PT)
34. Universidade de Lisboa (PT)
35. Universidade do Porto (PT)
36. Kazimierz Pulaski University of Technology and Humanities in Radom (PL)
37. Politechnika Lubelska (PL)
38. Politechnika Slaska (PL)
39. West Pomeranian University of Technology (PL)
40. Politechnika Gdanska (PL)
41. Transilvania University of Brasov (RO)
42. Universitatea Technica din Cluj-Napoca (RO)
43. Universitatea "POLITEHNICA" din Bucuresti (RO)
44. Uludağ University (TR)

LLP/Erasmus stays

In the academic year 2013/2014 26 students (thence 1 Master degree student and 2 Doctoral degree students for Erasmus practical placement), 27 teachers and 2 administrative staff participated in the LLP/Erasmus programme. The Faculty accepted 13 students, 23 teachers and 1 administrative staff from the partner universities.

National Scholarship Programme of the Slovak Republic (NSP SR)

Three Doctoral students of the faculty were awarded the scholarship for study stay abroad from the NSP SR in the academic year 2013/2014.

Faculty accepted 2 people within the NSP SR, namely:

- Doctoral student from the Moscow Power Engineering Institute, RU;
- University teacher from the Institute of Technical and Experimental Physics, Czech Technical University in Prague, CZ.

Other activities

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

- Russian Academy of Sciences, Trapeznikov Institute of Control Sciences (RU),
- Faculty of Transportation Sciences, Czech Technical University in Prague (CZ),
- ELTODO EG, a.s., Prague (CZ),
- ELTODO dopravní systémy s.r.o. Prague (CZ),
- University of Pardubice (CZ),
- Railway Research Institute, j.s.c., Prague (CZ),
- VÚKV, a.s., Prague (CZ),
- Technický a zkušební ústav stavební Prague, s.p. (CZ),
- Universita degli Studi di Catania (IT),
- West Pomeranian University of technology Szczecin, Faculty of Electrical Engineering and Faculty of Computer Science and Information Technology (PL),
- Technische Universitaet Ilmenau, Faculty of Computer Science and Automation (DE),
- University of Zagreb, Faculty of Transport and Traffic Sciences (HR).

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,
- co-operation within the Doctoral study (mainly with Catania),
- co-operation within the double degree doctoral programme (with Ilmenau).

Foreign stays, visits and conferences

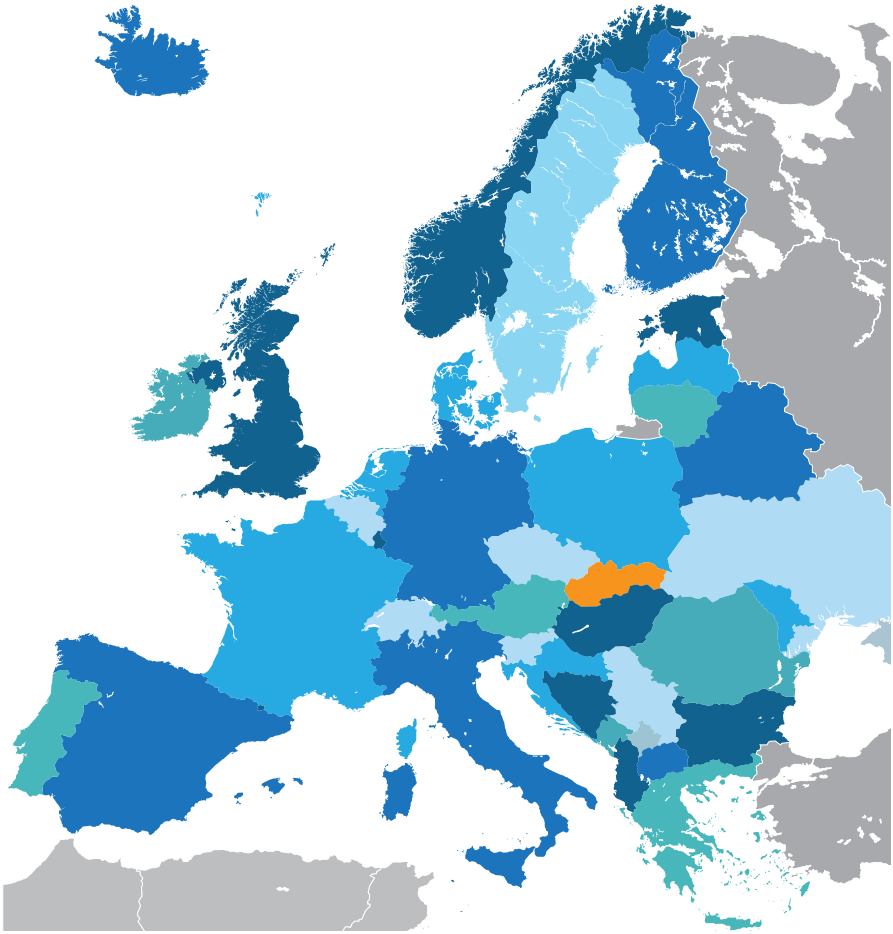
Employees and Doctoral students of the faculty performed in 2014 several short or long stays in foreign countries at partner universities or institutions, and on the contrary, the FEE and its departments accepted students and teachers from abroad.

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

IN/OUT	DPh	DMAEE	DEBE	DME	DPES	DCIS	DTM	IAS
Belgium	0/1		0/1	0/1		0/1		
Bulgaria						2/1		
Cyprus							0/1	
Czech Rep.	1/6	2/4	2/7	0/15	6/5	1/10	1/8	2/1
China		0/1	0/2					
Finland					0/2			
France	0/1					0/1	0/1	
Greece			0/2				2/0	
Netherlands					0/1		0/2	1/0
India					0/1			
Ireland			1/0				3/0	
Japan					1/0			0/1
Canada					0/1			1/0
Kazakhstan			0/2					
Lithuania					0/1			0/1
Macedonia		0/1						
Hungary	0/1							
Malaysia							0/1	
Germany	0/2		0/3	0/1	0/1		1/2	
Poland		4/6		3/1		3/8		
Portugal	0/1			0/1		0/1		
Austria	0/1	0/1				1/5		0/1
Romania		1/1			3/2			
Russia	0/1	0/1		0/2			1/0	
Slovenia					1/0	0/1	0/3	
Spain				0/3		0/1		
Switzerland	0/3							
Sweden							0/3	
Italy				1/4	0/1	0/1		0/1
Turkey				0/1				
Ukraine				3/0				
U. Kingdom					0/1		0/1	0/1
USA				0/2				
Total	1/17	7/15	3/17	7/31	11/16	7/30	8/22	4/6
Total all	48 / 154							

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

Employees of the FEE 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 the FEE for 2014.

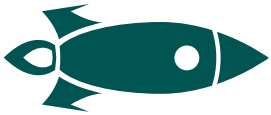


Main tasks of the faculty for the year 2015

The development of the FEE will be realized in accordance with the framework program of the Faculty for the period 2014-2020, which was approved by the Scientific Board of the FEE on the 12th of May 2014. 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

Quantifiable main tasks for the year 2015

- Development of tools for more efficient engagement of research groups in the EU Framework Programme for Research and Innovation HORIZON 2020;
- Intensification of propagation and support of students and teachers mobility in line with internationalization of education;
- Organization of annual meeting of management of faculties of electrical engineering and related orientations FELAPO 2015;
- Participation in the organization of at least 5 other conferences/ seminars/ events;
- In accordance with the plans of qualification growth to realize the habilitations of at least 3 and the inaugurations of at least 2 faculty members;
- Organization and promotion of Student Scientific Competitions for all 3 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 two times per year;
- Intensification of cooperation with industrial partners and other institutions;
- Organization of a meeting of the Faculty management with Doctoral students and their supervisors and meeting with academic community of the Faculty once a year ;
- Within the marketing activities to implement at least 1 action directed towards primary schools and 10 actions directed towards secondary schools in order to inform students of secondary schools about study possibilities at the FEE;
- Organization of open-door actions towards high school students twice a year;
- Promote individual visits to/from the FEE in order to intensify cooperation with high schools.



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Department of Physics

General Information

Advances in technical fields have always relied to a large degree on know-how and methods originating in physics. Many phenomena and principles studied today in physics become the basis of applications tomorrow, e.g. in quantum information science. It is therefore very important to provide the students of the technical fields with good basics of mathematics and physics.

The Department of Physics teaches General Physics to students of all faculties of the University and several specialized Advanced Physics courses. The Department provides the students with the basic understanding of physics, trains them in applying the principles of physics to various engineering problems as well as gives the students a review of modern physics.

The Department is divided into three sections according to their research and educational specialization. The staff consists of 1 Professor, 2 Associate Professors at the Professor positions, 5 Associate Professors, 12 senior lecturers, 5 internal Ph.D. students, 4 research fellows and 3 technical/administrative workers who support the research and teaching activities of the Department.

The research carried out at the Department is mostly concerned on the utilization of acoustic and optical wave processes for the investigation of condensed matter. Acoustic Group exploits a wide range of acoustic methods and techniques as well as acoustoelectric and acoustooptic phenomena to investigate semiconductors, metals, ion glasses and magnetic liquids. New acoustic techniques are also developed.

Optical group studies physical properties of the conventional telecommunications optic fibres and special fibres such as capillary fibres and photonic fibres. The group has extended its activities to include technologies of preparation and analysis of photonic structures for integrated optics and optoelectronics. The latest results are from the area of optofluidic waveguides where sensors and optic elements are being developed. Self-diffraction of light in magnetic fluids and photorefractive phenomenon in selected condensed matter materials are also studied within the group.

The theoretical high-energy physics group works in the area of strong electroweak symmetry breaking and quark-gluon plasma.

The research groups of the Department are well known abroad. The scientific activities of the Department are regularly presented at the international conferences and are published in significant physical journals. The members of the staff also participate in various educational and scientific activities outside the Department and the University, especially as members of various scientific boards at both domestic and international institutions. There are also many activities focused on further education of high school and elementary school Physics teachers and their pupils and students, which is an important outreach work.

Staff of the Department

Head of the Department:	**Peter Bury**
Vice-head of the Department:	Dušan Pudiš
Secretary for Education:	Gabriela Tarjányiová
Administrative Support:	Anna Chasníková
Technical Support:	Nadežda Remencová, František Černobila, Juraj Remenec (⅓)

Sections of the Department

Section of Acoustics and Materials

Head of the Section:	Peter Bury
Professor:	Peter Bury
Associate Professors:	Peter Hockicko, Igor Jamnický (½), Sofia Slabeyciusová
Research Fellows:	Jozef Kúdelčík
Senior Lecturers (without PhD):	Ivan Bellan

Section of Optics and Photonics

Head of the Section:	Dušan Pudiš
Professors:	Dušan Pudiš, Ivan Martinček
Associate Professors:	Daniel Káčik
Senior Lecturers (with PhD) :	Jana Ďurišová (maternity leave until 31.8.2014), Ivana Lettrichová (maternity leave from 5.5.2014), Ľuboš Šušlik, Norbert Tarjányi

Section of General Physics and Elementary Particles

Head of the Section:	Ivan Melo
Research Fellows:	Mikuláš Gintner, Ivan Melo
Senior Lecturers (with PhD):	Marián Janek, Beáta Trpišová, Gabriela Tarjányiová

Postgraduate Students

Internal:	Jana Bírešová (since 1.9.2014), Mária Pardelová (since 1.9.2014), Peter Gašo, Štefan Hardoň, Daniel Jandura, Peter Tatar, Lukáš Varačka

Education

Courses in Bachelor, Master and Doctoral Degree Programmes

Bachelor Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31110	Introduction to Physics	1	1 - 2 - 0
31201	Physics I	3	3 - 2 - 1
31303	Physics II	3	3 - 2 - 1
31307	Computer Simulation of Real Processes	3	1 - 0 - 2
31450	Basics of Optoelectronics	4	2 - 1 - 0
31315	Chapters of Physics	3	2 - 1 - 0
31112	Introduction to Photonics	5	2 - 1 - 1
Courses at the Faculty of Mechanical Engineering			
2B010	Seminar on Physics	1	0 - 2 - 0
2B018	Physics I	2	3 - 2 - 0
2B033	Physics II	3	2 - 0 - 2
2B018	Physics I (External studies)	2	20 - 6 - 0
2B033	Physics II (External studies)	3	20 - 6 - 0
Courses at the Faculty of Management Science and Informatics			
5BF005	Fundamentals of Physics	1	3 - 1 - 1
Courses at the Faculty of Civil Engineering			
40B113	Physics	1	2 - 1 - 1
40B117	Seminar on Physics	1	0 - 2 - 0
40B203	Physics - optics	2	2 - 1 - 1
40B202	Physics	2	2 - 1 - 1
40B211	Chapters of Physics	2	0 - 2 - 0
40E202	Physics (External studies)	2	20 - 0 - 0
40E211	Chapters of Physics (External studies)	2	10 - 0 - 0
Courses at the Faculty of Operation and Economics of Transport and Communication			
11P101	Physics	1	2 - 1 - 1
11P102	Physics	1	2 - 1 - 1
12P101	Physics (External studies)	1	8 - 4 - 4
12P102	Physics (External studies)	1	12 - 0 - 4
12P103	Physics (External studies)	1	16 - 0 - 0
Courses at the Faculty of Special Engineering			
92026	Physics	2	2 - 1 - 1
97026	Physics (External studies)	2	18 - 0 - 0

Master Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
32109	Physics III	1	2 - 1 - 0
32321	Measurements in telecommunications	4	3 - 0 - 2
32410	Physics of accelerators	2	2 - 2 – 0
Courses at the Faculty of Humanities			
8BT248	Physical acoustics	4	2 - 1 - 0

Doctoral Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Faculty of Civil Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
4D102	Applied Physic	1	2 - 0 - 0
4D109	Chapters of Physics	1	2 - 0 - 0
4D109	Chapters of Physics (External Studies)	1	1 - 0 - 0

Science, research and development

The research carried out at the Department is mostly concerned with the utilization of acoustic and optical wave processes for the investigation of condensed matter. Acoustic Group exploits a wide range of acoustic methods and techniques as well as acoustoelectric and acoustooptic phenomena to investigate semiconductors, metals, ion glasses and magnetic liquids. New acoustic techniques are also developed. Acoustic group has reached important results during investigation of semiconductor MOS layers with so-called high-K dielectric layers ($Si-SiO_2-HfO_2$), during studies of magnetic fluids on the basis of the transformer oil, as well as studies of LiPON type ion glasses, published in 2014 in 2 current contents journals and further in journals indexed in WOS and Scopus and in several conference proceedings.

Optical group studies physical properties of the conventional telecommunications optic fibres and special fibres such as capillary fibres and photonic fibres. The group has extended its activities to include technologies of preparation and analysis of photonic structures for integrated optics and optoelectronics. The latest results are from the area of optofluidic waveguides where sensors and optic elements are being developed. Self-diffraction of light in magnetic fluids and photorefractive phenomenon in selected condensed matter materials are also studied within the group. Results are published in current contents journals. The most important results were achieved in the field of special optical fibers and fiber devices for sensor applications. In the field of active devices, the new types of light emitting diodes with patterned surface using photonic structures and polymeric membranes were prepared. Such types of optic and optoelectronic devices show unique properties especially light extraction and light guiding.

The theoretical high-energy physics group works in the area of strong electroweak symmetry breaking and quark-gluon plasma. Understanding of electroweak symmetry

breaking (EWSB) is one of the most important problems of particle physics. In spite of recent discovery of 125 GeV scalar particle at the LHC accelerator at CERN there remain questions about the true nature of EWSB mechanism and hence about physics behind the Standard Model (SM). Properties of the discovered boson are compatible with the SM Higgs boson hypothesis, nevertheless they are also compatible with many extensions of SM. In collaboration with Dr. Juráň from Silesian University in Opava we constructed and study so-called top-BESS model with SU (2) isospin triplet of vector resonances as effective description of spontaneous EWSB. Results were published in the most important scientific journals Physical Review D and the European Physical Journal C and contacts were established with S. Pokorsky from Warsaw University, C. Grojean from Theory Division at CERN and F. Riva from ITF EPF in Lausanne.

Acoustic Laboratory

Laboratory is oriented towards studies of physical properties of materials and structures with acoustic methods. Three acoustic spectrometers serve for this purpose, each equipped with unique technology for the generation, detection of longitudinal, transverse and surface acoustic waves as well as processing of acoustic signals. Another acoustic spectrometer is used for determination of the distribution of particles in liquid materials. The laboratory also features two magnets for investigation of magnetic and acousto-magnetic properties of condensed matter and facilities for investigation of dielectric properties of materials.

Technology Laboratory

Laboratory serves for the preparation of samples for either optical or acoustic investigation. It has facilities for cutting and grinding the samples and facilities for evaporation or deposition of solid metal layers and resistors.

Optic Laboratory

Laboratory is focused on research and development of optical fibres, optical fibre sensors, optical fibre elements and optical materials. During the research we use and develop various types of interferometry methods and interferometers, methods of measurement of optical radiation absorption in fibres and optical materials, and methods of refractive index measurement. Laboratory has different types of semiconductor and gas lasers, light sources in the visible and near infrared region, spectrometers operating in the wavelength range 350 – 2200 nanometers and elements for imaging and fibre optics.

Laboratory of fibre technologies

Laboratory of fibre technologies is oriented towards preparation of optical fibres and fibre structures from different types of optic materials. Laboratory features optical fibre pulling tower, which can be used to prepare optical fibres from fused quartz and other types of optical glasses. In the laboratory we develop technologies of preparation of optical fibres, optical fibre elements and microfluid optical elements from siloxane polymers, such as polydimethylsiloxane LS 6941, LS 6943, LS 6946 and Sylgard 184.

Laboratory of laser technologies

Laboratory features cutting edge laser technologies for preparation of planar photonic structures. The basic technology is interference lithography where one can achieve photonic structures with various 2-dimension-

al symmetries and a resolution at the level of hundreds of nanometers. Another technology offers a possibility to create planar structures with arbitrary arrangement using tapered optic fiber probes in the near field scanning. This is known as the near field lithography. The final on the list is the technology of direct inscription with laser beam, which enables to create structures of arbitrary arrangement in surfaces of different materials with sub-micrometer resolution. Laboratory is prepared for implementation of photonic and arbitrary structures with a resolution of a few hundred nanometers into surfaces of optic and optoelectronic elements.

Laboratory of microscopy

Laboratory features confocal microscope, atomic force microscope (AFM) and ellipsometer. Confocal microscope can measure 3D profiles of structures with a resolution of hundreds of nanometers in all three dimensions. AFM is designed for nanotechnologies where it is possible to analyze surface morphology with a resolution of tens of nanometers. At the same time it has a litographic mode to create structures via AFM litography. Ellipsometric measurements are suitable for thin transparent layers.

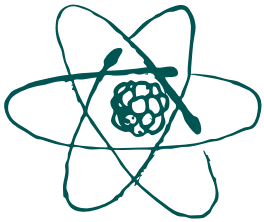
Co-operation

Co-operation Partners in Slovakia

- International Laser Center, Bratislava
- Institute of Electrical Engineering, Slovak Academy of Sciences
- Institute of Physics, Slovak Academy of Sciences, Bratislava
- Dept. of Microelectronics, FEI STU Bratislava
- Institute of Experimental Physics, Slovak Academy of Sciences, Košice
- Matej Bel University, Banská Bystrica
- FMFI Comenius University, Bratislava
- PriF Comenius University, Bratislava
- University of P.J. Šafarik, Košice
- Faculty of Aeronautics - Technical University of Košice
- Volkswagen Bratislava
- Betamont Zvolen

International co-operation Partners

- Institute of Physics, Faculty of Philosophy and Natural Sciences, Silesian University in Opava, CZ
- Lublin University of Technology, Lublin, PL
- Université de Mons - Faculty Polytechnique, Belgium
- ISIR, Osaka University, Japan
- CERN, Switzerland
- International Particle Physics Outreach Group
- IPHT Jena, Germany
- Joint Institute of Nuclear Research, Dubna, Russia
- Instituto do Ceramica y Vidrio (CSIC), Madrid, Spain
- Institute of Technical and Experimental Physics, ÚTEF ČVUT Prague, CZ
- ZCU Plzen, CZ
- ITF EPF, Lausanne, Switzerland
- TU Ilmenau, Germany



Visitors to the Department

Name	Institution	Length of stay
Josef Juráň	Silesian University, Opava, CZ	30 days

Visits to Foreign Institutions

Name	Institution	Length of stay
Ivan Melo	Palacky University, Olomouc, CZ	3 days
	MFF UK Prague, CZ	2 days
	CERN, Switzerland	13 days
	Darmstadt, Germany	6 days
	Karoly Robert College, Gyongyos, HU	5 days
Marián Janek	JINR, Dubna, Russia	22 days
Peter Hockicko	KU Leuven, Belgium	3 days
	University of Vienna, Austria	4 days
	University of Pardubice	2 days
	University Ofaveiro, Portugal	5 days
Mikuláš Gintner	Silesian University, Opava, CZ	25 days
	UTEF ČVUT, Prague, CZ	20 days
	CERN, Geneva, Switzerland	12 days
	ITF EPF, Lausanne, Switzerland	1 day
Dušan Pudiš	TU Ilmenau, Germany	6 days
Daniel Káčik	UFE Praha, CZ	3 days
	ENSEEIHT Toulouse, France	5 days

Other Activities

Specialised Lectures and Courses Organized by the Department

Masterclasses in Physics 2014
Customer: High school students from Žilina region
Lecturers: Mikuláš Gintner, Ivan Melo
Date: March 2014

Cosmic rays
Customer: KF EF ŽU Žilina
Lecturer: Karel Kudela, ÚEF SAV Košice
Date: May 2014

Invited Lectures/Papers

Higgs boson and other animals
Lecturer: Mikuláš Gintner
Where: Public Library in Žilina
Date: June 2014

Higgs boson and other animals
Lecturer: Mikuláš Gintner
Where: Maximilian Hell Days, Tren. univ. A. Dubčeka, Trenčín
Date: September 2014

Selected chapters of Quantum Field Theory (4 lectures)
Lecturer: Mikuláš Gintner
Where: Institute of Physics, Silesian University, Opava, CZ
Date: November 2014

Photonic crystals in nature, technologies and applications
Lecturer: Dušan Pudiš
Where: Boskovice, CZ,
Date: October 2014

Membership in International Institutions /Committees

Ivan Melo	Slovak delegate in IPPOG (International Particle Physics Outreach Group) Slovak delegate in EPPCN (European Particle Physics Communication Network)
Peter Bury	vice-chairman of the National IUPAP Committee (International Union for Pure and Applied Physics)
Peter Hockicko	Member of SEFI (European Society for Engineering Education), PWG (Working Group on Physics), Slovak delegate Member of EUCU.NET (European Children's Universities Network)
Norbert Tarjányi	EPS (European Physical Society)
Daniel Káčik	Member of Steering committee action COST TD 1001

Membership in National Institutions/Committees

Igor Jamnický	Member of the Organizing Committee of 20th APCOM conference 2014 Member of OV15 Accreditation Committee – working group
Peter Bury	Member of the Slovak Physical Society Council Member of the Scientific Committee of 20th Conference APCOM 2014 Member of the Field Commission Solid State Physics and Acoustics at FEI STU Bratislava Member of the Scientific Committee of ADEPT 2014 Member of the Scientific Committee of 21st Conference of Czech and Slovak physicists, Olomouc, 2014 Member of the Scientific Committee of International conference ELEKTRO 2014
Dušan Pudiš	Member of the Organizing Committee of ADEPT 2014 Member of the Programme Committee of ELEKTRO 2014
Peter Hockicko	Member of the Scientific Committee of the 9th International Conference Material Acoustics Place 2014, Zvolen Member of a committee of the Slovak Acoustic Society at SAS

Membership in University Boards

Dušan Pudiš	Member of the Commission for the field 5.2.12 Electrotechnologies and materials Member of Scientific Council of EF ŽU Secretary of the Academic Senate of EF ŽU

	Member of the Executive Council of the KAP club (alumni and friends of University of Žilina)
Igor Jamnický	Member of the Commission for the field 5.2.12 Electrotechnologies and materials
Peter Bury	Chair of the Commission for the field 5.2.12 Electrotechnologies and materials, EF ŽU Member of Academic Senate of EF ŽU Member of Scientific Council EF ŽU
Daniel Káčik	Member of Academic Senate of EF ŽU Member of the Commission for the field 5.2.12 Electrotechnologies and materials
Marián Janek	Member of the Organizing Committee of ELEKTRO 2014
Ivan Martinček	Member of Scientific Council of EF ŽU Member of the Commission for the field 5.2.12 Electrotechnologies and materials

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Department of Measurement and Applied Electrical Engineering

General Information

Department of Measurement and Applied Electrical Engineering (DMAEE) was founded by dividing of the Department of Theoretical and Applied Electrical Engineering. The history of the department however started in 1953 when at the Railway University in Prague was originated the Department of Electrical Engineering and the Cabinet of Theoretical Engineering was its part. The independent department was originated in 1957 named Department of Theoretical Electrical Engineering and Electrical Machines, (DTEEM) providing teaching of electrical engineering subjects for electrical engineering studies.

The first subject taught at the Faculty of Electrical Engineering was "Foundations of electrical engineering". Successively the pedagogical process was extended with the subjects as theoretical electrical engineering, electrical measurement and the department started to provide teaching of subjects of theory of electrical machines and electrical machines construction as well.

After removing the university from Prague to Žilina and changing its name to University of Transport, the department began providing teaching of electrical engineering subjects at non-electrical study branches and at the same time the Department of Electrotechnology was separated.

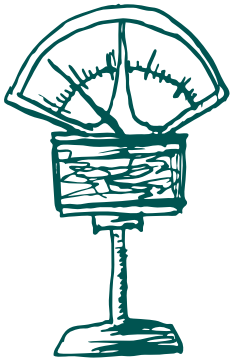
In 1986 the branch of electrical machines was separated from the department and the department was named to Department of Electrical Engineering.

In 1993 the department was named Department of Theoretical and Applied Electrical Engineering.

In 2005 the department had two branches: Division of Theoretical Electrical Engineering and Division of Applied Electrical Engineering and Measurement. Two independent departments: Department of Electromagnetic and Biomedical Engineering and Department of Measurement and Applied Electrical Engineering arose from the original department.

Department of Measurement and Applied Electrical Engineering guarantees bachelor study program Electrical Engineering focused on Automobile Electrical Engineering.

The staff of the DMAEE guarantees and provides the course Measurements and Measuring Systems for all students of the Faculty of Electrical Engineering of the University of Žilina, optional courses for students in study program Electrical Engineering and course Electrical Engineering for students of other faculties of the University of Žilina.



Staff of the Department

Head of the department:	**Miroslav Gutten**
Vice head of the department:	Daniel Korenčiak
Secretary:	Milan Šebök
Administrative staff:	Jana Zlatohlavá
Associate professors:	Dagmar Faktorová, Miroslav Gutten, Milan Chupáč, Ján Poliak, Milan Šimko
Senior Lecturers (with PhD):	Martin Brandt, Daniel Korenčiak, Matej Kučera, Milan Šebök, Jozef Jurčík

Postgraduate Students

Internal:	Richard Janura, Jozef Jurčík, Eva Luptáková (from 1.9.2014), Ľubomír Ostrica († 28.8.2014), Mária Pápežová

Education

Courses in Bachelor and Master Degree Programmes

Bachelor Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31635	Bachelor Project Automotive EE	6	0 – 0 – 6
31609	Electrical Machines for Automation	6	3 – 1 – 1
31604	Bioelectronics	6	2 – 0 – 2
31306	Measurement and Measuring Systems	3	2 – 0 – 3
31416	Electrical Engineering of Road Vehicles	4	2 – 1 – 2
31519	Inf. and Com. Systems of Road Vehicles	5	2 – 0 – 1
31529	Standards for Electrical Engin. Products	5	2 – 1 – 0
31562	Diagnostics of Electrical Equipment	4	2 – 1 – 2
31513	Sensors for Technical Praxis	5	2 – 1 – 2
31401	Applied Electrical Engineering	4	2 – 1 – 2
Courses at the other Faculties			
11P103	Electronics RV and Comm. Technique	1	2 – 0 – 2
11P104	Electrical Engineering	2	2 – 0 – 2
11P105	Electrical Engineering	2	2 – 0 – 1
11P106	Electrical Engineering	2	2 – 1 – 0
12P105	Electrical Engineering	2	8 – 0 – 8
12P106	Electrical Engineering	2	16 – 0 – 0
2B047	Electrical Engineering	4	2 – 0 – 2
2B047	Electrical Engineering	4	2 – 1 – 1

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the other Faculties		*(L) lessons - (S) seminars - (LE) lab. exercises	
2B083	Electrical Engineering HV	5	2 – 0 – 2
2B083	Electrical Engineering HV	6	2 – 2 – 0
2B047	Electrical Engineering	5	16 – 6 – 0
2B047	Electrical Engineering	5	18 – 4 – 0
2B070	Electrical Engineering	4	16 – 6 – 0
2B083	Electrical Engineering HV	6	18– 6 – 0
2B083	Electrical Engineering HV	6	10 – 6 – 0
92043	Electrical Engineering	3	2 – 0 – 1
92043	Electrical Engineering	3	2 – 0 – 1
92265	Electrical Engineering and fire safety	6	2 – 1 – 0
97043	Electrical Engineering	3	12 – 0 – 0
97265	Electrical Engineering and fire safety	6	12 – 0 – 0

Master Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
32115	Modelling of Electromagnetic Field	1	1 – 0 – 2
Courses at the other Faculties			
13P101	Electrical Engineering HV	1	2 – 1 – 0
14P101	Electrical Engineering HV	1	16 – 0 – 0

Research & Development

Research activities at the Department are aimed mainly to the following areas: diagnosis methods and systems for power transformers testing using modern measuring systems and tools, infrared analysis (thermo-diagnostics) with scanning of thermal field of power electrical and telecommunication equipment and their modelling, simulations and medical applications of thermovision, sensors for technical applications.

Recently the research programme has been extended to electromagnetic non-destructive testing and evaluation of metals and dielectric materials. Research covers also optimization of methods for materials dielectric properties investigation in high-frequency range and possibilities of microwave technique utilization in medical diagnosis and therapeutic applications and in optimization of radiocommunication equipments.

Co-operation

Co-operation Partners in Slovakia

- Slovak University of Technology, Faculty of Electrical Engineering and Information Technology, Bratislava
- Slovak University of Technology, Faculty of Mechanical Engineering, Bratislava

- Technical University of Košice, Faculty of Electrical Engineering and Informatics, Košice
- Alexander Dubček University, Faculty of Mechatronics, Trenčín
- Comenius University, Bratislava, Jessenius Faculty of Medicine, Martin
- Lambda Controls, s.r.o., Liptovský Hrádok
- Stredoslovenská energetika a.s. Žilina
- EVPÚ, a.s., Nová Dubnica
- ZŤS Elektronika, s.r.o., Nová Dubnica
- ŽOS Vrútky, a.s., Vrútky
- TOYOTA, s.r.o., Žilina
- OTC, s.r.o., Hlohovec
- BEZ Transformátory, a.s., Bratislava
- Motocentrum, s.r.o. Žilina
- Slovenská teplárenská, a.s., Žilina
- Tepláreň, a.s. Považská Bystrica
- INA Kysuce, a.s. Kysucké Nové Mesto
- Slovenský vodohospodársky podnik, š.p. Banská Štiavnica
- HESIA s.r.o. Bratislava
- KIA Motors Slovakia, s.r.o. Žilina

International co-operation Partners

- VŠB - Technical University, Ostrava, CR
- University of West Bohemia, Faculty of Electrical Engineering, Plzen, CR
- Czech Technical University, Faculty of Mechanical Engineering, Prague, CR
- University of Defence, Brno, CR
- Politechnika Gliwice, Faculty of Electrical Engineering, Poland
- Politechnika Radom, Faculty of Transport, Radom, Poland
- Politechnika Lublin, Faculty of Electrical Engineering and Informatics, Lublin, Poland
- Politechnika Gdansk, Faculty of Electrical and Control Engineering, Gdansk, Poland
- West Pomeranian University of Technology Szczecin, Poland
- LMU Munich, Germany
- NIRD for Technical Physics Iasi, Romania
- EN-CENTRUM s.r.o., Praha, CR
- TMV SS, s. r.o., Praha, CR
- ETM – Ing. Pavel Hála, Brno, CR
- Školicí středisko Bosch - Automobilová technika, CR
- Nova Partner, s.r.o. Český Brod, CR
- Haefely-Tettex-Hipotronics Praha, CR
- Energo-Complex Sp. Z o.o., Poland

Visitors to the Department

Name	Institution	Length of stay
Adam Cichy	SUT Gliwice	1 day
Silviu - G. Dobrescu	NIRDTP, Iasi, Romania	5 days
Tomasz Koltunowicz	Politechnika Lubelska, Poland	8 days
Václav Mentlík	ZČU, FEL, Pilsen, CR	1 day
Pavel Trnka	ZČU, FEL, Pilsen, CR	1 day
Piotr Warda	Politechnika Lubelska, Poland	30 days
Pawel Zhukowski	Politechnika Lubelska, Poland	8 days

Visits to Foreign Institutions

Name	Institution	Length of stay
Dagmar Faktorová	Sv. Cyril and Methodius University, Skopje, Macedonia	5 days
	NIRDTP, Iasi, Romania	7 days
	Xi'an Jiaotong University, Xi'an, China	9 days
	TU VIENNA, Wien, Austria	1 day
Miroslav Gutten	A.I. Herzen State Pedagogical Uni. of Russia, St.Petersburg, RF	5 days
	Czech University of Life Sciences, Prague, CR	3 days
	SUT Gliwice, Poland	1 day
Jozef Jurčík	Czech University of Life Sciences, Prague, CR	3 days
	SUT Gliwice, Poland	1 day
Daniel Korenčiak	Politechnika Lublin, Poland	5 days
	SUT Gliwice, Poland	1 day
Matej Kučera	Politechnika Lublin, Poland	5 days
	Czech University of Life Sciences, Prague, CR	3 days
Milan Šebök	Politechnika Lublin, Poland	5 days
Ján Poliak	Czech University of Life Sciences, Prague, CR	3 days

Other Activities

Specialised Lectures and Courses Organized by the Department

Application possibilities of thermal-vision techniques in practice

Customer: ETM Brno
Lecturer: Milan Šimko, Milan Chupáč
Date: 13.6-15.6.2014

Membership in International Institutions /Committees

Dagmar Faktorová	Scientific Committee of the Conference TSP 2014 – Telecommunications and Signal Processing, Berlin, Germany Scientific Committee of the Conference SAEM 2014 – Symposium on Applied Electromagnetics, Skopje, Macedonia Scientific Committee of the Conference EIIC 2014 – Electronic International Interdisciplinary Conference, Praha, Czech Republic Programme Committee of the Conference EDS 2014 – Electronic Devices and Systems, Brno, Czech Republic
Miroslav Gutten	PAK Pomiary Automatyka Kontrola/Measurement Automation Monitoring – member of the editorial board

	member of the editorial board: Education Journal (EDU) member of the editorial board: International journal for traffic and transport (IJTTE), Beograd, Serbia International Conference on Traffic and Transport Engineering, Beograd, Serbia – Scientific Committee of the Conference International Conference of the Results and Solutions of Young R & S for Innovations and Progress, 2014, TU-VSB Ostrava, CR Scientific Committee of the Conference
Milan Šimko	member of the editorial board: International journal for traffic and transport (IJTTE), Beograd, Serbia International Conference on Traffic and Transport Engineering, Beograd, Serbia – Scientific Committee of the Conference Eletrotechnický magazín Etm, CR – member of the editorial board
Milan Chupáč	Eletrotechnický magazín Etm, CR – member of the editorial board

Membership in National Institutions/Committees

Dagmar Faktorová	Slovak Medical Association, section: Company of Biomedical Engineering and Medical Informatics, Bratislava Scientific Committee of the Conference ELEKTRO 2014 Scientific Committee of the Conference ScieConf 2014 - Scientific Conference, Žilina
Miroslav Gutten	Council of Higher Education Institutions, Bratislava Scientific Committee of the Conference ELEKTRO 2014

Membership in University Boards

Dagmar Faktorová	Branch Committee for PhD. study field Theory of Electrical Engineering, Faculty of Electrical Engineering
Miroslav Gutten	Academic Senate of the Faculty of Electrical Engineering Scientific Board of the Faculty of Electrical Engineering Executive Committee KAP EF College of the Dean of the Faculty of Electrical Engineering
Daniel Korenčiak	Informatics Council of the Faculty of Electrical Engineering Academic Senate of the Faculty of Electrical Engineering
Milan Šebök	Working Committee of the VTS, University of Žilina
Ján Poliak	Auditing Committee of the VTS, University of Žilina Faculty Branch Committee for PhD. study field Transportation, Faculty of Operation and Economics of Transport and Communications

Contact Address

Department of Measurement and Applied Electrical Engineering **EN**

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www: http://fel.uniza.sk/kmae

Department of Electromagnetic and Biomedical Engineering

General Information

The original name of the department, founded in 1953 as a part of the Faculty of Electrical Engineering at the University of Railways in Prague, was the Department of Theoretical Electrical Engineering and Electric Machines.

After separating the Electric Machines' section, the education orientation of the Department was partly changed. For that reason the department was renamed to the Department of Theoretical Electrical Engineering in 1986. Since 1989, after spreading the teaching subjects to non-electrical branches of study of other faculties at the University of Žilina, the department was renamed to the Department of Theoretical and Applied Electrical Engineering.

Due to reorganization in 2005 the department has been divided into two independent departments which are Department of Electromagnetic and Biomedical Engineering (DEBE) and the Department of Measurement and Applied Electrical Engineering.

At present, the Department of Electromagnetic and Biomedical Engineering has two divisions. The Division of Electromagnetic Engineering provides courses and lectures of Theory of Electrical Engineering 1, B, 2, 3, Selected Topics from Theory of Electrical Engineering, Selected Chapters from Electromagnetic Theory, Fundamentals of Electromagnetic Compatibility, and Electromagnetic Compatibility for the students of the Faculty of Electrical Engineering. The Division of Biomedical Engineering provides teaching of some interdisciplinary and special subjects for the students of Biomedical Engineering (BME) study field. There are mainly the following subjects: Sensors and Measuring Methods in BME, Wave Processes in BME, Modelling and Simulation in BME, Signal Processing in Medicine, Biomedical Image Processing, Technical Means of Medicine, Radiation and Protection against Radiation, Instrumentation in Medicine, Fundamentals of Ecology, Bachelor's Project 1 and 2, Bachelor's Thesis BME, Diploma Project, Diploma Seminar and Diploma Thesis.

After the official accreditation of the master programme Biomedical Engineering in 2000 at the Faculty of Electrical Engineering, the department became the responsible one for the education and professional level of the study programme BME. In 2004 the Biomedical Engineering study programme was reaccredited for two grades study - Bachelor and Master degrees and the study programme in both grades has been approved by the last complex accreditation of the University of Žilina in 2009. The DEBE is the main guarantee of the study programme BME.

Along with the BME, the Department of Electromagnetic and Biomedical Engineering is the main one responsible for the postgraduate doctoral programme Theory of Electrical Engineering (TEE). The staff of DEBE guarantees and provides the courses for the PhD. study in TEE. The study programme TEE has also been approved by the last complex accreditation of the University of Žilina in 2009. The Faculty of Electrical Engineering repeatedly obtained the rights to habilitate associate professors and

to inaugurate full professors in this study field along with. The DEBE guarantees the above mentioned processes.

The research activities of the department are aimed mainly to the following topics: investigation of electromagnetic field and its interactions with various media, methods and tools of material non-destructive evaluation, problems of electromagnetic compatibility and biocompatibility, biomedical sensors and modelling, intelligent clothing and technical textiles, simulations of dynamic biological systems mainly for the use in medical diagnostics and electromagnetic field influence on living organisms.

Staff of the Department

Head of the Department:	**Klára Čápová**
Vice-head of the Department:	Ladislav Janoušek (until 31st May 2014) Mariana Beňová (from 1st June 2014)
Secretary:	Daniela Gombárska (until 31st May 2014) Milan Smetana (from 1st June 2014)
Administrative Support:	Ester Kyselová

Sections of the Department

Section of Electromagnetic Engineering

Head of the Section:	Mariana Beňová
Professors:	Klára Čápová
Associate Professors:	Ladislav Janoušek, Mariana Beňová, Milan Smetana
Research Fellows:	Tatiana Strapáčová (until 30th June 2014)
Senior Lecturers (with PhD):	Vilibalda Darmová (until 31st August 2014), Stanislav Hurta

Section of Biomedical Engineering

Head of the Section:	Daniela Gombárska (until 31st May 2014) Zuzana Pšenáková (from 1st September 2014)
Professors:	Ivo Čáp
Research Fellows:	Roman Radil
Senior Lecturers (with PhD):	Branko Babušiak, Štefan Borik (from 1st September 2014), Michal Gála, Daniela Gombárska, Zuzana Pšenáková

External teachers (Biomedical Engineering)

Professors:	Kamil Javorka[1], Ján Jakuš[1], Ján Lehotský[1], Anton Lacko[2]
Associate Professors:	Viera Jakušová[1], Michal Javorka[1], Yvetta Mellová[1], Martin Péč[1], Ivan Poliaček[1]
Senior Lecturers:	Juraj Čáp[1], Ľubomír Kočner[3], Štefan Pavlus[4]

1) Jessenius Medical Faculty of the Comenius University in Martin
2) Faculty of Health Care, Catholic University in Ružomberok
3) Central Military Hospital in Ružomberok
4) Hospital with Policlinic in Žilina

Postgraduate Students

Internal: Štefan Borik (until 31st August 2014), Ivona Malíková, Andrea Štubendeková, Ivana Gálová, Martin Bereta (from 1st September 2014), Vladimír Chudáčik (from 1st September 2014)

Education

Courses in Bachelor and Master Degree Programmes

Bachelor Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31205	Theory of Electrical Engineering 1	2	3 – 3 – 0
31206	Theory of Electrical Engineering B	2	3 – 3 – 0
31211	Seminar of TEE1	2	0 – 2 – 0
31314	Theory of Electrical Engineering 2	3	3 – 3 – 1
31316	Selected Topics from Theory of Electrical Engineering	3	2 – 1 – 0
31324	Seminar of TEE2	2	0 – 2 – 0
31439	Sensors and Measuring Methods in BME	4	2 – 0 – 1
31442	Theory of Electrical Engineering 3	4	3 – 2 – 0
31213	Design and construction of medical devices	5	2 – 0 – 2
31518	Bachelor's Project 1 BME	5	0 – 0 – 4
31543	Wave Processes in BME	5	2 – 2 – 0
31601	Bachelor's Thesis BME	6	0 – 2 – 0
31603	Bachelor's Project 2 BME	6	0 – 3 – 0
Within the framework of cooperation with external teachers from the Jessenius Medical Faculty of the Comenius University in Martin following courses for students of BME are provided:			
31304	Medical Biology	2	2 – 0 – 2
31304	Medical Biology	3	2 – 0 – 2
31423	Medical Biophysics	4	2 – 0 – 2
31448	Fundamentals of Biochemistry	4	2 – 0 – 2
31553	Fundamentals of Physiology and Pathological Physiology 1	5	2 – 0 – 2
31629	Fundamentals of Physiology and Pathological Physiology 2	6	4 – 0 – 4

Master Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
32114	Modelling and Simulation in BME	1	2 – 0 – 2
32135	Selected Chapters from Electromagnetic Theory	1	3 – 2 – 0
32138	Fundamentals of ElectromagneticCompatibility	1	2 – 1 – 0
32141	Biomedical Image Processing	1	2 – 0 – 2
32220	Neural Network	2	2 – 0 – 1
32214	Information Systems in Medicine	2	2 – 0 – 2
32245	Radiation and Protection against Radiation	2	1 – 0 – 1
32246	Signal Processing in Medicine	2	2 – 2 – 1
32310	Electromagnetic Compatibility	3	2 – 0 – 1
32334	Diploma Project	3	0 – 8 – 0
32402	Diploma Thesis	4	0 – 2 – 0
32404	Diploma Seminar	4	0 – 5 – 0
32426	Fundamentals of Ecology	4	4 – 4 – 0
Within the framework of cooperation with external teachers from the Jessenius Medical Faculty of the Comenius University in Martin, the Faculty of Health Care of the Catholic University in Ružomberok, the Central Military Hospital in Ružomberok, the Hospital with Policlinic in Žilina and others experts following courses for the students of BME are provided:			
32206	Technical Means in Medicine	2	2 – 0 – 2
32244	Basic Diagnostic and Therapeutic Methods in Medicine	2	2 – 0 – 2
32304	Bioethics and Medical Ethics	3	2 – 2 – 0
32319	Management of Health Services	3	2 – 2 – 0
32331	Instrumentation in Medicine	3	0 – 2 – 0

Research & Development

Within the framework of research in the field of electromagnetic methods the researchers of the department deal with the study of electromagnetic fields and electromagnetic phenomena. Scientific activities are concentrated mainly on problems of electromagnetic methods for non-destructive evaluation of conductive materials, primarily on eddy current testing. There are performed not only computer simulations but also experimental measurements and verifications within the frame of projects solutions. New possibilities of signal detection are investigated, mainly the use of advanced detection sensors and new ways of eddy current excitation.

In the laboratory of electromagnetic methods there are realized comprehensive measurements for investigation of influence of low frequency electromagnetic field (EMF) on biological structures.

The laboratory of biomedical engineering (BME) offers the base for the study and research in the field of technical and information support of biomedicine. The research of BME is concentrated in the field of EM influence on living organisms, on modelling and computer simulations of physiological systems, especially of human haemodynamics on intelligent clothing and technical textiles and on biomedical signal processing including image processing and analysis.

Laboratory of Electromagnetic Methods (EMM)

The laboratory of EMM is determined mainly for the solution of department research. Its facilities and devices enable to solve research problems in the field of applied electromagnetism. At present there are investigated the problems of electromagnetic nondestructive testing of materials and of the EMF influences on biological structures and other systems.

Laboratory of Biomedical Engineering (BME)

The laboratory of BME at the department was originally determined for specialized education within the frame of the new established study field of BME. But now the laboratory activities are oriented to the research as well and now it is used also for the investigation of selected problems of applied biomedicine, medical signal processing and also for elaboration bachelor, master and doctoral thesis.

Laboratory of Experimental Electrical Engineering (EEE)

The laboratory of EEE was established for the goals of education – experimental tasks and measurements for application both of theory of electrical engineering and sensors and special measuring methods in biomedical engineering.

Co-operation

Co-operation Partners in Slovakia

- Technical University, Košice
- Slovak Technical University, Bratislava
- Medical Faculty of the Comenius University, Bratislava
- Jessenius Medical Faculty of the Comenius University, Martin
- Faculty of Health Care, Catholic University in Ružomberok
- Central Military Hospital, Ružomberok
- University of A. Dubček, Trenčín
- Technical University in Zvolen
- Department of Electronics, Academy of Armed Forces, Liptovský Mikuláš
- Constantine the Philosopher University in Nitra,
- Institute of Measurement Science SAS, Bratislava
- Slovak Institute of Metrology, Bratislava
- Hospital of Jessenius Medical Faculty of the Comenius University, Martin
- Hospital with Policlinic, Žilina
- Hospital of Medical Faculty of the Comenius University, II. Internal clinic, Bratislava
- ŽSR, Headquarters, Infrastructure Management Department, Bratislava
- Railway Institute for Research and Development, Žilina
- Slovcert, s.r.o. Bratislava
- VÚTCH-CHEMITEX, spol. s r.o.

International co-operation Partners

- Tokyo University, Tokyo, Japan
- Tohoku University, Tohoku, Japan
- IIU Corp., Tokyo, Japan
- University of Kanazawa, Kanazawa, Japan
- Technical University RWTH, Aachen, Germany
- University of Technology, Compiegne, France

- Technical University, Graz, Austria
- National University of Ireland, Dublin, Ireland
- Xi'an Jiaotong University, School of Aerospace, Xi'an, China
- Czech Technical University, Prague, Czech Republic
- Technical University VŠB, Ostrava, Czech Republic
- Technical University, Brno, Czech Republic
- University of West Bohemia, Pilsen, Czech Republic
- Academy of Science, Prague, Czech Republic
- Norwegian University of Science and Technology, Trondheim, Norway
- Faculty of Education, University of Hradec Králové, Czech Republic
- Faculty of Science, University of Ostrava, Ostrava, Czech Republic
- Politecnico di Milano, Dipartmento di Meccanica, Milan, Italy
- AGUSTAWESTLAND, Samarate, Italy
- VITROCISET, Rome, Italy
- Consorzio Milano Ricerche, Milan, Italy
- SINTEF ICT, Dept. for Optical Measurement Systems and Data Analysis, Trondheim, Norway
- AGH University of Science and Technology, Department of Telecommunications, Krakow, Poland
- University of Patras, Department of Mechanical Engineering and Aeronautics, Patras, Greece
- Department of Electrical and Computer Engineering, Michigan State University, East Lansing, USA
- Nondestructive Testing Department, National Institute of Research and Development for Technical Physics, Iasi, Romania

Visitors to the Department

Name	Institution	Length of stay
Annraoi de Paor	NUI Dublin, Ireland	5 days
Ivo Doležel	FEL ZČU Pilsen, CZ	8 days
Martin Augustýnek	VŠB – TU, Ostrava, CZ	5 days

Visits to Foreign Institutions

Name	Institution	Length of stay
Klára Čápová	Helmholtz Institute for BME-RWTH Aachen, Germany	7 days
	National Technical University of Athens, Greece	7 days
	Nazarbayev University, Astana, Republic of Kazakhstan	8 days
	Xi`an Jiaotong University, Xi`an, China	6 days
Ivo Čáp	Helmholtz Institute for BME-RWTH Aachen, Germany	7 days
	Nazarbayev University, Astana, Kazakhstan	10 days
	NTUA, Athens, Greece	8 days
	VŠB-TU, Ostrava, Czech Republic	1 day
	Xi'an Jiantong University, Xi'An, China	5 days

Ladislav Janoušek	European Commission, Brussels, Belgium	2 days
Mariana Beňová	FEI, VŠB-TU Ostrava, Czech Republic	2 days
	Lappeenranta University of Technology, Finland	2 days
Michal Gála	FEI, VŠB-TU Ostrava, Czech Republic	2 days
Branko Babušiak	FEI, VŠB-TU Ostrava, Czech Republic	7 days
Zuzana Pšenáková	FEI, VŠB-TU Ostrava, Czech Republic	2 days
Andrea Štubendeková	University of West Bohemia, Pilsen, Czech Republic	90 days
Štefan Borik	Helmholtz Institute for BME-RWTH Aachen, SRN	31 days
	University of Hradec Králové, Czech Republic	1 day
Ivona Malíková	ČVUT Praha, Czech Republic	90 days

Other Activities

Invited Lectures/Papers

The principles of non-destructive evaluation of biomaterials real defects by advanced probes
Lecturer: Klára Čápová
Where: Helmhotz Institute for BME RWTH Aachen, Germany
Date: 2nd June 2014

Principles and utilization of advanced magnetic sensors (fluxgate, GMR, AMR)
Lecturer: Klára Čápová
Where: Helmhotz Institute for BME RWTH Aachen, Germany
Date: 3th June 2014

Corrosion cracks evaluation using smart detection sensors.
Lecturer: Klára Čápová
Where: Helmhotz Institute for BME RWTH Aachen, Germany
Date: 3th June 2014

Influence of low-frequency electromagnetic field on living organisms
Lecturer: Ivo Čáp
Where: Helmhotz Institute for BME RWTH Aachen, Germany
Date: 2nd June 2014

Modelling of physiological processes on the base of electromechanical analogy
Lecturer: Ivo Čáp
Where: Helmhotz Institute for BME RWTH Aachen, Germany
Date: 4th June 2014

Intelligent textiles utilization for biosignals sensing
Lecturer: Branko Babušiak
Where: VŠB-Technical University Ostrava, Czech Republic
Date: 28th May 2014

Biopotentials sensoring using intelligent textiles
Lecturer: Michal Gála
Where: Progressive technologies for textiles, its quality and safety, Žilina
Date: 27th - 28th May 2014

Conductive spinning and stripe and its utilization in intelligent textiles
Lecturer: Michal Gála
Where: VŠB-Technical University Ostrava, Czech Republic
Date: 28th May 2014

Membership in International Institutions /Committees

Klára Čápová	International Society COMPUMAG, Southampton, UK Editorial Board of the international scientific journal Advances in Electrical and Electronic Engineering, ISSN 1804-3119, Ostrava, CR ENDE Standing Committee Member (International Workshop on Electromagnetic Non-Destructive Evaluation) Programme Committee of the international conference ITIB 2014 Information Technologies in Biomedicine, Gliwice, Poland, June 2014;
Ivo Čáp	Branch Committee for PhD. study field "Theory of Education of Physics", Pedagogical Faculty, University of Hradec Králové, Czech Republic Branch Committee for PhD. study field "Theory of Education of Physics", Faculty of Science, University of Ostrava, Czech Republic Editorial Board of the journal Československý časopis pro fyziku, Academy of Sciences of CR, Prague, Czech Republic Editorial Board of the journal ARNICA, University of West Bohemia, Plzeň, Czech Republic International Board of EUSO (European Union Science Olympiad), Dublin, Ireland International Board of the IPhO 2014 (International Physics Olympiad), Astana, Kazachstan
Ladislav Janoušek	Japanese Society for Non-Destructive Inspection, Tokyo, Japan Program Committee of the 7th Framework Programme – Regions of Knowledge, Research Potential, Brussels, Belgium International Compumag Society, Southhampton, UK
Štefan Borik	IEEE Student Membership

Membership in National Institutions/Committees

Klára Čápová	Editorial Board of the international scientific journal Journal of Electrical Engineering, ISSN 1335-3632, Bratislava Scientific Board of Jessenius Medical Faculty CU, Martin Branch Committee for the PhD. study field "Theory of Electrical Engineering", FEI STU, Bratislava Branch Committee for the PhD. study field "Medical Biophysics", Jessenius Medical Faculty CU, Martin Branch Committee for the PhD. study field "Bionics and Biomechanics", FME TU, Košice PhD. supervisor in the study field "Bionics and Biomechanics", FME TU, Košice PhD. supervisor in the study field "Biomedical Engineering", FME TU, Košice Supervisory Board of the Slovak Medical Society, section of Biomedical Engineering and Medical Informatics, Bratislava Scientific Committee of the 10th International Conference ELEKTRO 2014, Rajecké Teplice

	Scientific Committee of the International Conference YBERC 2014, FEI STU Bratislava
Ivo Čáp	Branch Committee for the PhD. study field "Physics of Condensed Matter and Acoustics", Faculty of Science, UKF, Nitra
	Branch Committee for the PhD. study field "Medical Biophysics", Jessenius Medical Faculty CU, Martin
	PhD. supervisor in the field "Medical Biophysics", Jessenius Medical Faculty CU, Martin
	National coordinator of the European Union Science Olympiad, Ministry of Education, Bratislava
	Head of the Slovak Committee of Physics Olympiad, Ministry of Education, Bratislava
	Head of Preparation of the Representation Team for International Physics Olympiad, Ministry of Education, Bratislava
	Vice-head of the Central Committee of the Slovak Mathematics and Physics Association, Bratislava
	Committee of the Slovak Medical Society, section of Biomedical Engineering and Medical Informatics, Bratislava
	Scientific Committee of the 10th International Conference ELEKTRO 2014, Rajecké Teplice
Ladislav Janoušek	FP7 support system for specific programme Regions of Knowledge, Research Potential, Ministry of Education, Bratislava
	Scientific Committee of the 15th International Conference on Computational Problems of Electrical Engineering (CPEE 2014)
	Local organizing committee – Chairman of the 15th International Conference on Computational Problems of Electrical Engineering (CPEE 2014)
Branko Babušiak	Local organizing committee of the 15th International Conference on Computational Problems of Electrical Engineering (CPEE 2014)
Mariana Beňová	Local organizing committee of the 15th International Conference on Computational Problems of Electrical Engineering (CPEE 2014)
Vilibalda Darmová	Slovak Medical Society, section of Biomedical Engineering and Medical Informatics, Bratislava
Michal Gála	Local organizing committee of the 15th International Conference on Computational Problems of Electrical Engineering (CPEE 2014)
Daniela Gombárska	Local organizing committee of the 15th International Conference on Computational Problems of Electrical Engineering (CPEE 2014)
Zuzana Pšenáková	Slovak Medical Society, section of Biomedical Engineering and Medical Informatics, Bratislava
Milan Smetana	Local organizing committee of the 15th International Conference on Computational Problems of Electrical Engineering (CPEE 2014)
Tattiana Strapáčová	Local organizing committee of the 15th International Conference on Computational Problems of Electrical Engineering (CPEE 2014)

Membership in University Boards

Klára Čápová	Scientific Board of the Faculty of Electrical Engineering College of the Dean of the Faculty of Electrical Engineering Academic Senate of the Faculty of Electrical Engineering Main Guarantee of the PhD. Degree (3rd grade) study field "Theory of Electrical Engineering", Faculty of Electrical Engineering Main Guarantee of the procedures to habilitate and to inaugurate in the study field "Theory of Electrical Engineering", Faculty of Electrical Engineering Head of the Branch Committee for the PhD. study field "Theory of Electrical Engineering", Faculty of Electrical Engineering Branch Committee for the PhD. study field "Marginal States of Materials", Faculty of Mechanical Engineering Administrative council of KAP, Faculty of Electrical Engineering PhD. supervisor in the study field "Theory of Electrical Engineering", Faculty of Electrical Engineering
Ivo Čáp	Scientific Board of the Faculty of Electrical Engineering Scientific Board of EDIS publishing of the University of Žilina Main Guarantee of the Bachelor and the Master Degree (1st and 2nd grade) study field "Biomedical Engineering", Faculty of Electrical Engineering Branch Committee for the PhD. study field "Theory of Electrical Engineering", Faculty of Electrical Engineering PhD. supervisor in the study field "Theory of Electrical Engineering", Faculty of Electrical Engineering
Ladislav Janoušek	Scientific Board of the Faculty of Electrical Engineering College of the Dean of the Faculty of Electrical Engineering Co-Guarantee of the PhD. Degree (3rd grade) study field "Theory of Electrical Engineering", Faculty of Electrical Engineering Co-Guarantee of the procedures to habilitate and to inaugurate in the study field "Theory of Electrical Engineering", Faculty of Electrical Engineering Branch Committee for the PhD. study field "Theory of Electrical Engineering", Faculty of Electrical Engineering PhD. supervisor in the study field "Theory of Electrical Engineering", Faculty of Electrical Engineering
Mariana Beňová	PhD. supervisor in the study field "Theory of Electrical Engineering", Faculty of Electrical Engineering
Milan Smetana	Executive council of KAP, Faculty of Electrical Engineering PhD. supervisor in the study field "Theory of Electrical Engineering", Faculty of Electrical Engineering

Contact Address

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Department of Mechatronics and Electronics

General Information

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

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

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

Within the year the updating of laboratory equipment in the building AB was completed. Significant progress has been made in building of centres of excellence laboratories.

In the last year the research activity of the Department has achieved a significant increasing implemented by means of grant projects. Department staff participated in several international and national projects. Centres of Excellence CEEX2 and CEKR2 have been built within the frame of which the Department has cooperated with several prestigious Slovak institutions (SAS Košice, The Technical University of Košice and Jesenius Faculty of Medicine of the Comenius University in Martin). These projects represent a very significant support to research which has been done at our Department.

In the year 2014 the Department involves seventeen members of educational staff, three research workers, fifteen internal PhD students and six external PhD students. From the point of view of internal structure it has been divided into three divisions. The first one is focused on power- and applied electronics, the second one is operating in the field of mechatronics, autotronics, and industry automation. The third division deals with special electronics focused on applications in mechatronic systems and medicine.

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

Within the frame of pedagogical activities the Department has been providing education of electronics, mechatronics, micro-computer

systems involving industrial controllers and power electronics at the Faculty of Electrical Engineering, and also at further faculties of the University of Zilina. Such education has been dedicated for different study branches and specializations in the bachelor, magisterial and doctoral studies, both in internal and external ones.

The Department has also organized and provided research and development, expertizing and contracts, and develops publication activity in the field of electronics, control systems, mechatronics and power electronics mainly. Further education is provided by the Department in the field of power electronic systems, microcomputer control systems, industrial controllers and programmable logic systems.

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

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

Staff of the Department

Head of the Department:	**Pavol Špánik**
Vice-head of the Department:	Jozef Čuntala
Secretary for Education:	Anna Kondelová
Administrative Support:	Andrea Prandová

Sections of the Department

Section of Electronics

Head of the Section:	Michal Frivaldský
Professors:	Pavol Špánik
Associate Professors:	Jozef Čuntala, Michal Frivaldský
Research Fellows:	Anna Kondelová
Senior Lecturers (with PhD):	Michal Praženica, Slavomír Kaščák,Roman Radvan, Rastislav Havrila
Senior Lecturers (without PhD):	Jozef Lakatoš

Section of Mechatronic Systems and Autotronics

Head of the Section:	Branislav Dobrucký
Professors:	Branislav Dobrucký
Associate Professors:	Pavel Pavlásek, Peter Drgoňa

Research Fellows:	Marek Paškala, Ondrej Hock
Senior Lecturers (without PhD):	Peter Šindler

Section of Mechatronic Systems and Autotronics

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

Postgraduate Students

Internal :	Roman Radvan (until August 2014), Andrej Rybovič (until August 2014), Peter Čuboň (until August 2014), Marek Valčo (until August 2014), Jozef Šedo (until August 2014), Juraj Koscelník, Martin Galád, Roman Mažgút, Tomáš Laškody, Zuzana Loncová (from September 2014), Viliam Jaroš (from September 2014), Juraj Košťál (from September 2014), Pavol Štefanec (from September 2014), Marek Píri (from September 2014), Boris Kozáček (from September 2014)
External:	Marek Paškala, Ivan Šištík, Ivan Lovás, Andrej Kaňovský, Erika Záhorcová Polčanová, Anna Bystričanová Holásková

Education

Courses in Bachelor and Master Degree Programmes

Bachelor Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31212	Introduction to Industry Automation and Mechatronics	1,3	1-0-3
31302	Electronics I	3	2-0-3
31402	Automatic Regulation	1,4	2-2-0
31413	Electric Light and Heat	4	2-1-1
31414	Electromagnetic Compatibility	4	2-2-0
31415	Electronics II	4	2-0-3
31426	Measurement of Non-Electric Parameters	4	2-0-2
31427	Power Supplies	4	2-0-1
31430	Computers in Industrial Automation	4	2-0-2
31502	Power Electronics	5	3-1-2
31511	Microprocessor Technology	5	3-0-2
31524	Logical Circuits	5	3-0-2
31528	Multimedia Technology	5	2-0-1
31542	Image Processing and Analysis	5	2-0-2

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31552	Computer and Office Technique	5	2-0-1
31556	Mechatronics	5	2-0-2
31557	Automatic Regulation	2,5	2-1-1
31563	Design of Electronic Devices	6	2-2-6
31628	Power Semiconductor Systems	6	3-1-1
31630	Bachelor Project Power Electronic Systems	6	0-0-6
31634	Bachelor Project Mechatronic Systems	6	0-0-6
Courses at the Faculty of Mechanical Engineering			
2B092	Drives of Mechatronic Systems	5	2-0-1
2B127	Electronics	6	2-0-2

Master Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
32107	Electromagnetic Compatibility in Electr.	1	2-2-0
32117	Design of ASIC	1	1-3-0
32119	Computers in Industrial Automation	1,2	2-0-2
32126	Control of Electric Actuators	1	3-1-1
32129	Theory of Automatic Control 1	1	2-1-1
32136	Power Semiconductor Converters	1	3-0-3
32200	Analysis and Synthesis of PE Circuits	2	2-2-0
32211	Measurement and Digit. Data Processing	2	2-2-0
32216	Microprocessors, Microcomputers and DSP	2	2-0-3
32233	Microproc. and Microcomputer Systems	2	3-0-3
32236	Theory of Automatic Control 2	2	2-1-1
32325	Design of ASIC	2	2-2-0
32341	Virtual Instrumentation	2	2-0-2
32111	Information and Industrial Networks	3	2-0-2
32300	Power Electronics Applications in ET & EE	3	3-0-1
32324	Design and Construction of PE Systems	3	2-2-0
32330	Semiconductor Sensors	3	2-2-0
32334	Semestral Project	3	0-4-0
31515	Mechatronic Systems	3	2-0-2
32402	Diploma Thesis PES	4	0-2-0
32404	Diploma Seminar	4	0-2-0
32405	Discrete Control of Power Systems	4	6-0-6
32406	Dispatching Systems	4	4-0-4
32416	Industrial Informatics	4	4-0-4

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Mechanical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
2N125	Electronic Control Elements	1,2	2-2-0
2N246	Microcomputer Technics	1	2-0-2
2N140	Converter Drives	3	2-2-0
2N141	Control Microcomputers	3	2-2-0

Research & Development

The Department has also organized and provided research and development, expertizing and contracts, and develops publication activity in the field of electronics, control systems, mechatronics and power electronics mainly.

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

Laboratory of Electromagnetic Compatibility

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

Laboratory of Physical Models

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

Laboratory of Doctoral Research

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

Laboratory of Low Power Drives Research

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

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

Co-operation

Co-operation Partners in Slovakia

- EVPÚ a.s Nová Dubnica

- Panasonic Electronic Devices Slovakia, s.r.o., Trstená
- NES Nová Dubnica
- Power-One, Dubnica nad Váhom
- Siemens s.r.o., Bratislava, Žilina
- Vedeckotechnologický park, Žilina
- LJF Martin, UK Bratislava
- ABB Slovakia, Bratislava
- DataTherm, s.r.o. Žilina
- Robotec s.r.o. Sučany
- CONTINENTAL MATADOR s.r.o. Púchov
- HAGARD: HALL a.s. Nitra, Žilina
- IPESOFT s.r.o. Žilina
- Považská cementáreň a.s., Ladce
- Energo controls s.r.o. Žilina
- ControlTech, s.r.o. Trnava
- Schneider Electric Slovakia, s.r.o., Bratislava, Žilina
- MACRO, s.r.o., Žilina
- SSE, a.s. Žilina
- Súkromná zváračská škola, Žilina
- Department of el. engineering, mechatronics and industrial engineering, FEI TU Košice
- Department of mechatronic systems, FM TUAD, Trenčín
- Department of automation and regulation, FEI STU, Bratislava
- Department of electric machines and apparatus, FEI STU, Bratislava
- INA Kysuce, a.s. Kysucké Nové Mesto
- KIA Motors, s.r.o. Žilina
- GRANIT, s.r.o. Žilina
- AAUTO, s.r.o. Žilina
- VIP AUTO, s.r.o. Žilina
- TEAM DC, Bratislava
- GS1 Slovakia, Žilina
- Htest Slovakia, Banská Bystrica
- SSC, Bratislava
- NDS, Bratislava
- SEMIKRON s.r.o. Vrbové
- EMIS s.r.o. Bratislava
- Pneustyle s.r.o. Žilina
- AXONpro a.s. Bratislava
- Samsung Electronics Slovakia s.r.o. Galanta
- ŽOS Vrútky
- AEROMOBIL Nitra

International co-operation Partners

- Universitá degli studi di Catania, IT, DIEES
- Panasonic Electronic Devices Co., Ltd., Kadoma, JPN
- Panasonic Electronic Devices Europe GmbH, Lüneburg, DE
- Politecnico di Bari, IT, DEE
- National University of Ireland, Dublin, IRL
- Technikum Wien, AT
- National Instruments Czech Republic, s.r.o., CZ
- Technical Univesity RWTH Aachen, DE
- Politechnika Radomska, PL
- XILINX USA, University program
- Humusoft s.r.o. Praha, CZ
- TU – VŠB Ostrava, CZ
- FAIRCHILD Semiconductor - Power Franchise, EU
- FreeScale s.r.o., Rožňov pod Radhoštěm, CZ
- Rockwell Automotion s.r.o., Praha, CZ
- University Ioan Slavici, Timisoara, RO
- The University of Strathclyde, Glasgow, UK
- EQUINOCCIO Madrid, ES

Visitors to the Department

Name	Institution	Length of stay
Wojciech Jarzyna	Lublin University of Technology, PL	1 month
Dariusz Zielinski	Lublin University of Technology, PL	1 month
Piotr Lipnicki MSc	Lublin University of Technology, PL	1 day
Mario Cacciato	UNICT Catania, IT	3 days
Volodymyr Yaskiv	TNTU, Ternopil, UA	2 days
Valeryi Lazaryuk	TNTU, Ternopil, UA	2 days
Anna Yaskiv	TNTU, Ternopil, UA	2 days

Visits to Foreign Institutions

Name	Institution	Length of stay
Branislav Dobrucký	MEI, Moskva, RU	29 days
Pavol Špánik	UNICT Catania, IT	5 days
Michal Frivaldský	UNICT Catania, IT	5 days
Peter Drgoňa	UNICT Catania, IT	7 days
Miroslav Hrianka	RWTH – Aachen, DE	7 days
Pavel Pavlásek	EC, Brussel, BE	3 days

Other Activities

Invited Lectures/Papers

eSeminar: QR Identifiers
Customer: GS1 SLOVAKIA, Department of Mechatronics and Electronics, University of Žilina
Lecturer: Pavel Pavlásek
Date: 8th December 2014

Identification Chain of Goods and Services
Customer: GS1 SLOVAKIA, Department of Mechatronics and Electronics, University of Žilina
Lecturer: Miroslav Štaffen, Pavel Pavlásek
Date: 9th December 2014

Control of Tunnel Operation Distant Education for Operators at the Bôrik Tunnel
Customer: SSC
Lecturer: Fedor Kállay, Marek Paškala
Date: September 2014

Café scientifique: Popular Educational Lectures for the public
Customer: JLF UK Martin
Lecturer: Miroslav Hrianka, Libor Hargaš, Dušan Koniar
Date: 29th January 2014

Training courses for employees of Visteon Electronics Slovakia, s.r.o - Basic Course
Customer: Visteon Electronics Slovakia, s.r.o. - Establishment Námestovo
Lecturer: Peter Drgoňa
Date: 09/2014 – 12/2014

Competition: The Technical Idea of the Year
Participants: Secondary school students
Organizers: Pavol Špánik, Michal Frivaldský, Roman Radvan, Ondrej Hock
Date: 5th June 2014

Membership in International Institutions /Committees

Branislav Dobrucký	Senior Member of IEEE IE Society
	Member of SMTC 2014 Evaluation Committee competition
Pavel Pavlásek	Member of the Editorial Board of the Inžinierske stavby Journal
	Member of Brandon Hall Excellence in Learning Technology Awards
	Expert of EC H2020 SMEINST
	Member of European Commitee expert team of science and research
Pavol Špánik	Senior Member of IEEE IE Society
	Member of the Scientific Board of FEI – TU Ostrava, CZ
	Member of the Electronics Committee, FEI – TU Ostrava, CZ
Michal Frivaldský	Member of IEEE IE Society
Peter Drgoňa	Member of IEEE IE Society

Membership in National Institutions/Committees

Branislav Dobrucký	Steering Programme Committee of ALER 2014 Conference
	Steering Programme Committee of ELEKTRO 2014 Conference
Pavel Pavlásek	Member of the Commission of Transport and Road Administration Port (The Žilina Self-governing region)
	Member of the Commission of the Ministry of Education of Slovak Republic for Selection of the Aid of Candidates from Developing Countries and Compatriots
Pavol Špánik	Member of the Working Group „Industry Technologies" at Ministry of Education, Science, Research and Sport of the Slovak Republic
	Member of the Working Group „Electro-mobility" at Ministry of Economy of the Slovak Republic
	Member of the Grant Commission for Scientific Grant Agency of the Slovak Republic VEGA No 5 for electrical engineering and informatics

Membership in University Boards

Branislav Dobrucký	Member of the Editorial Board of ZU Scientific Journal – Communication – Scientific Letters
	Member of the Scientific Board of FEE UoZ
	Member of the Electrical Engineering Committee, FEE UoZ
	Member of the Automat. and Control Committe – Proc. Control, FEE UoZ
Pavol Špánik	Member of the Academic Senate of University of Zilina
	Member of the Academic Senate of FEE UoZ
	Member of the Scientific Board of University of Zilina
	Member of the Scientific Board of FEE UoZ

	Member of the Electrical Engineering Committee, FEE UoZ
	Member of the Power Engineering Committee, FEE UoZ
	Member of the Automation and Control Committee – Process Control, FEE UoZ
	Member of the Measurement Technique Committee, FEI TU Košice
Pavel Pavlásek	Member of the Technical Subjects Didactics Committee, UKF Nitra
Michal Frivaldský	Member of the Academic Senate of FEE UoZ

Awards

Juraj Koscelník	Student Travel Scholarship, award for the best student contribution to the conference – IEEE - IECON 2014 – October 29 – November 11, 2014, Dallas, TX - USA

Contact Address

Department of Mechatronics and Electronics **EN**

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Katedra mechatroniky a elektroniky **SK**

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Slovenská republika
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Department of Power Electrical Systems

General Information

Department of Power Electrical Systems was founded in the academic year 1955/56 as the Department of Electric Traction and Energetics at the Railway University in Prague. Since 1992 the department has been a part of the Faculty of Electrical Engineering.

The department had originally an accreditation in a field of "Electric Traction and Energetics". The department graduates were formerly trained mainly for 24 and 12 FMD, for industrial plants producing electric traction equipment (Skoda Plzen, CKD Trakce Praha, ZOS Nymburk, ZOS Vrutky), for both urban and industrial transport and for the scientific and research laboratories in the electro-technical industry.

The highly important period for the department was during years 1991-1994. In those years, a TEMPUS project JEP-1939/91-94 was accepted and realized. The project entitled "Improvement of Educational Activities in Power Electronics and its Applications" considerably affected the next heading of the department. The aims of the project were: a creation of a new curriculum for Power Electronics, Electric Drives and Electrical Machines, setting up new laboratories, purchase of computing and measuring hardware, mobility of students and staff. The universities in Catania, Roma, London and Helsinki co-operated and guaranteed this project. The results of the project set the department forward in its effort to become a modern department with a high-level educational programme. In 1996 the department finished a TEMPUS project JEN-01939SQ-94 representing a continuity of the project mentioned above.

In 2005, the Faculty of Electrical Engineering underwent a vast reconstruction. A section of Power Electronics was secluded from the Department of Power Electrical Systems together with a part of Department of Electronics and Electrotechnology and formed a new Department of Mechatronics and Electronics.

Change of the labour market enforced the department, besides its own traditional educational and research activities, to look for other possibilities of employability of its graduates. Nowadays the department is divided into the section of Electroenergetics and section of Electric Drives and Electric Traction. Educational and research activities of these sections guarantee a wide professional orientation which covers almost whole power electrical engineering branch.

In the academic year 2005/2006, a three-degree study has been put to an effect at all universities in Slovakia. Department of Power Electrical Systems has been granted an accreditation for a bachelor degree in a programme of studies of Electrical Engineering; for master degree in programme of Electric Power Systems, Electric Drives and Electric Traction. For PhD degree, third study degree, the department was accredited in a study programme of Power Electrical Engineering.

Within the complex accreditation in 2009, the University of Žilina confirmed its position as university. Department of Power Electrical Systems gained right to bestow the Bach-

elor degree in study program of Electrical Engineering, academic degree Ing. in study programs of Electric Power Systems, Electric Drives and Electric Traction.

Since 1997 the department has had an accreditation for PhD degree study in a field of "Power Electrical Engineering" with the following branches: Electric Drives, Electric Machines and Apparatus, Power Electronics and Electric Traction. Another field of PhD studies, "Electric Power Systems," was added after complex accreditation in 2009.

Department is equipped with high quality computer and measuring technology in the area of technical infrastructure. The substantial improvement of department was achieved mainly by help of EU Structural Funds, which enabled reconstruction of rooms of department as well as the departments' instrumentation. This was possible mainly by the project: Centre of excellence of power electronics systems and materials for their components I, II.

Freescale Semiconductor from Czech Republic provided a big support for the department by generalizing latest technologies in the area of digital signal controllers. Department was able to apply for grant research projects on this basis. Department solved several VEGA, KEGA and APVV projects recently, which have identified students, graduates and staff of the department.

Department intensively cooperate with significant companies from Slovakia. These are mainly Slovenské elektrárne, Slovenska elektrizačná prenosová sústava, Stredoslovenská energetika, EVPU Nová Dubnica, Freescale Semiconductor, SIEMENS, ZSR, SEZ Krompachy and others.

Staff of the Department

Head of the Department:	**Juraj Altus**
Vice-head of the Department:	Alena Otčenášová
Secretary for Research:	Peter Braciník
Administrative Support:	Darina Rufusová
Technical Support:	Anna Žuffová

Sections of the Department

Section of Electric Power Systems

Head of the Section:	Alena Otčenášová
Professors:	Juraj Altus, Michal Pokorný
Associate Professors:	Peter Braciník, Alena Otčenášová, Marek Roch
Senior Lecturers (with PhD):	Josef Beran, Miloslav Bůžek, Marek Höger, Ivan Litvaj

Section of Electric Drives and Electric Traction

Head of the Section:	Ján Vittek
Professors:	Valéria Hrabovcová, Ján Vittek
Associate Professors:	Milan Pospíšil, Pavol Rafajdus
Research Fellows:	Pavel Lehocký, Vladimír Vavruš (1/10), Juraj Makarovič (9/10)
Senior Lecturers (with PhD):	Pavol Makyš, Matej Pácha, Marek Štulrajter (1/10)

Postgraduate Students

Internal:	Peter Dúbravka, Lukáš Gorel, Marek Mušák, Michal Reguľa, Dominik Szabó, Michal Baherník, Roman Bodnár, Peter Butko, Tomáš Fedor, Adrián Peniak, Martina Látková (from September 2014), Filip Suško (from September 2014), Lubos Struharňaský (from September 2014), Michal Hrkeľ (until January 2014), Daniel Hropko (until November 2014), Ján Ivanecký (until May 2014)
External:	Miroslav Dubovský (until August 2014), Ján Sitár, Marek Baňas, Michal Janíček (from September 2014)

Education

Courses in Bachelor and Master Degree Programmes

Bachelor Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31103	Business Management and Economy	1	2 – 1 – 0
31107	Basics of Electrical Engineering	1	2 – 1 – 0
31311	Informatics 2	3	2 – 0 – 2
31404	Work safety in Electrical Engineering	4	2 – 0 – 1
31408	Electricity distribution	4	2 – 1 – 1
31411	Electric Machines in English 1	4	1 – 1 – 0
31447	Production and Maintenance of Elect. Devices	4	2 – 1 – 1
31454	Electric Machines	4	4 – 1 – 2
31105	Materials and Technologies in Electric. Engineer.	4	2 – 1 – 1
31500	Electrical Power Apparatus	5	2 – 0 – 2
31501	Electric Traction 1	5	3 – 2 – 0
31507	Electroenergetics 1	5	3 – 0 – 2
31509	Selected sections of Electric Machines	5	2 – 0 – 2
31512	Electric Drives 1	5	3 – 1 – 1
31514	Electric Machines in English 2	5	1 – 1 – 0
31517	Electrical Standards and Metrology	5	2 – 0 – 1
31525	Mechanics of Power Lines	5	2 – 2 – 0
31559	Application of digital signal processors 1	5	0 – 0 – 2
31600	Bachelor Thesis	6	0 – 2 – 0
31602	Bachelor Project Electric Traction	6	0 – 0 – 6
31607	Electric Traction	6	6 – 0 – 4
31608	Electric Drives 2	6	6 – 2 – 2
31610	Electroenergetics 2	6	6 – 2 – 2
31615	Quality Management	6	4 – 2 – 0

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31632	Application of digital signal processors 2	6	0 – 0 – 4
31633	Bachelor Project Electroenergetics	6	0 – 0 – 6
31637	Bachelor Project Electric Drives	6	0 – 0 – 6
32413	Fundamental Design in Electroenergetics	6	0 – 0 – 2

Master Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
32105	Dynamics a energetics of Electric Traction	1	2 – 2 – 0
32106	Electroenergetics in English	1	0 – 2 – 0
32121	Transmission of Electric Energy	1	3 – 1 – 1
32123	Programming of microcontroller systems	1	2 – 0 – 2
32125	Control of Electric Drives 1	1	3 – 0 – 2
32137	Electric Energy Generation	1	3 – 1 – 1
32201	Analysis of Electric Machines	2	2 – 0 – 2
32207	Electric Traction	2	2 – 1 – 2
32208	Electric Drives in Electroenergetics	2	2 – 1 – 1
32209	Electric Substations	2	2 – 0 – 1
32210	Electroheat and light	2	2 – 2 – 0
32213	Information Systems in Electroenergetics	2	2 – 0 – 2
32218	Power Supply of Electric Railways	2	2 – 2 – 0
32224	Microcomputer Systems Programming	2	2 – 0 – 2
32228	Control of Electric Drives 2	2	3 – 2 – 0
32229	Control of Electric Power Systems	2	2 – 1 – 1
32335	Simulation languages in Electroenergetics	2	2 – 0 – 2
32231	Sensors, actuators and interfaces	2	2 – 0 – 2
32241	Calculations of electrical networks	2	2 – 2 – 0
32303	Sensorless Control of Electric Drives	3	3 – 1 – 1
32308	Discreet Control of Electric Drives	3	3 – 0 – 3
32309	Electroheat	3	2 – 2 – 0
32327	Negative Influences on Power System	3	2 – 2 – 1
32333	Control of Electric Drives 1	3	3 – 1 – 1
32334	Annual project	3	0 – 0 – 4
32336	Lighting technique	3	2 – 1 – 0
32337	Special Electric Machines	3	2 – 0 – 2
32343	Electric Traction Vehicles	3	3 – 0 – 1
32402	Diploma Thesis	4	0 – 2 – 0
32404	Diploma Seminar	4	0 – 0 – 4
32409	Economy in Electroenergetics	4	4 – 4 – 0

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
32412	Materials in High Voltage technology	4	4 – 0 – 4
32413	Fundamental Design in Electroenergetics	4	0 – 0 – 2
32414	Total Quality Management	4	2 – 4 – 0
Courses at the Faculty of Mechanical Engineering			
2N111	Electrical Traction Equipment	2	3 – 2 – 0

Research & Development

Research and development activities of the **Electric Power System** section are focused on issues concerning electricity generation, transmission and distribution. The research activities oriented on electricity generation are mainly focused on a modelling of the operation of renewable energy sources. Acquired knowledge and results are used to design simulation models, which are thereafter applied in power system analyses as well as in an optimization of renewable energy sources' deployment within virtual power plants.

Scientific and research activities in the field of electricity transmission and distribution are focused on a modelling of electric power system operation, especially on an application of the concept of intelligent networks (Smart Grids) to the control of both power transmission and distribution networks. A use of different artificial intelligence approaches (expert systems, multi-agent systems) and an application of intelligent electronic devices are the key topics of the research in this field.

An integral part of the research activities of the department is solving the issue of power quality in the distribution or transmission system. The issue is solved comprehensively. Attention is given to the causes of poor quality of supply, EMC, statistics in different locations of the system and of course, possibilities for improvement through the application of the proposed device or other feasible measures.

The section of Electric Drives and Electric Traction mainly focuses on control of all electrical drives types such as DC motors, AC motors and special drives with different type of rotors (SRM, BLDC, Stepper Motor). Research focus can be divided into the following areas: Sensorless control of electric machines – This problematic allows increasing the overall drive reliability, reduce the drive size and therefore it is still very popular. It includes research of estimation algorithms and control techniques for DC and AC drives (IM, PMSM, BLDC). Traditional methods are usually applied for the higher speed range drive. For the low, even zero speed there are methods and algorithms which require high frequency signal injection. Currently, the sensorless techniques form the basis of some control systems, characterized as fault tolerance system, which means ensuring at least partial operation under any circumstances. The research results have been presented at significant international conferences.

Design of new progressive control methods – In this area research has been focused on methods which use forced dynamic control or sliding mode control. New method has been design called Hyper sliding mode control. This scheme does not need any PI controllers what means more easy implementation to industrial application

Design and application of control algorithms for linear motors drives – linear motors are very progressive especially for high dynamic applications. Research activities cover designing of new control methods which have

capability to avoid all complaints of linear motors such as non-linear friction, cogging torque and other problems related with high precise positioning algorithms.

Design of energy flow control in hybrid railway vehicles – hybrid vehicles are considered as a very progressive type of railway vehicles. The most needed issues involve a primary source operation optimization (catenary or a diesel engine) or braking energy storage. Conventional vehicles use friction brake and the braking energy is lost as a heat, while in hybrid vehicles the energy can be stored e.g. in supercapacitors or modern electro-chemical cells (Lithium based systems). Research results have been published at several scientific conferences and implemented in an international commercial project.

Laboratory of renewable energy sources

The function of the laboratory is to examine essential operating characteristics of renewable energy sources, especially photovoltaic systems and wind turbines, with the aim of taking an advantage of lessons learned in the development of simulation models for analyses of power system with renewable energy sources.

The laboratory equipment consists of a small wind power and photovoltaic power plant, which includes a system for predicting the production of photovoltaic power plants using image data from NOAA satellites.

Laboratory of electric power systems

The laboratory is used for the research of Smart Grid concept application to the control of distribution networks. The research focuses mainly on tasks concerning the use of artificial intelligence (expert systems, multi-agent systems) as well as intelligent electronic devices for a fault location and fault restoration in medium voltage networks and the control and management of virtual power plants consisting of renewable energy sources and operating within distribution system. To verify and model proposed management concepts a three-phase 22 kV line model is used. It consists of modules representing sections of cable and overhead lines, remote-controlled switching devices, electrical protection and loads.

Laboratory of high voltage

The laboratory is equipped with measuring and testing equipment for testing electrical strength as well as other parameters of insulation materials and elements used in high voltage engineering up to 300 kV.

The laboratory is operated in the cooperation with SSE, a.s. in the analyses of materials' characteristics, reasons of the faults of high voltage devices and the testing of protective means. It is also used for teaching activities.

Laboratory of power quality

The laboratory is equipped with measurement devices supported mainly by the international project "Cooperation between the University of Žilina and VŠB-TU Ostrava on improving the quality of education and training of researchers in area of electrical engineering" (EU funded). The laboratory is used mainly for research and PhD. studies.

The devices are used both for laboratory and outdoor measurements that could be done with the help of nine power analysers (evaluation of power quality according to STN EN 50160), which are interconnected within a SCADA system providing on-line data acquisition, processing, post analyses and presentation of all measured data on the screen of connected computer.

110 kV and 22 kV models are used to study different types of interferences, their propagation and interactions. They are also equipped with 4Q electronic meters with implemented remote data acquisition and control.

Laboratory of electric drive control

Laboratory of control systems has been created in cooperation with Freescale Semiconductor, Inc. in order to familiarize students with practical applications of electric drives and all the problems of real applications.

The electric drives laboratory stands consist of Freescale 56F8346 DSC Controller Board or Freescale MPC 5567 Controller Board, a low voltage power stage Freescale 16 V/120 W and a selectable electric machine – asynchronous machine (Siemens, voltage 21/12 V power 90 W) or permanent magnet synchronous machine (TG-Drives, voltage 21/12 V, 90 W). Each electric drive stand is supplied by a low-voltage source and equipped with debugging tools Freescale USB-TAP.

Students can use other Freescale development tools as TOWER system, SLK (Student learning kits), etc. Laboratory also serves as a base for competitions like Students' Freescale Technology Day and Freescale Cup – smart car race. The laboratory is Freescale certified and registered in the Freescale University Program.

Lab is also equipped with three research stands. The first one consists of two permanent magnet synchronous machines connected with a flexible coupling designed for parameters' investigation and control algorithms for such drives.

The second stand covers a linear engine with permanent magnet synchronous machine of 4 kW. Its track is 2640 mm long and at the machine is able to develop a torque of 200 Nm at speeds of 4.2 m/s. The drive load is simulated by an induction machine. Linear motor is supplied from three-phase invertor by VONSCH and controlled by a digital signal controller Freescale MC56F8346.

Third stand consists of 3-axis milling machine with linear motors in X and Y axes. Vertical displacement is handled by a step-machine. Horizontal motors have a special construction of the windings with non-ferrous core on the moving part, thus with no cogging torque. This structure brings ability for a high accuracy positioning, practically limited by the accuracy of the position sensor only. These machines have been developed in collaboration with the company EVPÚ, a.s., Nova Dubnica and supported by Slovak Research and Development Agency (APVV-99-031205). The control of power converters is handled by two Freescale MC56F8367 units. Positioning and the cutter commands use CNC Mach3 interface and software.

Laboratory NI304 – Center of Excellence of Power Electrical Systems and Materials for Their Components

In the laboratory NI304 there are implemented project activities of centres of excellence (CEEX I and II CEEX), which were implemented within the Operational Programme Research and Development, Measure 2.1 – creation and promotion of excellence in research.

Created laboratory is used for research and verification of new control structures for drive applications (rotational and linear motion). The proposed algorithms have to consider the adverse effects of the power converter (voltage ripple in the DC link, dead time, saturation power components, etc.). For achieving the highest quality of proposed drive, control is necessary to precisely know motor parameters, which can be done by off-line and on-line motor parameter identification methods. Research team also works with new motor control topologies for non-standard types of electrical machines.

Laboratory of Electric Traction

The laboratory is equipped with a combined system of two DC traction motors (50 kW, 600 V) for a standard set of measurements on traction machines. The system is supplied by a remote controlled DC power sources (voltage source 0-750 V, current source 0-250 A). The measurements are supported by analog and digital equipment, high-end oscilloscope Lecroy WaveRunner 44Xi-A, high voltage probe (up to 6 kV), magnetic probe, vector power analyser Zimmer LMG-500 and two electronic power sources (0-600 VDC, 0-25 A and 0-60 VDC, 0-45 A).

The laboratory is being equipped with another combined system of two AC induction traction motors (50 kW) driven by two converters. This stand is supported by EVPÚ, a.s., Nová Dubnica and Operational Programme Research and Development, measure 2.1 Support of networks of excellence in research and development as the pillars of regional development and support to international cooperation. Such combined system allows all the tasks of modern electric traction drive.

The most attractive part of the laboratory is a locomotive simulator with its main part – the drivers cab. This project is supported by Freescale Semiconductor, Inc., Pars NOVA, a.s. Šumperk (ČR) and ČD, a.s., DKV Brno (ČR). The software part is supported by OpenRails Train Simulator development team. The main aim is to shed light on the real world problems in electric traction.

Laboratory of electrical machines

This laboratory is designed for measurement and identification the parameters of almost all of electrical machines and their operating characteristics in motoring and generating modes. The laboratory is equipped with modern measuring instruments and dynamometers. The laboratory is used by students from all three levels of education, and of course is also used for other research activities of the department.

Co-operation

Co-operation Partners in Slovakia

- STU Bratislava: Department of Electrical Machines and Devices
- STU Bratislava: Department of Electrical Power Engineering
- TU Košice: Department of Electric Power Engineering
- TU Košice: Department of Electrical Drives and Mechatronics
- ABB Elektro s.r.o. Žilina
- CE Qualite Slovakia Nova Dubnica
- Comenius University in Bratislava, Jessenius Faculty of Medicine in Martin
- ELTECO Žilina, Slovakia
- ELZA Žilina, Slovakia
- EVPU Nová Dubnica, Slovakia
- GI-BON Quality systems Žilina
- IBG Slovakia s.r.o.
- MARKAB spol. s r.o. Žilina
- NES Nova Dubnica
- SUTN Bratislava
- PPA Controls
- PV SZKV Zvolen
- Regional Advisory and Information Centre Považská Bystrica
- SIEMENS
- Slovak centre of productivity Žilina, University of Žilina
- Stredoslovenská energetika, a.s. Žilina
- SEPS, a.s. Bratislava
- SEZ Krompachy

- Schneider Electric Slovakia s.r.o.
- Sungwoo hitech, s.r.o. Žilina
- Technical Testing Institute in Piešťany
- Vinuta Rajec, s.r.o.
- VUKI, a.s. Bratislava
- VUVT Engineering, a.s. Žilina
- VVUZ Vrútky
- ZSSK Division ZKV Bratislava
- ZOS Vrútky
- ZOS Zvolen
- ZSR Bratislava

International co-operation Partners

- Aalto University Helsinki, School of Science and Technology, Department of Electrical Engineering, FIN
- ABB Brno, s.r.o. PTPM Brno, CZ
- ABD Praha, s.r.o. závod Technika, CZ
- AD Developments Milton Keynes, UK
- Appraisals Services – Forensic Institute Praha, CZ
- AZD Praha, CZ
- Berner Fachhochschule, Hochschule für Technik und Architektur Burgdorf, CH
- Cinvestav Guadalajara, MEX
- Control Technique Dynamics, Andover, UK
- CZ Loko, a.s., Česká Třebová, CZ
- České dráhy O12 Praha, CZ
- ELCOM Praha, CZ
- Freescale semiconductor, Czech Systems Laboratory, CZ
- Hochschulle für Technik und Wirtschaft, Dresden, Fachbereiches Elektrotechnik, D
- Institut National des Telecommunications Paris/Evry, F
- Lappeenranta University of Technology Finland, Faculty of Electric Engineering, FIN
- Politechnika Gdańska, PL
- Politechnika Warszawa, Instytut Maszyn Elektrycznych, PL
- SKODA Transportation Plzen, CZ
- SKODA Electric Pilsen, CZ
- Technical University of Bochum, D
- Technische Universität Darmstadt, Institut für Elektrische Energiewandlung – Prof. Dr. Ing. Andreas Binder, D
- Technische Universität Dresden, Lehrstuhl Elektrische Antriebe und Grundlagen der Elektroenergietechnik – Prof. Dr. Ing. habil. P. Büchner, D
- Technische Universität Dresden, Institut für Energieversorgung und Hochspannungs-Technik – Prof. Dr. Ing. habil. Peter Schegner, D
- Technische Universität Graz, Fakultät für Elektrotechnik – Prof. Dr. Ing. Manfred Rentmeister, Institut für Elektrische Machines und Antriebe – Prof. Dr. Ing. Hansjőrg Kőfler, Institut der El. Leistungssysteme – Prof. Dr. Ing. Manfred Sakulin, A
- Technical University Cluj-Napoca, Romania - prof. Lorand Szabo, prof. ioan-Adrian Viorel
- TECHNODAT Elektro, s.r.o. Zlín, CZ
- University of Brandford, Leeds, Dr. Li Zhang, UK
- Universita degli Studi di Catania, Dipartimento Elettrico Elettronico e Sistemistico, ITA
- University of East London, Department of Electrical and Electronic Engineering,
- Dr. Roy Perryman, Prof. Stephen Dodds, UK
- University of Nottingham, Dr. Pat Wheeler, Dr. G. M. Asher, UK

- Universidade do Porto, prof. F. Maciel Barbosa, PT
- University of Picardie – Jules Verne, Amien, Prof. Gerard-Andre Capolino, F
- VSB – Univerzita Ostrava, prof. Ing. Josef Palecek, doc. Ing. J. Kijonka, CZ
- VSB – Univerzita Ostrava, doc. Ing. Robert Cep, PhD., Ing. Lenka Čepová, PhD., CZ
- VUT Brno, Ústav elektroenergetiky, CZ
- Západočeská univerzita Plzeň, doc. Ing. Jiří Danzer, CSc., prof. Ing. Václav Kus, CSc., prof. Ing. Zdeněk Peroutka, PhD., CZ
- Železniční zkušební okruh VUZ Cerhenice, Ing. Eduard Novák, CSc. CZ

Visitors to the Department

Name	Institution	Length of stay
Yuukou Horita,	University of Toyama, Japan	1 day
Evgeny Fedotov	Kazanskij Gos. Energ. Universitet, RU	61 days
Jindřich Stuchlý	VŠB – TU Ostrava, CZ	5 days
Jakub Vramba	VŠB – TU Ostrava, CZ	5 days
Klemen Deželak	University of Maribor, Slovenia	6 days
Bohumil Skala	ZČ Pilsen CZ	3 days
Pavel Drábek	ZČU Pilsen CZ	3 days
Jiří Fořt	ZČU, Pilsen CZ	3 days
Arkadiusz Dziechciarz	TU Cluj – Napoca, Romania	30 days
Loránd Szabó	TU Cluj – Napoca, Romania	5 days

Visits to Foreign Institutions

Name	Institution	Length of stay
Ján Vittek	TUL Liberec, CZ	5 days
	NMIMS Mumbai, India	1 day
Peter Braciník	Aalto University, Finland	6 days
Peter Dúbravka	TU of Cluj-Napoca, Romania	90 days
Matěj Pácha	IEEE, R8 Meeting and Sections Congress, Amsterdam	5 days
	Innotrans Berlin, DE	2 days
	ZČU Pilsen, FE, CZ	3 days
	IAS, IEEE, Vancouver, Canada	11 days
	VLDR, Vilnius, Lithuania	10 days
	CZ LOKO, Č. Třebová, CZ	25 days
Pavol Rafajdus	TU Liberec, CZ	3 days
	TU Cluj-Napoca, Romania	10 days
	ZČU Pilsen, FE, CZ	3 days

	University of Oxford, UK	3 days
Marek Mušák	University of Catania, Italy	151 days

Other Activities

Invited Lectures/Papers

Sliding Mode Control of Electric Drives
Lecturer: Ján Vittek
Customer: Nasree Monjee Institute of Management and Technology (NMIMS), Mumbai, India
Date: 15.12.2014

Brushless DC motors (BLCD)
Lecturer: Valéria Hrabovcová
Customer: ČVUT Praha
Date: 28.11.2014

Switched reluctance motors (SRM)
Lecturer: Valéria Hrabovcová
Customer: ČVUT Praha
Date: 5.12.2014

Brushless DC motors (BLCD) – simulation analysis
Lecturer: Pavol Rafajdus
Customer: ČVUT Praha
Date: 4-5.12.2014

Switched reluctance motors (SRM) – simulation analysis
Lecturer: Pavol Rafajdus
Customer: ČVUT Praha
Date: 10-11.12.2014

Energy monitoring and system control
Lecturer: Peter Braciník
Customer: State University of Novi Pazar, Serbia
Date: 29.09.2014

Use of solar and wind energy
Lecturer: Marek Höger
Customer: State University of Novi Pazar, Serbia,
Date: 29.09.2014

Lightweight positioning and actuators for high-tech applications.
Lecturer: Juraj Makarovič
Customer: ČVUT Praha, ČR
Date: 29.05.2014

Membership in International Institutions /Committees

Juraj Altus	Representative of University of Žilina, CIRED, CZ, Representative of SK in International Energetic Agency IEA, Paris, F, Member of IEEE, IEEE senior member, Member of international scientific committee of EPE 2014, Brno, CZ
Valéria Hrabovcová	IEEE senior member, Vice-chair of professional group of IEEE IAS/IES CS
Ján Vittek	Member of program committee of conferences IASTED, AfricaPES, Science PG Group, New York, member of editorial group for Journal of Electrical and Electronic Engineering, Wroclaw University of Technology, Poland, Associate Editor of Scientific Papers of the Institute Electrical Machines, Member of IEEE
Peter Braciník	Member of IEEE,

	National delegate and member of program committee of HORIZON 2020 for "Safe, clean and effectively used energy", Belgium
Alena Otčenášová	Member of international scientific committee of conference EPE 2014, Brno, CZ, Member of IEEE
Matěj Pácha	Member of IEEE, IAS/IES Joint Chapter Chair, IEEE Czechoslovakia Section, executive committee member, IEEE Industry Applications Society, Chapter and Membership Development, Senior Membership Chair, Member of expert group Research and development CZ LOKO, Ceska Trebova, CZ
Pavol Rafajdus	IEEE senior member, Member of international committee of conference Mechatronika 2014
Milan Pospíšil	Vice-Chairman of committee for PhD thesis defense in the scientific field of Energetics, FEI VSB TU Ostrava, CZ
Marek Höger	Member of IEEE
Pavol Makyš	Member of IEEE
Vladimír Vavrúš	Member of IEEE
Marek Roch	Member of IEEE

Membership in National Institutions/Committees

Juraj Altus	Departmental Committee for PhD thesis defense in a field of Electroenergetics in Bratislava, Member of the commission of „Aurel Stodola Award in Power Engineering", SE Bratislava, Member of Working group, Accreditation committee (OV15) Programme committee, XV. Slovak Seminar for Electrical Specialists Trenčín, 2014, October 15. - 17.
Valéria Hrabovcová	Member of Slovak Electro-technical Committee at SUTN, Member of the APVV Board for the programme "Human Potential in a Field of Research and Development and Popularisation of Science (LPP)", Departmental Committee for PhD thesis defence in a field of Power Electrotechnics at FEI STU Bratislava, Faculty Committee of PhD study in Mechanical Faculty TU Kosice in the field of Mechatronics,
Ján Vittek	Magazine Editorial Board Acta Electrotechnica et Informatica, FEI TU Kosice, Faculty committee for PhD thesis defence in the field of Mechatronics, SjF TU Kosice, Member of Working group, Accreditation committee (OV15)
Michal Pokorný	Programme committee, XIV. Slovak Seminar for Electrical Specialists Trencin, 2014, October 15. - 17.
Josef Beran	Executive board of Association of Electrical Specialist active in SVK with a nationwide competence (chairman), Periodical „ELEKTROREVUE", ISSN 1336-8559, with a nationwide operation for the members of Association of Electrical Specialist (managing

	editor), registered at the Ministry of Culture under licence number EV 927/08, Organisation committee for XV. Slovak Seminar for Electrical Specialists Trencin, 2014, October 15. - 17.
Peter Braciník	Contact Person at University of Žilina for International PhD Workshop OWD, which is annually organized by Department of Mechatronics at Silesian University of Technology, Gliwice, Poland
Milos Bůžek	Executive board of Association of Electrical Specialist active in SR (vice-chairman), Periodical „ELEKTROREVUE", ISSN 1336-8559, with a nationwide operation for the members of Association of Electrical Specialist (executive editor), registered at the Ministry of Culture under licence number EV 927/08, Organisation committee for XV. Slovak Seminar for Electrical Specialists Trencin, 2014, October 15. - 17.
Alena Otčenášová	Chairman of the Commission for the first attestation in the category teacher and subcategory secondary school teacher for training electrical subjects, MŠVVaŠ SR Chairman of the attestation commission for the second attestation in the category teacher and subcategory secondary school teacher for training electrical subjects, MŠVVaŠ SR Member of Electrical engineering sector committee for National qualification system establishment, MŠVVaŠ SR
Matěj Pácha	Contact Person at University of Žilina for cooperation with Freescale Semiconductor Inc., the organizer of student competitions Programme committee, ELEKTRO 2014 Conference
Pavol Makyš	Programme committee, ELEKTRO 2014 Conference
Ivan Litvaj	Slovak Society for Quality, „Schools and Education" work group member.

Membership in University Boards

Juraj Altus	Departmental committee for PhD thesis defence in a field of Power Electrical Engineering at Faculty of Electrical Engineering, Departmental committee for PhD thesis defence in a field of Energetics at Faculty of Electrical Engineering, Scientific board of Faculty of Electrical Engineering, Scientific board of University of Žilina, Academic Senate of Faculty of Electrical Engineering (chairman),
Valéria Hrabovcová	Departmental committee for PhD thesis defence in a field of Power Electrical Engineering at Faculty of Electrical Engineering, Scientific board of Faculty of Electrical Engineering,
Michal Pokorný	Departmental committee for PhD thesis defence in a field of Power Electrical Engineering at Faculty of Electrical Engineering, Departmental committee for PhD thesis defence in a field of Energetics at Faculty of Electrical Engineering (chairman), Scientific board of Faculty of Electrical Engineering,

Ján Vittek	Departmental committee for PhD thesis defence in a field of Power Electrical Engineering at Faculty of Electrical Engineering, Scientific board of Faculty of Electrical Engineering,
Peter Braciník	Departmental committee for PhD thesis defence in a field of Energetics at Faculty of Electrical Engineering,
Alena Otčenášová	Departmental committee for PhD thesis defence in a field of Energetics at Faculty of Electrical,
Milan Pospíšil	Departmental committee for PhD thesis defence in a field of Power Electrical Engineering at Faculty of Electrical Engineering, Žilina, Departmental committee for PhD thesis defence in a field of Motor Vehicles, Rail Vehicles, Ships and Aeroplanes, Žilina,
Pavol Rafajdus	Scientific board of Faculty of Electrical Engineering, Žilina, Departmental committee for PhD thesis defence in a field of Energetics at Faculty of Electrical, Vice-dean for Research of Faculty of Electrical Engineering, Žilina,
Marek Roch	Board of Information and Communication Technology of the University (member), board of Information and Communication Technology at Faculty of Electrical Engineering (member),
Ivan Litvaj	Quality Manager at Faculty of Electrical Engineering.

Awards

M. Dubovský	Aurel Stodola Award, PhD. Thesis "Power quality in distribution network"
J. Vittek	J. A. Komensky plaque, outstanding pedagogic activities

Contact Address

Department of Power Electrical Systems **EN**

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Katedra výkonových elektrotechnických systémov **SK**

Elektrotechnická fakulta
Žilinská univerzita v Žiline
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www: http://www.kves.uniza.sk

Department of Control and Information Systems

General Information

The Department of Control and Information Systems (further referred to as the DCIS) guarantees three study programmes in the study branch Automation at the University of Žilina. Specifically it is the study programme Automation in bachelor degree, study programme Process Control Engineering in MSc. degree and study programme Process Control Engineering in PhD. degree.

Research activities of the DCIS are oriented in the field of information and safety-related system analysis and synthesis ranging from solution of theoretical models to practical projects of operation including implementation. There are many sectors of activities in which the DCIS has an exclusive position in the Slovak Republic, especially in expertise activities in the field of analysis and synthesis of railway interlocking systems.

The area of reliable and safe information transmission and processing in control of selected critical processes both in safety-related systems for all kinds of transport, complex technologies and in security systems for protection of humans and property provides dynamic incentive for all the staff. Realization of information services for operative control supported by automation and computer technology is applicable in decisive branches of the national economy.

Activities performed at the DCIS are integrated to the national and international co-operation with academic and industry sphere and realized through various forms - from research projects to exchanges of students and experts.

In 2014 the staff of the DCIS consisted of 16 university teachers, 2 technicians and administrative support and 10 full-time postgraduate students. The pedagogical staff consisted of 4 professors, 1 guest professor, 2 associate professors, 8 senior lecturers with PhD. degree, and 1 research fellow with PhD. degree.

Staff of the Department

Head of the department:	**Juraj Spalek**
Vice-head of the department:	Aleš Janota
Secretary:	Rastislav Pirník
Study Consultant:	Peter Nagy
Administrative Support:	Klára Berešíková
Technical Support:	Kamila Kršíková
Research Fellows:	Michal Gregor

Sections of the Department

Section of Automation and Signalling Systems

Head of the Section:	Karol Rástočný
Professors:	Aleš Janota, Karol Rástočný, Juraj Spalek
Guest Professor:	Pavel Přibyl
Associate Professor:	Juraj Ždánsky
Senior Lecturers (with PhD.):	Jozef Hrbček, Vojtech Šimák, Peter Nagy

Section of Communication and Information Systems

Head of the Section:	Mária Franeková
Professor:	Mária Franeková
Associate Professor:	Peter Vestenický
Senior Lecturers (with PhD.):	Emília Bubeníková, Peter Holečko, Alžbeta Kanáliková, Rastislav Pirník, Peter Peniak

Postgraduate Students

Internal:	Ján Ďurech, Marián Hruboš, Tomáš Mravec, Igor Miklóšik, Michal Gregor (until 12.8.2014), Tomáš Mikluščak (until 12.8.2014), Ľubomír Pekár (until 30.9.2014), Peter Matis (until 28.2.2014), Zuzana Lobotková, Marek Výrostko (until 30.4.2014)
External:	Milan Slivka, Peter Nagy (until 31.1.2014), Emília Bubeníková (until 9.7.2014), Anna Cerovská (until 31.8.2014), Peter Lüley

Education

Courses in Bachelor and Master Degree Programmes

Bachelor Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31100	Algorithmisation of problems	1	2-2-0
31443	Theory of automated control 1	3	3-1-1
31504	Bachelor project	5	0-0-5
31521	Communication security	5	3-1-1
31534	Single-chip controllers programming	5	2-0-2
31536	Sensor technology	5	3-1-1
31541	Control systems reliability and safety	5	3-2-0
31209	Programming languages 1	1	2-2-0

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31202	Information communication networks	2	1-0-2
31204	Computing technical environment	2	1-0-2
31425	Logical systems	4	3-1-1
31437	Control systems	4	2-1-2
31443	Theory of information and signals	4	3-1-1
31620	Bachelor project 2	6	2-0-3
31600	Bachelor work	6	0-2-0
31606	Distributed control systems	6	3-1-1
31612	Information systems	6	3-1-1
31623	Control systems programming	6	2-0-2
Courses at the Faculty of Special Engineering			
92347	Applied electronics	2	2-0-2
Faculty of Security Engineering			
97347	Applied Electronics	2	18-0-0

Master Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
32101	Control systems safety analyses	1	3-2-0
32103	Information systems security	1	3-0-2
32120	Computer networks	1	3-1-1
32130	Theory of automated control 2	1	3-1-1
32142	Signal processing appliances	1	3-1-1
32124	Safety systems components	1	3-1-1
32311	Expert systems	3	3-0-2
32316	Master project	3	0-0-5
32342	Processes visualisation	3	2-0-2
32301	Safety systems applications	3	3-0-2
32302	Safety systems	3	3-0-2
32329	Applications of information systems in process control	3	3-1-1
32202	Higher programming languages applications	2	2-1-2
32203	Secure system communication	2	3-1-1
32221	Object-oriented system development	2	2-0-2
32225	Signal processing appliances	2	3-1-1
32238	Artificial intelligence	2	3-1-1
32243	Safety systems	2	3-1-1
32401	Wireless communication	4	3-1-1
32402	Diploma work	4	0-2-0

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
32403	Diploma project	4	0-0-10
32338	Robotic systems	4	4-0-2
32411	Intelligent transportation systems	4	3-0-2

Research & Development

The scientific-research and development activities of department are focused on the area of control tasks algorithmisation, automation of control on process, operational and management levels, while utilising modern artificial intelligence approaches, and on the area of reliable, safe and secure communication and information processing in control of selected critical processes, above all the ones which imply the criterion of safety besides usual optimisation criteria. For reasons given there is a large number of research projects and cooperation projects with praxis and industry directed into the area of applied telematics and intelligent control and safety systems in transport and industry.

Laboratory of industrial processes control

The laboratory is oriented on development and simulation of algorithms for industrial processes control. The fundamentals of equipment are PCs, Siemens PLCs, extension modules for sensors and actuators connection, modules for remote inputs and outputs, visualisation panels, frequency converters and programming and configuration software. The interconnection of components and positions is realised by industrial networks. Actual models of industrial processes support the operation of this technology.

Laboratory of safety critical control systems

The laboratory is focused on development of safety related control systems. The fundamentals of technology equipment are PCs and Siemens PLCs with software support. Safety relevant communication between these programmable automata and cooperating devices is realised using safety relevant protocol PROFISAFE. The laboratory includes operational safety systems by Scheidt&Bachmann (BUES2000, ZBS2000).

Laboratory of traffic processes control

The laboratory is focused on the area of system identification, design and implementation of control algorithms for traffic and industrial systems. It is equipped with programmable logical automata, safety PLCs, I/O modules, converters, traffic and industrial systems models and specialised computers with software; Automation Studio, Safe Designer, MATLAB, Atmel Studio, RSLogix, RSLinx, RSView.

Laboratory Betamont

The laboratory aims on experimental works of PhD. students and final degree students of bachelor and master programmes. The focus is the area of development, customisation and realisation of experimental communication subsystem of Intelligent Transportation Systems (ITS). The development heads towards display appliances in the function of

dynamic traffic signs, information panels and similar, primarily in the direction ITS infrastructure – driver. The development in laboratory also includes applications of distinct communication standards, primarily intended for the communication between vehicles, vehicles and infrastructure and between ITS infrastructure objects.

The laboratory is built within the following projects: „Centre of excellence for intelligent transportation systems and services I", „Centre of excellence for intelligent transportation systems and services II" and „New methods for measuring dynamic properties of motor vehicle and its interaction with roadway" (in cooperation with BETAMONT), which have been acquired in the operational programme Research and development by the EU Structural funds.

Laboratory of information technologies

The laboratory is oriented on information systems (databases, web technologies, virtualisation), computer networks (modelling, simulation, monitoring) and its safety (penetration testing, intrusion detection, firewalls, cryptanalysis, antimalware).

Hardware equipment: Juniper IDP 75 – intrusion detection system; Fluke Networks Time Machine Express NTM - EX2 – network traffic monitoring device

Software equipment: OPNET Modeler + Wireless Suite – network modelling, simulation and emulation environment; OPNET IT Guru Academic Edition – academic edition of environment; PRTG Paessler Network Monitor – network traffic monitoring tool.

Laboratory of experimental tasks

The laboratory is intended for experimental operations related to bachelor, master and research tasks including realisation of electronic devices.

Laboratory of automated control theory and signal processing

The laboratory is aimed on testing of theoretical fundamentals from the area of automated control theory (continuous and discrete systems), theory of information and signals and digital signal processing with custom programs and MATLAB with its specialised toolboxes (Simulink, Control Toolbox, Signal Processing Toolbox). It includes actual educational models by Humusoft CE 151 (ball on plane) with accessories (Extended Real Time Toolbox and Real Time Windows Target) and appliances by IMFsoft (motor rpm regulator, temperature regulation).

Joint laboratory of tunnel systems

The laboratory serves for experimental works for bachelor, master and PhD. students by providing a joint laboratory of tunnel systems (JLTS) as a competence centre, which systematically cooperates on optimisation of equipment and permanent increasing of safety of tunnel systems in Slovak and Czech Republic. The laboratory is built within the projects "Centre of excellence for intelligent transportation systems and services II" and "Transport telematics systems research centre", which have been acquired in the operational programme Research and development by the EU Structural funds. A part of the laboratory will be a laboratory for research of methods for tunnel systems safety quantification.

Laboratory of modelling and simulation

The laboratory is aimed on education of specialised subjects requiring support of software tools. It is mainly intended for modelling of functional properties of control systems (UML; Rhapsody software tool), reliability and safety attributes (CARE software tool), control procedures and control structures (Matlab and LabView environments). In case of need, it is available for other applications – design and work with database systems, expert systems and so on. The laboratory includes technology utilised in objects protection (alarm systems, electric fire signalisation, camera surveillance systems). The laboratory can also be utilised for students' individual work during working out the semester projects and diploma theses.

Laboratory of computer networks and secure communications

The laboratory is focused on the area of LANs including wireless communication technologies. The technical equipment for computer networks includes basic PCs, structural cabling distributor, switches and routers 3com a Cisco, IEEE 802.11 wireless networks analyser. The technical equipment for industrial communication networks includes PROFIBUS and CAN protocol analysers.

Laboratory of microcomputers and robotics

The laboratory is intended for research and development in the area of robotics and microcomputers. It is equipped with computers and programmable interfaces for ATMEL microcomputers and ABB industrial robots. The laboratory hosts the research of mobile sensor platform for robots navigation.

Laboratory of modelling, optimisation and simulation technologies for ITS

The laboratory is focused on development, modification and realisation of mathematical and simulation models for the support of traffic network control. The main objective is development of methods and algorithms for predictive control of telematic subsystems.

Device equipment: I/O card, SW - toolbox for predictive control, workstation for the complex control system model, specialised literature.

Co-operation

Co-operation Partners in Slovakia

- ABB s.r.o., Banská Bystrica
- AP Signaling s.r.o., Martin
- Aquastyl, s.r.o., Považská Bystrica
- Avekol, s.r.o. Žilina
- AŽD Slovakia, Bratislava
- B+R automatizace, s.r.o. Nové Mesto nad Váhom
- Betamont, s.r.o. Zvolen
- Gity, a.s., Martin
- ELTODO SK, s.r.o. Bratislava
- FEI – Slovak technical university Bratislava
- FEI – Technical university Košice
- IBM Slovensko, Bratislava
- IS - Industry Solutions, a.s. Žilina
- MtF - Slovak technical university Bratislava
- Profibus.sk, FEI, STU Bratislava
- ROBOTEC, s.r.o., Sučany
- Scheidt&Bachmann Slovensko s. r. o., Žilina

- Siemens s. r. o., CEE RU-SK IC-MOL RA RA-COC
- Siemens s.r.o. Divízia Automatizačná technika a pohony (IA&DT)
- SjF - Slovak technical university Bratislava
- SkyToll, a.s. Bratislava
- SÚTN, Bratislava
- URAP-Automatizácia s.r.o
- Visteon Electronics Slovakia, s.r.o. - Námestovo
- Slovak association of electrotechnical industry, Bratislava
- ŽSR, Bratislava

International co-operation Partners

- Altas komercinis transportas (ALTAS), Maišiagala, Lithuania
- ALTPRO d.o.o., Zagreb, Croatia
- AŽD Praha s.r.o., Prague, CR
- Bernecker + Rainer Industrie Elektronik GmbH, Germany
- ELTODO EG, Praha, CR
- Faculty of transport, CTU, Prague, CR
- První Signální a.s., Ostrava, CR
- SDT – Sdružení pro dopravní telematiku (Transport telematics association), Prague, CR
- SIEMENS AG, I MO RA PEC, Vienna, Austria
- Siemens Aktiengesellschaft Oesterreich, IC MOL RCM ET, Vienna, Austria
- Signalbau, a. s., Přerov, CR
- Thales Rail Signalling Solutions GesmbH, Vienna, Austria
- Tollnet, a.s. Prague, CR

Visitors to the Department

Name	Institution	Length of stay
António Andonov	Todor Kableshkov University of Transport, Sofia, Bulgaria	5 days
Vladimír Gergov	Todor Kableshkov University of Transport, Sofia, Bulgaria	5 days
Jerzy Mikulski	Politechnika Ślaska, Wydzial Transportu, Katowice, Poland	10 days
Peter Tschulik	Siemens Aktiengesellschaft Oesterreich, Vienna, Austria	1 day
Milan Kunhart	AŽD Praha, CR	2 days
Andrzej Białoń	Centrum naukovo-techniczne kolejnictwa, Warszawa, Poland	3 days
Jakub Młyńczak	Politechnika Ślaska, Wydzial Transportu, Katowice, Poland	1 day

Visits to Foreign Institutions

Name	Institution	Length of stay
Mária Franeková	Veľké Karlovice, CR – ICCC 2014	2 days
	Todor Kableshov University of Transport, Sofia, Bulgaria	3 days
Peter Holečko	Transport telematics association, Praha, CR	1 day
Aleš Janota	Silesian University of Technology, Ustroň, Poland - TST 2014	3 days

	Vienna, Austria – ICCVE 2014 conference and trade fair	2 days
	School of Architecture, Torino, Italy – 25. DC-TUD COST	2 days
	IFSTTAR, Paris, France – 24. DC-TUD COST	3 days
	Maribor, Slovenia – 23. DC-TUD COST	2 days
	University of Cantabria, Santander, Spain – TU1105 COST	2 days
	Brussels, Belgium – Smart Cities kick-off meeting	1 day
	Kopřivnice, CR - SDT meeting	2 days
	TU-VŠB Ostrava, CR	1 day
	VÚT Faculty of Civil Engineering, Brno, CR	1 day
Rastislav Pirník	ČVUT Faculty of Transport, Erasmus teacher mobility	4 days
	Ustroň, Poland - TST 2014	3 days
	Velké Karlovice, CR – ICCC 2014	2 days
Karol Rástočný	KPM Konzult, Brno, CR (Editorial board meeting, New railway technology)	2 days
	Silesian University of Technology, Ustroň, Poland (TST 2014)	3 days
	TU Pardubice, Faculty of Transport	2 days
Juraj Spalek	Vienna, Austria (ICCVE 2014)	2 days
	Kopřivnice, CR (Tatra, a.s.)	2 days
Juraj Ždánsky	Silesian University of Technology, Ustroň, Poland - TST 2014	3 days
	Bernecker + Rainer Industrie Elektronik GmbH, Austria	2 days
Jozef Hrbček	Bernecker + Rainer Industrie Elektronik GmbH, Austria	2 days
	Silesian University of Technology, Ustroň, Poland - TST 2014	3 days
Vojtech Šimák	Bernecker + Rainer Industrie Elektronik GmbH, Austria	2 days
	FEU Porto, Portugal, Erasmus teacher mobility	5 days
Marián Hruboš	Silesian University of Technology, Ustroň, Poland - TST 2014	3 days
Igor Miklóšik	Silesian University of Technology, Ustroň, Poland - TST 2014	3 days
Ján Ďurech	Silesian University of Technology, Ustroň, Poland - TST 2014	3 days
	University of Oxford, UK	3 days
Marek Mušák	University of Catania, Italy	151 days

Contracts (Business Activities)

Appraisal of national requirements fulfilment for installation of ETCS mobile unit on electric unit (EPJ) type 671 for the elaboration of assessment report by the notified body ARSENAL RACE

Customer:	Thales Austria GmbH, Handelskai 92, 1200 Vienna, Austria
Coordinator:	Peter Nagy
Note:	Contract within 16.12.2014 – 30.6.2015

P-103-0001/14: Overall appraisal of the Simis W SK system – Point version phase 4.4 V10.3.12

Customer: SIEMENS AG, Östereich, Siemensstr. 90, 1211 Wien, 2012
Coordinator: Karol Rástočný

Other Activities

Specialised Lectures and Courses Organized by the Department

Information Systems Security Management
Customer: Lecture for the students of Safe process control
Lecturer: Martin Šuták, GiTy a. s., Martin
Date: 11. 11. 2014

Hardware and software equipment of AŽD ESA 33 electronic interlocking box
Customer: Lecture for the 2nd degree students of the Process Control programme
Lecturer: Petr Jelínek, AŽD Praha, spol. s r.o.
Date: 25. 11. 2014

Software equipment of SIEMENS SIMIS W electronic interlocking box
Customer: Lecture for the 2nd degree students of the Process Control programme
Lecturer: Rastislav Kušpál, SIEMENS spol. s r.o., Žilina
Date: 5. 12. 2012

Control and interlocking technology in Budapest subway
Customer: Lecture for the DCIS students and staff
Lecturer: Géza Tarnai, TU Budapest
Date: 01.12.2014

Invited Lectures/Papers

Modernisation of Technology and Educations Methods Orientated to Area of Cryptography for Safety Critical Applications
Lecturer: Mária Franeková
Where: Todor Kableshkov University of Transport, Rimska Baňa - KEIT 2014, Bulgaria
Date: 20. 06. 2014

What contributes the University Scientific Park to the intelligent transport
Lecturer: Juraj Spalek
Where: Road Conference 2014, Bratislava
Date: 25. - 26. March 2014

Challenges and Unwanted Features of the Smarter Cities Development. International Conference on Mobility and Smart Cities, Springer-Verlag (in Print)
Lecturer: Milan Dado, Aleš Janota, Juraj Spalek
Date: 27 - 28.10.2014, Rome

Information and Communication Networks
Lecturer: Rastislav Pirník
Where: UNIZA – Faculty of Civil Engineering
Date: 16.04.2014

National traffic information system, state and realisation of NDIC.
Lecturer: Rastislav Pirník
Where: CTU – Faculty of transport
Date: 25.08.2014

Presentation of specifics of ITS technical studies within Slovak regional towns (Prešov, Martin and Ružomberok) and the problem of tunnel constructions in Slovakia.
Lecturer: Rastislav Pirník
Where: CTU – Faculty of transport
Date: 26-27.08.2014

Tunnel operation, operational states
Lecturer: Rastislav Pirník
Where: UNIZA – Road tunnels dispatcher course for NDS, run I
Date: 10.11.2014

Tunnel operation, operational states
Lecturer: Rastislav Pirník
Where: UNIZA – Road tunnels dispatcher course for NDS, run II
Date: 14.11.2014

Membership in International Institutions /Committees

Mária Franeková	Member of international scientific board of the 14th international conference Transport Systems Telematics TST'14, Katowice-Ustroń, Poland Member of editorial board of international scientific journal Advanced in Electrical and Electronic Engineering, Poland, ISSN 1804-3119 Member of editorial board of international scientific journal Archives of Transport System Telematics, CR, ISSN 189-8208 Member of editorial board of international scientific journal Journal of Scientific and Applied research, Bulgaria ISSN 1314-6289 Member of editorial board of international scientific journal for electrotechnics Elektrorevue, CR, ISSN 1213-1539
Peter Holečko	Member of Cooperative systems workgroup of Transport telematics association, Praha, CR
Aleš Janota	Member of programme board: 14th International conference on Transport System Telematics – TST 2014, October 22-25, 2014, Katowice—Ustroń, Poland chairman of scientific-programme board of journal Archives of Transport System Telematics, ISSN 1899-8208 Member of programme board of journal TransNav International Journal on Marine Navigation and Safety of Sea Transportation, Gdynia, Poland, ISSN 2083-6473 Member of programme board: 10th Symposium on Formal Methods FORMS/FORMAT 2014, October 1-2, 2014, Braunschweig, Germany Member of scientific board of XVIII. International conference Computer Aided Science, Industry and Transport TRANSCOMP 2014, Zakopane, Poland: 1-4. 12. 2014 transport commission: Polish science academy, Katowice, Poland
Rastislav Pirník	Member of Cooperative systems workgroup of Transport telematics association
Karol Rástočný	Member of programme board 14th international conference Transport Systems Telematics, Ustroň, Poland: 22. – 25. 10. 2014 Member of programme board 19th international conference IEEE Applied Electronics, Plzeň, CR: 9. – 10. 09. 2014

	Member of editorial board of international journal Transport Problems, ISSN 1896-0596 Member of editorial board of international scientific journal Archives of Transport System Telematics, ISSN 1899-8208 Member of editorial board of international scientific journal Advances in Electrical and Electronic Engineering, ISSN 1804-3119 Member of editorial board of journal New railway technology, ISSN1212-3942 Member of reviewing board of journal PROMET - Traffic&Transportation on Traffic and Transportation Research (Scientific Journal on Traffic and Transportation Research; Journal is covered by Thomson Reuters), ISSN: 1848-4069
Juraj Spalek	vice chief-editor of scientific journal Annals of faculty engineering hunedoara – Journal of engineering, ISSN: 1584-2665, ISSN: 1584-2673, indexed in Index COPERNICUS – Journal Master List Member of scientific board Acta technica Corviniensis – Bulletin of Engineering, e-ISSN: 2067-3809, Edited by Faculty of Engineering Hunedoara University Politehnica Timisoara Member of programme board of international scientific journal Archives of Transport Systems Telematics, Polish Association of Transport Telematics, ISSN 1899-8208 Member of reviewer team IET Intelligent Transport Systems ISSN: 1751956X, 17519578 Member of reviewer team TUNEL (ITA-AITES) ISSN 1211-0728
Juraj Ždánsky	Member of scientific-programme board of journal Archives of Transport System Telematics, ISSN 1899-8208 Member of scientific-programme commission 14th International conference Transport System Telematics, Katowice, Ustroň, Poland

Membership in National Institutions/Committees

Mária Franeková	Member of technical standardisation committee TK 83 railway applications, SÚTN Bratislava Member of Slovak cybernetics and informatics society at the Slovak science academy (SSKI) Member Profibus.sk association Member Scientific-technical association at the UNIZA Member of KEGA (commission Nr. 2) Member organising board UNIZA children university 2014, Žilina
Aleš Janota	Member of technical standardisation committee TK 104 Industrial process control, SÚTN Bratislava Member of programme board 22nd international symposium EURO-ŽEL2014 "New challenges for European railways", Žilina: 3.-4. 6. 2014 Member of programme board InTech – Intelligent Technologies 2014, September 11-13, 2014, Aquacity Poprad, Slovakia

Karol Rástočný	Chairman of programme board International conference of railway communication and interlocking technology, Vyhne, 12. – 14. 03. 2014 Member of programme board International symposium ŽEL 2014, Žilina, 3. – 4.6. 2014 Member of programme board International conference Intech, Poprad, 12. – 13. 9. 2014 Member of editorial board of AT&P Journal, ISSN 1335-2237 Member of technical standardisation committee Nr. 83, SÚTN Bratislava
Juraj Spalek	Member of scientific board ELEKTRO 2014 – 10th international conference: Slovakia, May 19-20, 2014 Member of Slovak cybernetics and informatics society at the Slovak science academy (SSKI) Member of Slovak association for applied cybernetics and informatics (SSAKI) Member of workgroup for OV 16 of Accreditation commission of Slovak ministry for education
Rastislav Pirník	Member of programme board of 10th international conference of railway communication and interlocking technology, Vyhne, SR
Jozef Hrbček	Member of organisation board 10th international conference ELEKTRO 2014, Rajecké Teplice, SR, 19. - 20. May 2014
Alžbeta Kanáliková	Member of organisational and programme board of 7th international conference Innovation process in e-learning, Bratislava, SR 20. 3. 2014

Membership in University Boards

Emília Bubeníková	Member of execution board KAP- EF Member of organising board of Electroolympics organised in cooperation with Slovak electrotechnics industry association
Mária Franeková	Member of faculty branch commission of 5.2.14 Automation branch Member of scientific board FEE UNIZA Chairperson of KAP- EF association
Aleš Janota	Member of faculty branch commission of 5.2.14 Automation branch Member of faculty branch commission of 9.2.9 Applied informatics FCI UNIZA Member of scientific board FEE UNIZA
Rastislav Pirník	Member of KAP- EF association Member VTS association at UNIZA
Karol Rástočný	Chairman of faculty branch commission of 5.2.14 Automation branch Member scientific board FEE UNIZA Member FEE UNIZA senate
Juraj Spalek	Member scientific board UNIZA Member scientific board FEE UNIZA Member of faculty branch commission of 5.2.14 Automation branch Member of faculty branch commission of 9.2.9 Applied informatics FCI UNIZA Member FEE UNIZA senate
Peter Vestenický	Member of faculty branch commission of 5.2.14 Automation branch

Juraj Ždánsky	Member of organising board of Electroolympics organised in cooperation with Slovak electrotechnics industry association

Awards

Marián Hruboš	Certificate of merit in category Designer of the Year 2014 Elosys 2014 exhibition
K. Rástočný, J. Ždánsky	Literature fund monograph prize (Scientific and expert literature and computer programs section) in the category natural and technical sciences for the writing Control systems with PLCs, Literature fund, Bratislava 2014
Juraj Spalek	Bronze medal FME TU Košice for the propagation of faculty reputation Commemorative medal of the FEI TU Košice for a long term cooperation with the Department of Cybernetics and Artificial Intelligence

Contact Address

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www: http://kris.uniza.sk

Department of Telecommunications and Multimedia

General Information

The Department of Telecommunications was founded in 1967. In first years, activities of the Department were concentrated on circuits' theory and signals, digital and impulse techniques, transmission systems and switching systems, telecommunication networks and their reliability. Aim of the Department has been directed towards modern trends in communication technologies. Several new laboratories have been built and education has been gradually increasing in a domain of software oriented-courses. In recent years specialization of the Department has been extended also to the area of multimedia technologies including multimedia content development. In 2008 the name of the Department was changed to Department of Telecommunications and Multimedia (DTM).

At the present, the research and education of the Department of Telecommunications and Multimedia is covered by wide range of activities related to telecommunication, information and multimedia technologies. In the field of telecommunication technologies, attention is focused on communication networks, access technologies, convergence of network technologies with main activities oriented on quality of media services.

Regarding fixed networks technologies, great afford is paid to wideband optical networks which are joint activity with the Department of Physics. Wireless technologies are directed towards mobile and satellite communications, positioning systems as well as to DVB-x. Other significant research activities are in the area of digital signal processing, the stress is laid upon semantic analysis and recognition of audio – visual content including 3D image/video processing.

Relatively new interdisciplinary areas of interest are the multimedia technologies that are oriented on multimedia content creation. This specialization incorporate the courses on fundamental of image composition, film directing, multimedia editing and post-processing, etc. The main target of this area is the support of future multimedia services. Regarding number of students that have been studying at the Department, DTM belongs among the biggest departments and the most important at the Faculty of Electrical Engineering. DTM consists of 3 divisions: Telecommunication Group, Radiocommunication Group and Digital signal processing Group.

Staff of the Department

Head of the Department:	**Martin Vaculík**
Vice-head of the Department:	Róbert Hudec
Secretary:	Jozefa Imrišková
Technical Support:	Miloslav Karch, Mariana Kazimírová,Katarína Prokšová
Research workers:	Miroslav Benčo, Michal Chmulík, Ján Litvík, Juraj Machaj, Martina Radilová

Sections of the Department

Section of telecommunication technique

Head of the Section:	Peter Kortiš
Professors:	Milan Dado
Associate Professors:	Ladislav Schwartz, Milan Trunkvalter, Martin Vaculík
Senior Lecturers (with PhD):	Ivan Dolnák, Jozef Dubovan, Peter Kortiš, Martin Vestenický

Section of radiocommunication technique

Head of the Section:	Vladimír Wieser
Professors:	Vladimír Wieser
Associate Professors:	Peter Brída, Vladimír Hottmar
Senior Lecturers (with PhD):	Bohumil Adamec, Darina Jarinová

Section of digital signal processing

Head of the Section:	Roman Jarina
Associate Professors:	Roman Jarina, Peter Počta, Daša Tichá
Senior Lecturers (with PhD):	Patrik Kamencay, Michal Kuba, Martin Paralič

Section of multimedia technologies

Head of the Section:	Róbert Hudec
Associate Professors:	Róbert Hudec
Senior Lecturers (with PhD):	Ján Hlubík, Miroslav Markovič, Slavka Pitoňáková, Miroslav Uhrina
Lecturer:	Vladimír Soviar
Part-time Lecturer:	Tomáš Rolík, Daniel Milučký

Postgraduate Students

Internal:	Martin Bojmír (until Sept. 2014), Daniel Benedikovič, Viktor Ďurček, Miroslav Frič (until Aug. 2014), Igor Guoth, Katarína Kotianová (until Nov., 2014), Jozef Kozák (until July, 2014), Miroslav Malík (from Sept., 2014), Slavomír Matúška (until Aug., 2014), Jozef Polacký, Ján Račko (from Sept., 2014), Michaela Solanská, Peter Sýkora, Jana Šajgalíková, Andrej Tkáč (until Aug., 2014), Tibor Trnovszký (from Sept., 2014), Ondrej Závodský (from Sept., 2014), Martin Šimaliak (until Aug., 2014)
External:	Jozef Benikovský (until Aug., 2014), Ivan Dolnák, Ladislav Peťko, Martin Šimaliak (from Aug., 2014)

Education

Courses in Bachelor and Master Degree Programmes

Bachelor Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31301	Electroacoustics	3	3 – 1 – 1
31400	Analog Circuit Systems	4	2 – 1 – 2
31420	Communication Technologies 1	4	2 – 1 – 1
31433	Transmission Media	4	3 – 1 – 0
31440	Signals and Systems	4	3 – 2 – 0
31419	Java - Language and Applications	4	2 – 0 – 2
31424	Linear Circuits and Systems	4	2 – 0 – 1
31432	Computer Networks 1	4	2 – 0 – 4
31503	Bachelor Project 1	5	0 – 0 – 2
31522	Communication Technologies 2	5	2 – 0 – 1
31526	Measurement in Telecommunications	5	0 – 0 – 2
31535	Radiocommunication Systems 1	5	2 – 1 – 0
31544	Television Technique	5	3 – 1 – 0
31532	Computer Networks 2	5	2 – 0 – 4
31546	Design of Multimedia Web Pages	5	2 – 0 – 2
31600	Bachelor Work T	6	0 – 2 – 0
31603	Bachelor Project 2	6	0 – 0 – 2
31605	Database Systems	6	4 – 0 – 2
31625	Radiocommunication Systems 2	6	4 – 0 – 0
31308	Image Composition and Stylistics	3	1 – 2 – 0
31309	Legal Aspects of Media Applications	3	1 – 1 – 0
31310	Transmission Techniques	3	2 – 2 – 0
31312	Image Composition Project	3	0 – 0 – 2
31406	The Past of Literature and Film	4	2 – 2 – 0
31417	Photographic and Film Technology	4	2 – 0 – 2
31431	Vector Graphic and Typography	5	1 – 0 – 2
31435	Audio Production Project	4	0 – 0 – 2
31438	Scriptwriting and Dramaturgy	4	2 – 2 – 0
31440	Signals and Systems	4	3 – 2 – 0
31451	Audio Production	4	2 – 0 – 2
31436	Rhetoric	4	1 – 1 – 0
31508	Digital Video and Audio	5	2 – 0 – 2
31539	Group project	5	0 – 0 – 6
31546	Design of Multimedia Web Pages 1	5	2 – 0 – 2
31554	Fundamentals of Stage Management	5	2 – 2 – 0
31506	The Past and Present of Visual Arts	5	2 – 1 – 0

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31631	Final Project	6	0 – 4 – 0
62145	Wireless Technology and Radiocommunication	5	2 – 1 – 0
63199	Multimedia Composition	6	2 – 2 – 0
63200	Image Composition and Stylistics	6	2 – 2 – 0
Courses at the Institute of High Mountain Biology			
62145	Wireless Technology and Radiocommunication	5	2 – 1 – 0
63199	Multimedia Composition	6	2 – 2 – 0
63200	Image Composition and Stylistics	6	2 – 2 – 0

Master Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
32108	Photonic Communication Systems	1	2 – 0 – 2
32127	Electromagnetic Waves Propagation and Antennas	1	2 – 1 – 0
32133	Signals and Systems Theory	1	2 – 2 – 0
32100	Algorithms and Program Languages	1	2 – 0 – 2
32113	Measurement in Telecommunications 2	1	0 – 0 – 2
32116	Computer Aided Circuits Design	1	1 – 0 – 2
32204	Digital Signal Processing 1	2	2 – 0 – 2
32226	Radiocommunication Systems and Networks 1	2	2 – 1 – 1
32205	Digital Audio Processing	2	2 – 1 – 0
32215	Measurement in Telecommunications 3	2	0 – 0 – 2
32219	Non-linear Circuit Systems	2	2 – 1 – 0
32220	Neural Networks	2	2 – 0 – 1
32232	Circuit Synthesis	2	2 – 0 – 2
32239	Fiber Optics	2	2 – 2 – 0
32242	Enhanced Programming Languages	2	2 – 0 – 2
32306	Digital Signal Processing 2	3	2 – 0 – 2
32317	Communication Technologies 3	3	2 – 0 – 1
32332	Radiocommunication Systems and Networks 2	3	2 – 0 – 2
32322	Microwave Technique	3	2 – 0 – 2
32323	Microwave Circuits	3	2 – 1 – 2
32339	Special Circuit for Comm. Systems	3	2 – 2 – 0
32402	Diploma Work	4	0 – 2 – 0
32403	Diploma Project	4	0 – 0 – 2
32418	Networks Projection and Operation	4	4 – 0 – 2
32422	Reliability of Telecomm. Systems	4	2 – 1 – 0
32423	Trends in ICT	4	2 – 0 – 0

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
32100	Algorithms and Program Languages	1	2 – 0 – 2
32102	Architectural Acoustics	1	2 – 1 – 1
32104	Introduction to Visual Arts	1	2 – 1 – 0
32110	3D Graphic and Animation	1	1 – 1 – 0
32128	3D Graphic Project	1	0 – 5 – 0
32134	Design of Multimedia Web Pages 2	1	2 – 0 – 2
32139	Digital Image and Video Processing	1	1 – 0 – 3
32212	Cutting service	2	2 – 1 – 0
32217	Digital television	2	2 – 1 – 0
32222	Distribution of multimedia signals	3	2 – 1 – 1
32227	Project 2	2	0 – 6 – 0
32234	Graphic interfaces API	2	2 – 0 – 2
32235	WEB application design 1	2	1 – 0 – 2
32240	Literature and movie arts	2	2 – 2 – 0
32247	Radiocommunication Systems and Networks MI	1	2 – 1 – 1
32314	WEB application design 2	3	1 – 0 – 2
32318	3D virtualization	3	1 – 0 – 3
32320	Experimental multimedia creation	3	1 – 0 – 2
32326	Media marketing	4	4 – 4 – 0
13P103	Radiocommunication systems	3	3 – 1 – 0
Courses at the Faculty of Operation and Economics of Transport and Communications			
13P103	Radiocommunication systems	5	3 – 1 – 0

Research & Development

Research activities of the Department are oriented in the area of fixed and mobile networks and signal processing. The research in the telecommunication technology is focused on communication networks and network technologies in transport and access network, convergence of network technologies and services and also methodology of multimedia services quality evaluation. Dominant part of research is focused on research and development of mathematical models and technologies for high-speed all optical networks using numerical modelling of physical structures. Design of methods for speech quality evaluation and quality evaluation of audio-visual streams in IP networks is also very significant research activity.

In the field of radiocommunication technique, research activities are focused on wireless communication systems and mobile positioning in these systems. Scientific activities are based on quality of services improving in mobile networks with fixed and ad hoc architecture. The optimization of routing and topology in these networks is main research scope. Research in the field of mobile positioning is very interesting topic. It is focused on proposal of new positioning methods and integration of various positioning systems. Part of research capacity is devoted to theory of operation load and fronts.

Research in the field of digital signal processing is focused on processing and annota-

tion of video and audio data. Crucial part of the research is semantic annotation of the observed data, classification of 2D/3D objects and faces, segmentation, reconstruction and modelling of 3D scene with application to industry. The research results are mainly implemented to intelligent transport systems and computer support of medical applications. In case of audio signal processing, attention is paid to recognition of general voices, analyse of emotional status from audio scene and quality of speech and audio evaluation. Attention is primarily devoted to parametric description of audio with using of optimization techniques and new procedures of stochastic modelling of audio data time sequences. The research activities are implemented in particular laboratories.

ExpLab laboratory

ExpLab laboratory is located in ND317 room at the Department. This laboratory is focused on research and development in the field of very high frequencies technology/circuits and modern converged packet networks. This laboratory is equipped with modern measurement and emulation technology (e.g. network analyser Rhode&Schwartz ZVL, digital oscilloscope LeCroy 104MXS with 1 GHz maximum input frequency, programmable generator, LCR bridge and so on). Converged packet network part of this laboratory is equipped with unique multifunction network traffic emulator and analyser AVALANCHE 290 and with various network CISCO devices (routers, switches and so on). This network technology allows to emulate and to analyse a complex network infrastructure. Laboratory is used for research purposes and practical experiments mainly for PhD. students. Within a short time of laboratory activity (approximately 3 years) two PhD. thesis have been successfully completed. One PhD. thesis will be completed this year. The significant results of experiments and results of emulations have been published in indexed international journals.

Laboratory of digital communications

The laboratory is focused on research and education in the area digital communications, e.g. networks security from sophistically attacks on network components point of view, QoS evaluation, optical transmissions from spectrum, dispersion and attenuation optical fibres point of view and access networks. The laboratory is equipped with unique equipment as named spectrum analyser, reflectometer, network analyser of transmissions protocols, different networks simulators and network operations analyser. The laboratory is equipped with optical access system GPON, all components for xDSL technology analysis and various types of communication terminals for connection to private also public networks.

Laboratory of the optical communications systems

The laboratory of the optical communication systems is primarily used for students, who deal with problems of the physical layer of optical networks. Simulation software VPI Photonic is utilized for teaching. Software for numerical modelling of real optical and electronic components, and due to its modular design, allow quick work and deep understanding of the problematic. In the laboratory, the courses provided by the Department are Photonic Communication Systems, Fibre Optics, and more. Laboratory capacity is 16 students.

Laboratory of the information technology ("HP Innovative Education")

Laboratory of the Information Technology ("HP Innovative Education") is situated in a modern equipped room (ND326) at the Department. The available hardware equipment obtained by a grant from Hewlett-Packard Company include installed graphics software Photoshop CS4, CorelDraw X4 and Cinema4D too. For teachers are available two HP tablets that can be interactively used by wireless connection to the projector to work with students. There are realized several courses organized by the Department, for example: Creating multimedia web sites, Web applications, 3D - graphics, Vector graphics, and more. Laboratory capacity is 12 students.

Laboratory of digital video processing

The laboratory creates a group of scientists and staff, graduates and students with common research goals in the area of digital image processing and video. The laboratory consists of a total of 3 sub-laboratories:

1. **Laboratory of semantic analysis image and video data analysis.**
2. **Laboratory of applied research and prototype solutions of electronic systems.**
3. **Laboratory of 3D modelling and virtual reality.**

Laboratory of semantic analysis of image and video data is located in the room ND309B. The research in this part of laboratory is specialized on semantic analysis of video data with application for different segment, for example web, traffic, medicine, army, etc. The dominant part is created by research of algorithm not only for low-level description but also high-level description of image data, analysis of content by MPEG-7 descriptors, classification image data, cut detection, image and video segmentation, videoconcealment, etc. Laboratory is equipped by 2D sensing and projective technology for area of traffic, web and industry, 16-core workstations, HeavyHorse, SW, etc.

Laboratory of applied research and prototype solutions of electronic systems is located in the room ND312C. The research and development in this part of laboratory is oriented on applied electronics in domains such as medical, military, ICT etc. The systems of intelligent textiles for measurement of humans biological parameters (EKG, muscle activity, heartbeat etc.) and On Board Unit systems for monitoring structural conditions of airplanes and helicopters is dominant part of research. Laboratory is equipped with complete technology from company LPKF for Rapid Prototyping (design, fabrication, initiation and testing), with 8-layers DPS and SMD components (Eagle v6, ProtoMat S103, MultiPress S, Minicontact RS, ProtoPlace S, ProtoFlow E), different design of processor boards and peripherals (Freescale, Virtex, Atmel, etc.), and with otherwise top measurement technology and safe data-store with 8TB in RAID.

Laboratory of 3D modelling and virtual reality is located in a room under the student restaurant at Veľký diel. The research and development in this part of laboratory is focused on the area of virtual reality, especially in areas, like a web, medicine, transportation, and so on. The dominant part in this laboratory is research of stereovision algorithms, modelling of 3D scenes and objects (CAD software, 3D scanner and video data), 3D face recognition, classification of 3D objects, 3D modelling of traffic flow, diagnosis and treatment of cancer. At the heart of the laboratory is 3D printing. This means that the proposed 3D models using 3D printer can be printed. The laboratory is equipped with 3D sensors, projection equipment and printing technology from ZCorp (3D scanner ZScanner 700/Creaform, Z650 3D printer), 32-core workstation HeavyHorse, SW and so on.

Laboratory of multimedia

The laboratory is equipped with audio and video technology so that students have the opportunity to become familiar with the basic tasks of processing audiovisual material. In terms of research, the laboratory focuses on assessing the quality of internal and external factors on the transmitted audiovisual data and 3D applications. It is equipped with rich camera systems, mixer, video on-line editing systems and application servers for processing audiovisual material. In terms of measuring technique the laboratory is equipped with basic measuring devices allowing the measurement and analysis of video and audio. Laboratory is situated at two places. The part of laboratory focused on editing of video is located in room the NB321. The second part focused on studio technique and atelier works (audio and video) is placed in the AMT (Ateliér mediálnej tvorby) laboratory under the Student restaurant at Veľký diel.

Audiolab - Laboratory of acoustics and audio signal processing

Specialized research laboratory was established in 2003. Research of the laboratory was initialized under the SEMANTICA FP6 Marie Curie ERG project. Activities of the lab are oriented to both basic and applied research in various areas of speech and audio signal processing using machine learning and artificial intelligence approaches. During its existence, Audiolab research group was involved in several national projects either supported by the Grant Agency for R&D (APVV), Scientific Grant Agency (VEGA), or under the framework of the State Program of Science and Research of the Ministry of Education. It was also partner of the COST Action 292. Currently, members of the laboratory participate on research of selected tasks within EU COST Action IC1003 QUALINET and IC 1103 – "Integrating Biometrics and Forensics for the Digital Age". Laboratory is part of the Centre of excellence for systems and services of intelligent transport. The laboratory is equipped with 2 powerful multicore workstations intended for advanced mathematical solutions, server, powered PCs, specialized software as well as common instrumentation for acoustical measurements and sound analysis. Nowadays, laboratory infrastructure is upgraded by support of EU Structural Funds.

Laboratory of mobile communication systems

The laboratory is focused on scientific research and education of mobile radiocommunication networks and systems. The laboratory consists of 2 sub-laboratories:

1. **Laboratory of mobile communication networks.**
2. **Laboratory of localization systems and services.**

Laboratory of mobile communication networks is located in ND312A and ND312B rooms. Education is oriented in various radiocommunication networks, e.g. mobile radio networks 2G and 3G (GSM, GPRS, EDGE, UMTS, HSPA), TETRA, ZigBee, WLAN (IEEE 802.11a, b, g, n). The laboratory is equipped with station used for signal receiving of meteorological satellite NOAA. The laboratory is also equipped with Qualnet software for simulation of various kinds of wireless networks. Radio signal propagation is modelled by Radioplan, EDX and it is possible to compare with experimental measurements. Education of radiocommunication theory is based on hardware and software platform TIMS. Research in laboratory is focused on proposal of new algorithms and methods improving some QoS parameters in mobile communication networks. Particular algorithms are modelled by means of software tools NS-2 and Qualnet. Hardware equipment enables to establish more simply wireless ad

hoc and wireless mesh networks based on IEEE802.11a, b, g, n and IEEE 802.15.4. Tester Agilent N4010 is possible to use for analysis of these networks.

Laboratory of localization systems and services is located in ND312B rooms. It is devoted to research of positioning algorithms and methods in heterogeneous wireless networks. Achieved results are implemented to real positioning systems designed by the laboratory staff. Localization systems are able to localize mobile terminals in indoor and outdoor environment. Some very interesting location based applications were implemented for user indoor/outdoor navigation. The proposed solutions are implemented to intelligent transport systems. Laboratory is equipped with several development kits for wireless networks and systems, e.g. sensor networks, RFID systems and GNSS. There are GNSS simulator GSS6700 and wi-fi network simulator for positioning process GSS5700, too.

Co-operation

Co-operation Partners in Slovakia

- Regulatory Authority for Electronic Communications and Postal Services
- General Milan Rastislav Štefánik Armed Forces Academy in Liptovský Mikuláš
- Slovak University of Technology, Bratislava
- Technical University of Košice
- Pavol Jozef Šafárik University in Košice
- Constantine the Philosopher University in Nitra
- Matej Bel University, Banská Bystrica
- Technical University in Zvolen
- Alcatel Lucent
- Association of Telecommunication Operators, Bratislava
- Academy Support Centrum (ASC) Košice
- Instructor Training Center, Košice
- CISCO Academy, Košice
- CISCO Slovakia
- Gity Slovensko, Inc., Martin
- IBM Slovensko, Ltd. Banská Bystrica
- Cluster Z@ICT, Žilina
- Nokia Siemens Networks, Bratislava
- Orange, Inc. Bratislava
- PC Consulting, Bratislava
- Slovak Electrical Society Section with the Dept. of Telecomm. Univ.of Žilina
- RRC-CZ, Ltd. Prague
- SEPS, Inc., Bratislava
- Slovak Society for System Integration, Banská Bystrica
- Slovak Organization for Space Activities, Bratislava
- Slovak Telekom, Inc., Bratislava
- Siemens Program and System Engineering s.r.o. Slovensko - Bratislava, Žilina
- Siemens Ltd., Bratislava
- Slovak Electrotechnical Society, Banská Bystrica
- Central Slovak Energetic, Žilina
- Telemont Slovakia, Bratislava
- Catholic University in Ružomberok
- ES Slovakia, Inc., Žilina
- Research Institute of Posts and Telecommunications Banská Bystrica
- Transport Research Institute, Inc., Žilina
- WRX Slovakia Limited, Malinovo
- Institute of Informatics, Slovak Academy of Sciences, Bratislava
- Contineo Ltd., Košice
- TES Media Ltd., Žilina
- ZTV Television Žilina
- Betamont, Zvolen
- VUTCH-CHEMITEX, Žilina

R&D cooperation partners abroad

- Department of Physics, Nottingham, UK
- TU Budapest, Hungary
- Czech Technical University Prague, ČVUT, Czech Republic
- European Telecommunications Standards Institute, Sophia-Antipolis, France
- MESAQIN.com, Prague, Czech Republic
- University of Graz, Austria
- TU Dresden, Germany
- Telekom Austria, Austria
- Deutsche Telekom, Germany
- Swisscom, Switzerland
- Ankara University, Turkey
- National University of Ireland, Galway, Ireland
- University College Dublin, Ireland
- Trinity College Dublin, Ireland
- Universidade da Beira Interior, Covilha, Portugal
- TNO, Netherlands
- CWI, Netherlands
- FTW, Austria
- France Telecom, France
- Univesity of Zagreb, Croatia
- University of Duisburg-Essen, Germany
- Jerusalem College of Technology, Israel
- University of Maribor, Slovenia
- University of Patras, Greece
- University of Hradec Králové, Czech Republic
- Linköping University, Sweden
- Gdansk University of Technology, Poland
- VŠB – Technical University Ostrava, Czech Republic
- Al-Ahliyya Amman University, Jordan
- Mutah University, Jordan
- The University of Jordan, Jordan
- Jordan University of Science and Technology (JUST), Jordan
- The Jordan Traffic Institute (JTI), Jordan
- The Ministry of Public Works and Housing, Jordan
- Ain Shams University (ASU), Egypt
- Menofia University, Egypt
- Minia University, Egypt
- Alexanderia University, Egypt

Visitors to the Department

Name	Institution	Length of stay
Hugh Melvin	National University of Ireland, Galway,Ireland	3 days
Stylianakis Vasilis	University of Patras, Greece	5 days
Michael Logothetis	University of Patras, Greece	5 days
Volkmar Brückner	University of Applied Science, Leipzig	15 days
Oleg Chernojarov	Moscow Power Engineering Institute,Russia	5 days
Ondřej Krejcár	University of Hradec Králove, CZ	7 days

Visits to Foreign Institutions

Name	Institution	Length of stay
Peter Brída	University of Maribor, Slovenia	6 days
	VUT Brno, CZ	8 days
	University of Hradec Králové, CZ	5 days
	Linköping University, Sweden	8 days
	UTM (Universiti Teknologi Malaysia), Malaysia	2 days
	Al-Ahliyya Amman University, Jordan	4 days
	The Swedish National Road and Transport Research Institute -VTI, Sweden	1 day
	IFFSTAR (The French Institute of Science and Technology for Transport, Development and Networks, Paris, France	2 days
Juraj Machaj	University of Maribor, Slovenia	6 days
	Imperial College London, UK	5 days
Peter Počta	CVUT Prague, CZ	5 days
	CWI, Amsterdam, Netherland	4 days
	TU Berlin/Deutsche Telekom labs, Berlín, Germany	4 days
	Univessity of Maribor, Slovenia	6 days
	Blekinge Institute of Technology, Karlskrona, Sweden	3 days
	TU Delft, Netherland	3 days
	University of Central Lancashire, Larnaca, Cyprus	4 days
Miroslav Uhrina	TU Berlin/Deutsche Telekom labs, Berlin, Germany	4 days
	VŠB – Technical University Ostrava, CZ	2 days
Martin Vaculík	VŠB – Technical University Ostrava, CZ	3 days
Vladimír Wieser	VŠB – Technical University Ostrava, CZ	1 day
	VUT Brno, CZ	2 days

Contracts (Business Activities)

EF/24.11.2014: Software development for tyre analyse by methods perception

Customer: CEIT, a.s.
Coordinator: Róbert Hudec
Co-operators: Miroslav Benčo, Martin Paralič

Other Activities

Invited Lectures/Papers

3D object reconstruction in real scene
Lecturer: Patrik Kamencay
Where: VŠB – Technical University Ostrava, CZ
Date: 5th June 2014

Semantic inclusion of textual and non-textual information of web documents
Lecturer: Martina Radilová
Where: VŠB – Technical University Ostrava, CZ
Date: 5th June 2014

Neural networks and their basic applications
Lecturer: Peter Kortiš
Where: VŠB – Technical University Ostrava, CZ
Date: 5th June 2014

Quality of voice and video transmission over IP networks (as one of the crucial aspects of current Telecommunications)
Lecturer: Peter Počta
Where: University of Maribor, Slovenia
Date: 14th May 2014

Modular positioning systems as vision of future localization
Lecturer: Peter Brída
Where: University of Maribor, Slovenia
Date: 14th May 2014

Introduction to Mobile Positioning
Lecturer: Peter Brída
Where: University of Hradec Králové, CZ
Date: 29th July 2014

Indoor positioning algorithms and systems based on wireless networks
Lecturer: Juraj Machaj
Where: University of Maribor, Slovenia
Date: 14th May 2014

Membership in International Organizations and Societies

Peter Brída

ICST member (Institute for Computer Sciences, Social Informatics and Telecommunications Engineering), Gent, Belgium
Member of IGNSS (International Global Navigation Satellite Systems), Australia
Scientific Committee member of the Conf. on Knowledge in Telecommunication and Optics, Ostrava
Scientific Committee member of the International Conference on Telecommunications and Signal Processing (TSP)
Editor in scientific journal Central European Journal of Engineering, publisher: Versita and Springer Verlag
Scientific Committee member of The 10th Advanced International Conference on Telecommunications AICT 2014
Scientific Committee member of The 6th Asian Conference On Intelligent Information and Database Systems ACIIDS 2014
Scientific Committee member of 10th International Conference on Artificial Intelligence Applications and Innovations (AIAI 2014)
Scientific Committee member of The 13th International Conference on Intelligent Software Methodologies, Tools, and Techniques (SOMET_14)
National representative and MC member of COST TU1302 – SaPPART

Róbert Hudec	Scientific Committee member of the International Conference on Telecommunications and Signal Processing (TSP)
Patrik Kamencay	Scientific Committee member of the International Conference on Telecommunications and Signal Processing (TSP) Editorial Board member of Journal Computational Research
Juraj Machaj	Scientific Committee member of the International Conference on Telecommunications and Signal Processing (TSP) Scientific Committee member of The Advanced International Conference on Telecommunications AICT 2014 Editorial board member of journal Computer Science and Information Technology
Daša Tichá	Editorial board member of journal Slaboproudý obzor, CZ
Peter Počta	Member of Speech Transmission Quality working group (ETSI), Sophia–Antipolis Member of Study Group 12 at ITU-T, Geneva Member of Scientific Committee of Int. conf. on Knowledge in Telecommunication and Optics, Ostrava National representative and MC member of COST IC 1003 - Qualinet National representative and MC member of COST IC 1304 - Across
Martina Radilová	Scientific Committee member of the International Conference on Telecommunications and Signal Processing (TSP)
Ladislav Schwartz	Editor in chief of Journal Universal Journal of Communications Network, USA, ISSN 2331-6748 (Print), ISSN 2331-6756 (Online) Editorial board member of journal - Network and Communication Technologies, Canada, ISSN 1927-064X (Print) ISSN 1927-0658 (Online) Member of Scientific Committee of Digital Technologies
Martin Vaculík	Member of Scientific Committee of Int. conf on Knowledge in Telecommunication and Optics, Ostrava
Vladimír Wieser	Editorial Board member of Journal Radioengineering, CZ

Membership in National Institutions/Committees

Ladislav Schwartz	Member of committee for technical normalization "TK41 Telekomunikácie" at SÚTN, Bratislava Terminology forum at VÚS Banská Bystrica
Vladimír Wieser	Member of working group AK for research field 16: Informatics sciences, automatization and telecommunications Member of VEGA - 5 for electrotechnics, automatization and control system and close fields of informative and communication technologies for Electrotechnic and informatics

Membership in University Boards

Róbert Hudec	Member of OK for study specialization no. 5.2.15 Telecommunications Member of Academic Senate of EF Member of FEE Scientific Council

Martin Vaculík	Member of OK for study specialization no. 5.2.15 Telecommunications Member of FEE Scientific Council Member of editorial board at journal Communications – Scientific Letters Member of Academic Senate of EF Chairman of Academic Senate of University of Žilina Member of VŠB TU Ostrava, FEI Scientific Council
Vladimír Wieser	External member of OK FEI TU in Košice Member of FEE Scientific Council Member of OK for study specialization no.5.2.15 Telecommunications Member of OK for doctoral study "8.4.6 Military communication and information systems." AOS gen. M .R. Štefánika, Liptovský Mikuláš

Awards

T. Čakan, V. Wieser, A. Tkáč	Best Paper Award Certificate (Performance Improvement of MANET Networks using Directional Antennas with Power Control). Conference KTTO 2013, Hradec Nad Moravicí, 4.-6.9.2013.
Daniel Benedikovic	Editor-in-chief of Nature Photonics Best Student Poster (High-efficiency subwavelength engineered surface grating coupler in SOI and DSOI). IEEE 11th International Conference on Group IV Photonics 2014, Paris, France, August 2014.

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Institute of Aurel Stodola

General Information

Institute of Aurel Stodola (IAS) operates at the departmental level in the hierarchy of the Faculty of Electrical Engineering. IAS situated in Liptovský Mikuláš was established on the 1st of April 2012 by the Academic Senate of the Faculty of Electrical Engineering as an educational and research institute of the Faculty of Electrical Engineering. Two departments at the former Satellite Workplace in Liptovský Mikuláš founded in September 2002 (Department of Engineering Fundamentals and Department of Experimental Electrical Engineering) were merged to form IAS. Since 2013 IAS has been pleased to operate in the buildings partly renovated by the means of the European Union Structural Funds' project "Support of the University of Žilina Infrastructure to Improve the Educational Conditions".

The institute retains features of the university environment. IAS students are provided with standard conditions for studying in all areas as students of other faculties of the University of Žilina or other faculties of Slovak universities. Educational activities of the staff are aimed at the bachelor's degree programme of Digital Technologies in the field of Telecommunications. IAS manifests continuous research activities in the field of the study branch at an appropriate level for students to be able to adequately accept new knowledge in the field and respond to it. IAS is competent to fully integrate this knowledge into the provided education.

IAS research addresses the field of alternative energies, especially photovoltaics. The main directions are measuring methods for solar cells, the physical properties of thin films, especially for solar cells and hybrid electronics, research in optical elements for the physical layer of optical networks and systems and the theory of real functions. Research work is based on long-term cooperation with the institutes of the Slovak Academy of Sciences and some Slovak and foreign universities.

Staff of the Institute

Head of the Institute:	**Jarmila Müllerová**
Vice-head of the Institute:	Marcela Koščová
Manager:	Daniela Brunová
Administrative Support:	Eva Púčeková
Technical Support:	Ľubomír Bako, Milan Kňava
Professors:	Jarmila Müllerová, Ivan Glesk (Visiting Professor from 1st September 2014), Pavel Cheben (Visiting Professor from 1st September 2014)
Associate Professors:	Zdeněk Dostál, Zdislav Exnar, Marcela Koščová
Research Fellow:	Libor Ladányi (from 1st September 2014)
Senior Lecturers (with PhD):	Gabriel Cibira, Miroslav Ďulík, Stanislav Jurečka, Robert Menkyna, Mária Pálušová

Lector:	L'ubomír Mydielka
External Lecturer:	Zuzana Polovková

Postgraduate Students

Internal:	Libor Ladányi (until 26th August 2014), L'ubomír Scholtz
External:	Dušan Korček (until 26th August 2014)

Education

Courses in Bachelor Degree Programmes

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31100	Algorithmization of Tasks	1	2 – 2 – 0
31102	Linear Algebra	1	2 – 2 – 0
31103	Management and Economics in Business	1	2 – 1 – 0
31104	Mathematical Analysis	1	2 – 2 – 0
31107	Fundamentals of Electrical Engineering	1	3 – 0 – 0
31110	Introduction to Physics	1	1 – 2 – 0
31200	Foreign Language for Digital Technologies (DT)	2	0 – 2 – 0
31201	Physics 1	2	3 – 2 – 1
31203	Mathematical Analysis 2	2	4 – 3 – 0
31205	Theory of Electrical Engineering 1	2	3 – 3 – 0
31209	Programming Languages 1	2	2 – 2 – 0
31208	Selected Topics in Mathematics	2	2 – 2 – 0
31303	Physics 2	3	3 – 2 – 1
31305	Mathematics	3	3 – 3 – 0
31306	Measurements and Measuring Systems	3	2 – 0 – 3
31311	Programming Languages 2	3	2 – 0 – 2
31314	Theory of Electrical Engineering 2	3	3 – 3 – 0
31325	Electronics of DT	3	3 – 0 – 2
31307	Computer Modelling of Real Processes	3	1 – 0 – 2
31318	Digital Media and Devices	4	2 – 0 – 2
31319	Digital Electronics	4	2 – 0 – 2
31321	Computer Networks	4	2 – 0 – 2
31433	Transmission Media	4	3 – 1 – 0
31444	Theory of Signals and Systems of DT	4	3 – 2 – 0
31105	Materials and Technologies in Electrical Engineering	4	2 – 1 – 1
31546	Design of Multimedia Web Pages	4	2 – 0 – 2
31423	Communication & Information Services	5	2 – 0 – 2

Code	Title	Sem.	Hours/Week L-S-LE*
Courses at the Faculty of Electrical Engineering		*(L) lessons - (S) seminars - (LE) lab. exercises	
31544	Digital Transmission Systems and Networks	5	3 – 1 – 1
31545	Optical Data Recording and Storage	5	3 – 1 – 0
31547	Discrete Control Systems	5	2 – 1 – 1
31622	Bachelor Project of DT	5	0 – 0 – 2
31531	Computer Graphics and Animation	5	1 – 0 – 2
31549	Sensors and Security Systems	5	2 – 0 – 1
31527	Communication Technologies of DT	6	3 – 0 – 1
31530	Radiocommunication & Navigation Systems of DT	6	2 – 1 – 0
31600	Bachelor Thesis	6	0 – 0 – 12
31605	Database Systems	6	2 – 0 – 1

Research & Development

The activities are focused to area the real functions theory in mathematics. Research on semiconductor and semiconductor-dielectric systems, the morphology of their structures, electrical charge states and optical properties, the effect of structure forming and passivation and the study of nano-textured interfaces has been continuing. The main focus of this issue is the area of semiconductor solar cells and other thin-film elements. Numerical problems are solved in the computer grid environment.

The design and simulation of optical switching elements and optical filters has been aimed at all-optical communication systems and digital devices. Moreover, the research activity is focused on the area of alternative energy resources. Activities have been concentrated on the solar simulator implementation and the development of an original method of diagnostics of solar panels using infrared monitoring within research projects. Furthermore, IAS staff has been dealing with the processing and transmission of sensor signals and with the design of algorithms of adaptive and fuzzy control. The main research effort is directed towards applications of digital technologies in the solar power devices as well as in the education.

In 2014, the IAS staff has been involved into investigator teams of three projects of the Scientific Grant Agency of the Slovak Republic (VEGA), three projects of the Slovak Research and Development Agency (APVV), the projects of EU Structural Funds and a project of the International Visegrad Fund. Three invited papers at international conferences and invited lectures at three educational courses were presented by the staff abroad in 2014. Two papers published in CCC journals and conference papers registered in the renowned databases have witnessed the IAS efforts. Silicon nanostructures have been investigated during the research stay of one IAS staff member at the Osaka University, Japan.

Laboratory of Thin Films

The Laboratory is the Joint Laboratory of the Institute of Physics (IoF), Slovak Academy of Sciences, Bratislava and IAS (established by the agreement between IoF and the University of Žilina in 2004). The laboratory provides solving projects of the Scientific Grant Agency of the Slovak Republic, the Slovak Research and Development Agency and international projects. Laboratory research programme is focused on the microstructure and optical properties of semiconductor/dielectric thin-film

structures and on the analysis of the impact of technological processes of the preparation of thin films on their physical properties.

The Laboratory is equipped with AvaRaman Raman spectrometer, Thermo DXR Raman microscope, spectrophotometers for measurements in ultraviolet, visible and infrared spectral regions (fiber optics AvaSpec 2048 a grating Unicam SP 700C), NICOLET iS10FTIR spectrometer, Ocean Optics SPECEL 2000 ellipsometer and Perkin Elmer infrared spectrophotometer. Electron scanning microscope BS 350 aimed at the investigation of analysed sample surfaces belongs to the laboratory appliances, too. The laboratory is further furnished by a computer grid using Matlab environment for solving tasks connected with scientific projects concerning the research on optical properties of materials and on optical communications.

Laboratory of the Research on Alternative Energy Resources

The laboratory is intended to be used for experiments related to the research within the projects of the Scientific Grant Agency of the Slovak Republic and the Slovak Research and Development Agency. The laboratory equipment includes basic analogue and digital measuring tools, multimeters, oscilloscopes, generators, special-purpose measuring instruments (global solar radiation meter FLA613-GS, non-contact laser thermometer TM2000), Fluke Ti20 Infrared Camera with IR Inside software, the central measuring station, the solar simulator, an accessory for measuring reflection coefficient and attenuation, the calorimetric measurement set INMAT66 etc. The laboratory is furnished with computers with software package COMSOL Multiphysics 3.4 which are designed to solve scientific and research tasks. CAD Import Module extends the import of the model geometry created by CAD systems and also allows importing other types of graphic files. The result can be used for the mathematical modelling of physical processes and verification of properties in the synthesis of systems.

A measuring station of solar irradiation and the biaxial solar tracker designed to track solar panels towards the sun in order to maximize their energy output is a part of the laboratory.

Laboratory of Simulation and Modelling

The laboratory is equipped with a computer grid for solving ab-initio tasks in parallel mode by algorithms applied in high-performance computing. Simulation methods are designed to analyse problems of quantum states of electrical charge carriers in semiconductor/dielectric structures, of particle tunnelling through dielectric layers and of the impact of technological processes of the preparation of semiconductor structures on their microstructure, electrical and optical properties. Methods of high performance computing can significantly increase the quality of research and improve the international cooperation on the issue, which has been developed for a long time under several research projects. The laboratory is also equipped with measuring cards using National Instruments LabVIEW environment, the Keathley Picoammeter and the FEMTO Femtoammeter for the research on electrical properties of semiconductor structures. The laboratory involves students of the master's degree into research projects.

Laboratory for Photovoltaic Cell Testing

The newly established laboratory is equipped with instruments from the projects funded by the Slovak Research and Development Agency (APVV) and European Structural

Funds within the project "Modernization of research infrastructure in the areas of electrical engineering, electrical materials, and information and communication technologies" (ITMS 262101200210). It is used for basic and applied research of electrical and optical properties of materials and interfaces of advanced thin-film structures for photovoltaics and research and development of components and subsystems of photovoltaic devices designed to increase their efficiency and stability. It is equipped with i.a. solar simulators, solar cell testers and SPM platform for measuring physical properties of surfaces with an atomic level resolution. Spectral analyzer, radio signal generator and other equipment are used for research in communication technologies for autonomous photovoltaic systems.

Co-operation

Co-operation Partners in Slovakia

- Institute of Physics, Institute of Electrical Engineering, Slovak Academy of Sciences, Bratislava
- Academy of the Armed Forces of General Milan Rastislav Štefánik, Liptovský Mikuláš
- Institute of Electronics and Photonics, Institute of Nuclear and Physical Engineering,
- Faculty of Electrical Engineering and Information Technology, Slovak University of
- Technology in Bratislava
- Department of Experimental Physics, Faculty of Mathematics, Physics and Informatics, Comenius University in Bratislava
- Faculty of Mining, Ecology, Process Control and Geotechnology, Technical University of Košice
- Alcatel – Lucent Slovakia, a.s.
- Ceragon Networks Ltd. Liptovský Hrádok
- Pavel Stotka – PCNC, Kľačno

International Co-operation Partners

- Institute of Scientific and Industrial Research (ISIR), Department of Semiconductor Materials and Processes, Osaka University, Japan
- New Technologies - Research Centre, University of West Bohemia, Pilsen, Czech Republic
- Faculty of Electrical Engineering and Communication, Department of Radio Electronics, Department of Electrical and Electronic Technology, Brno University of Technology, Czech Republic
- Institute of System Engineering and Informatics, Faculty of Economics and Administration, University of Pardubice, Czech Republic
- HZB Helmholtz Zentrum Berlin, Institute for Silicon Photovoltaics, Berlin, Germany
- National Instruments (Czech Republic), Ltd., Czech Republic
- AIST-NT, Apeldoorn, the Netherlands
- Teste - Testovací Technika s.r.o., Poděbrady, Czech Republic

Visitors to the Department

Name	Institution	Length of stay
Jiří Křupka	University of Pardubice, Czech Republic	2 days
Pavol Šutta	University of West Bohemia, Pilsen, Czech Republic	4 days

Pavel Cheben	National Research Council, Ottawa, Canada	2 days
Peter Vernhout	AIST-NT, Apeldoorn, Netherlands	4 days

Visits to Foreign Institutions

Name	Institution	Length of stay
Stanislav Jurečka	Institute of Scientific and Industrial Research, Osaka University, Japan	35 days
Jarmila Müllerová	Graz Technical University, Austria	3 days
	Brno University of Technology, Czech Republic	2 days
	University of Strathclyde, Glasgow, United Kingdom	4 days
	Abdus Salam International Centre for Theoretical Physics, Trieste, Italy	4 days
Miroslav Ďulík	University of Technology, Kaunas, Lithuania	4 days

Other Activities

Specialised Lectures and Courses Organized by the Institute

Safety for working on electrical installations and electrical equipment

Customer: Students and the staff of IAS
Lecturer: 22nd Seminar: Education and Training for Professionals in Electrical Engineering. The organizers: the Academy of Armed Forces, Liptovský Mikuláš, the Slovak Society for Electrical Engineering, branch office Liptovský Mikuláš
Date: 27th February 2014

Access networks - short history and evolution

Customer: Students and the staff of IAS
Lecturer: Peter Lizúch, Alcatel – Lucent Slovakia
Date: 6th March 2014

Transmision & WDM systems and management

Customer: Students and the staff of IAS
Lecturer: Jozef Kopča, Alcatel – Lucent Slovakia
Date: 6th March 2014

IPTV - basic principles, latest features

Customer: Students and the staff of IAS
Lecturer: Miloslav Siman, Alcatel – Lucent Slovakia
Date: 6th March 2014

Programming of Unitronics PLC controllers

Customer: The staff of IAS and the Academy of Armed Forces Liptovský Mikuláš
Lecturer: Jozef Šuriansky, ART Žarnovica Ltd.
Date: 10th June 2014

VHX-5000 Keyence Digital Microscope

Customer: The staff of IAS
Lecturer: Rastislav Ošťádal, Keyence Microscope Europe
Date: 25th September 2014

Transmission via an optical link with bit clock recovery

Customer: The staff of IAS and the Academy of Armed Forces Liptovský Mikuláš
Lecturer: Tomáš Paloušek, TR INSTRUMENTS Ltd. Brno
Date: 13th November 2014

Invited Lectures/Papers

Photonic Materials and Measurement Techniques

Lecturer: Jarmila Müllerová
Where: Trieste, Italy, The Abdus Salam Centre for Theoretical Physics, Winter College on Optics: Fundamentals of Photonics - Theory, Devices and Applications
Date: 10th – 21st February 2014

Advanced Materials for Photonics and Diagnostic Methods

Lecturer: Jarmila Müllerová
Where: Brno, the Czech Republic, Brno University of Technology, Faculty of Electrical Engineering and Communication, Department of Radio Electronics
Date: 20th – 22nd January 2014

Advanced Materials for Photonics and Characterization Methods

Lecturer: Jarmila Müllerová
Where: Boskovice, the Czech Republic, Summer School 2014 of Telecommunications Educational Seminars supported by the EU Structural Funds Project ExCom CZ.1.07/2.3.00/20.0217 "Development of Excellence of the Telecommunication Research Team in Relation to International Cooperation, VŠB – Technical University of Ostrava
Date: 14th – 17th October 2014

Design of a Novel Wavelength Scheme for DWDM-PON Coexisting with Current PON Technologies and Protected against Signal Interference

Lecturer: Jarmila Müllerová
Where: Graz, Austria, 16th International Conference on Transparent Optical Networks ICTON 2014
Date: 6th – 10th July 2014

Dispersive and BEMA Investigation on Optical Properties of Photovoltaic Thin Films

Lecturer: Jarmila Müllerová
Where: Jelenia Góra, Poland, 19th Polish-Slovak-Czech Optical Conference on Wave and Quantum Aspects of Contemporary Optics
Date: 8th – 12th September 2014

Electrochemical Acummulators for RES

Lecturer: Zdeněk Dostál
Where: Blansko, the Czech Republic, International Conference "35th Non-conventional Energy Sources", the Czech Society for Electrical Engineering and Brno University of Technology
Date: 21st – 23rd May 2014

Application of New Materials in Solar Cell Research

Lecturer: Stanislav Jurečka
Where: Secondary Vocational School of Electrical Engineering, Liptovský Hrádok
Date: 16th October 2014

Membership in International Institutions/Committees

Jarmila Müllerová	Scientific Committee of the 19th Polish-Slovak-Czech Optical Conference On Wave and Quantum Aspects of Contemporary Optics, 8th – 12th September 2014, Wojanów, Poland
Zdeněk Dostál	Programme Committee of the Conference "35th Non-conventional Energy Sources", the Czech Society for Electrical Engineering and Brno University of Technology/21st – 23rd May 2014, Blansko, Czech Republic
Stanislav Jurečka	American Nano-Society Czech and Slovak Crystallographic Association CSCA

Membership in National Institutions/Committees

Jarmila Müllerová	Commission of the Slovak Grant Agency VEGA for Electrical Engineering, Automatization and Control Systems and related fields of Information and Communication Technologies, Branch Committee for PhD Study in study branch No. 4.1.4 Quantum Electronics and Optics, Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava Committee on Education of the Town Council, Liptovský Mikuláš Scientific Committee of the 20th Int. Conference on Applied Physics of Condensed Matter APCOM 2014, 25th – 27th June 2014, Štrbské Pleso Programme Committee of the 10th Scientific-Expert Conference with-International Participation ALER 2014 Alternative Energy Resources, 1st – 3rd October 2014, Liptovský Ján Scientific Committee of the 10th International Conference ELEKTRO 2014, 19th – 20th May 2014, Rajecké Teplice
Zdislav Exnar	Scientific Committee of the 10th International Conference ELEKTRO 2014, 19th – 20th May 2014, Rajecké Teplice Programme Committee of the 10th Scientific-Expert Conference with International Participation ALER 2014 Alternative Energy Resources, 1st – 3rd October 2014, Liptovský Ján
Marcela Koščová	Programme Committee of the 10th Scientific-Expert Conference with International Participation ALER 2014 Alternative Energy Resources, 1st – 3rd October 2014, Liptovský Ján

Membership in University Boards

Jarmila Müllerová	Branch Committee for PhD Study in Study Branch No. 5.2.15 Telecommunications Branch Committee for PhD Study in Study Branch No. 5.2.12 Electrotechnologies and Materials Scientific Board of the Faculty of Electrical Engineering Academic Senate of the Faculty of Electrical Engineering
Marcela Koščová	Academic Senate of the Faculty of Electrical Engineering

Awards

Zdeněk Dostál	Commemorative certificate of the Mayor of the town of Liptovský Mikuláš „For Excellent Results and Outstanding Teaching Involvement in the Education of the Young Generation", 28th March 2014, Liptovský Mikuláš
	Letter of Appreciation from the President of the Slovak Society for Electrical Engineering "For Long Term Educational and Publishing Activities in the Field of Supplying Electrical and Telecommunications Equipment with Emphasis on Renewable Energy Sources, through Organizing Conferences ALER Aimed at Presenting Results Concerning Methods, Trends and Technologies of Alternative Energy Sources", 1st October 2014, Liptovský Mikuláš
Jarmila Müllerová	"Outstanding reviewer" – Award from the Elsevier's Reviewer Recognition Platform for reviewing papers submitted to journals Materials Science in Semiconductor Processing and Applied Surface Science

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