DEPARTMENT OF CONTROL AND INFORMATION SYSTEMS

General Information

Department of Control and Information Systems (DCIS) provides education and research in the field of of automation of transport and industrial processes on the process, operational and management level where, besides usual optimization criteria, the safety criteria is required. This includes topics related to reliability and security of information manipulation with advanced artificial intelligence methods. The department guarantees four accredited study programmes in the field of study Automation: the study programme Automation in Bachelor degree, study programme Process Control Engineering and Applied Telematics in Master degree and study programme Process Control Engineering in the Doctoral degree.

The research activities of 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. DCIS is developing automated control methods by applying the latest knowledge from artificial intelligence, intelligent sensorics, robotics, computer-vision, intelligent human-machine communication, machine-learning, secure communication and so on, which also creates room for modern cloud solutions and the IoT concept.

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.

The activities of DCIS are integrated within national and international cooperation with academic and industrial domains in distinct forms – from research projects to students and experts exchange.

In 2019, the staff of the DCIS consisted of 14 pedagogical staff, 1 technician and administrative support and 5 full-time postgraduate students. The pedagogical staff consisted of 3 professors, 1 guest professor, 4 associate professors, 6 senior lecturers with PhD. degree, and 2 research fellows with a PhD. degree and 1 research fellow with a scientific-pedagogical degree associate professor and a scientific qualification degree IIa.

Staff of the Department

Head of the Department:	Juraj Spalek
Vice-head of the Department:	Aleš Janota
Secretary:	Rastislav Pirník
Study Consultant:	Peter Nagy
Technical Support	Kamila Kršíková
Research Fellows:	Michal Gregor, Marián Hruboš, Dušan Nemec

Sections of the Department

Section of Automation and Signalling Systems

Head of the Section:	Karol Rástočný
Professors:	Aleš Janota, Karol Rástočný, Juraj Spalek, Pavel Přibyl
Associate Professors:	Juraj Ždánsky

Senior Lecturers (with PhD):	Jozef Hrbček, Vojtech Šimák, Peter Nagy

Section of Communication and Information Systems

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

Postgraduate Students

Internal (full-time):	Jozef Valigurský, Milan Medvedík, Roman Michalík, Michal Mihálik

Education

Courses in Bachelor, Master and Doctoral Degree Programmes

Bachelor Degree Programmes

Course ID	Name	Sem.	Hours/Week
			L-E-Ls*
Courses at the Faculty of Electrical Engineering and Information Technology			
3B0102	Algorithmisation and programming	1	2 - 2 - 0
3B1100	Professional praxis	1	0 - 0 - 0
3B0203	Programming in C++	2	2 - 2 - 0
3B1200	Professional praxis	2	0 - 0 - 0
3B0304	Theory of information and signals	3	3 - 2 - 1
3B1301	Information and communication networks	3	0 - 0 - 0
3B1400	Theory of automated control	4	3 - 1 - 1
3B1401	Logical systems	4	2 - 1 - 1
3B1402	Distributed control systems	4	3 - 1 - 1
3B1403	Sensor technology	4	3 - 0 - 1
3B0401	Computer technical environment	4	1 - 0 - 1
3B1404	Professional praxis	4	0 - 0 - 0
3B1504	Bachelor project 1 A	5	0 - 0 - 5
3B1503	Communication security	5	3 - 1 - 1
3B1501	Single-chip controllers programming	5	2 - 0 - 2
3B7403	Sensor technology	5	3 - 1 - 1
3B1502	Reliability and safety of control systems	5	3 - 2 - 0
3B1500	Control Systems	5	2 – 1 - 2
3B1505	Professional praxis	5	0 - 0 - 0
3B1606	Professional praxis	6	0 - 0 - 0
3B1602	Information systems in process control	6	4 - 0 - 4
3B1600	Actuators and their control	6	5 – 2 - 2
3B1601	Control systems programming	6	2 - 0 - 2
3B1604	State exam subject	6	0 - 4 - 0

Course ID	Name	Sem.	Hours/Week L-E-Ls*
3B1605	Bachelor thesis and its presentation	6	4 - 4 - 0
3B1603	Bachelor project 2 A	6	0 - 0 - 10

*(L) lectures - (E) exercises - (Ls) labs

Master Degree Programmes

Course ID	Name	Sem.	Hours/Week
			L-E-Ls*
Courses at the Faculty of Electrical Engineering and Information Technology			
3I0101	Advanced methods of automated control	1	3 - 1 - 1
3I0102	Communication networks	1	3 - 1 - 1
3I0103	Signal processing theory in process control	1	2 - 1 - 1
3I1100	Telematic systems modelling	1	3 - 1 - 1
3I7100	Control systems with Safety PLC	1	2 - 0 - 2
3I0104	Interlocking and signalling systems components	1	3 - 0 - 2
3I0115	Information systems security	1	3 - 0 - 2
3I1101	Professional praxis (60 hours)	1	0 - 0 - 0
3I7101	Professional praxis (60 hours)	1	0 - 0 - 0
3I0200	Application of information systems in process control	2	2 - 0 - 2
3I0201	Secure system communication	2	3 - 1 - 1
3I0202	Control systems safety analysis	2	3 - 2 - 0
3I0203	Artificial intelligence 1	2	2 - 0 - 2
3I0204	Higher programming languages applications	2	2 - 0 - 2
3I0205	Interlocking systems	2	3 - 1 - 1
3I1200	Professional praxis	2	0 - 0 - 0
3I7200	Professional praxis	2	0 - 0 - 0
3I0300	Artificial intelligence 2	3	3 - 0 - 2
3I0301	Visualisation of processes	3	2 - 0 - 2
3I0318	Object-oriented system development	3	2 - 0 - 2
3I1300	Transport processes control	3	3 - 1 - 1
3I1301	Applied telematics diploma project 1	3	0 - 0 - 5
3I7300	Process control diploma project 1	3	0 - 0 - 5
3I0302	Interlocking systems applications	3	2 - 0 - 2
3I0303	Information systems security	3	3 - 0 - 2
3I1303	Professional praxis	3	0 - 0 - 0
3I7301	Professional praxis	3	0 - 0 - 0
3I0401	Automated identification	4	2 - 1 - 1
3I0402	Safety systems	4	2 – 0 - 2
3I1402	Elaboration and presentation of diploma thesis	4	0 - 10 - 0
3I1403	State exam subject	4	0 - 2 - 0
3I7400	Process control diploma project 2	4	0 - 0 - 5
3I7401	Elaboration and presentation of diploma thesis	4	0 - 10 - 0
3I1401	Applied telematics diploma project 2	4	0 – 0 - 5
3I7402	State exam subject	4	0 - 2 - 0
3I0400	Robotic systems	4	2 - 0 - 2
3I1400	Telematic applications	4	4 - 2 - 2

3I7403	Intelligent transportation systems	4	6 - 4 - 0
3I1404	Professional praxis	4	0 - 0 - 0
3I7404	Professional praxis	4	0 - 0 - 0

*(L) lectures - (E) exercises - (Ls) labs

Doctoral Degree Programmes

Course ID	Name	Sem.	Hours/Week
			L-E-Ls*
Courses at the Faculty of Electrical Engineering and Information Technology			
3D3100	World language	1	2 - 0 - 0
3D3101	Secure system communication	1	2 - 0 - 0
3D3102	Logical and event systems	1	2 - 0 - 0
3D3104	Process control	1	2 - 0 - 0
3D3105	Control systems	1	2 - 0 - 0
3D3109	Selected chapters from mathematics	1	2 - 0 - 0
3D3103	Modelling and simulation of control systems	2	2 - 0 - 0
3D3106	Reliability and safety of control systems	2	2 - 0 - 0
3D3107	Theory of automated control	2	2 - 0 - 0
3D3108	Signal processing theory in process control	2	2 - 0 - 0
3D3110	Written exam for dissertation exam and defence	3	0 - 0 - 0
3D3111	Dissertation thesis and dissertation thesis defence	6	0 - 0 - 0

*(L) lectures - (E) exercises - (Ls) labs

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 SIEMENS industrial processes control systems

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 railway transport processes control

The laboratory focuses on development of safety related control systems mainly utilised for railway traffic control. The fundamentals of technology equipment are PCs and Siemens PLCs with software support. The

laboratory provides real interlocking systems by Scheidt&Bachmann (BUES2000 electronic railway crossing devices and ZBS2000 electronic safe traffic control for auxiliary tracks) and by Betamont (ESB1 electronic station interlocking device). The devices also include railway interlocking devices building components (distinct relay constructions used in interlocking technology, signalling lights, switching locks, …).

Laboratory of B&R industrial processes control systems

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 by Bernecker + Rainer (B&R), safety PLCs, I/O modules, converters, traffic and industrial systems models, CNC multifunctional machine and it's digital twin. Specialised computers and software include Automation Studio, Safe Designer, Scene Viewer, MATLAB, Simulink, Atmel Studio.

Laboratory of IoT technologies

The laboratory is built within the cooperation between DCIS and IBM a is focusing on the area of intelligent transport, intelligent cities and Internet of Things (IoT) from the sensors level through data acquisition, analysis, presentation, including security aspects. The technologies available include IBM (Intelligent Operation Center, Bluemix cloud, Big Data, analytical and prediction tools), sensor networks technologies (Libelium) and information systems security devices and software (Pwnie Plug R4 penetration testing tool).

Integrated laboratory of IBM and 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 agency of Slovak Department of Education.

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 automated control 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), SICK industrial camera and bachelor and master projects appliances.

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). The hardware equipment consists of Juniper IDP 75 – intrusion detection system; Fluke Networks Time Machine Express NTM - EX2 – network traffic monitoring device; wireless technologies. The software equipment consists of Riverbed Modeler + Wireless Suite – network modelling, simulation and emulation environment; Riverbed Modeler Academic Edition – academic edition of environment; PRTG Paessler Network Monitor – network traffic monitoring tool, Pwnie Plug R4 – network penetration testing appliance.

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. It is an exact copy of a real software controlling a production robot and enables realistic simulations with the use of real robotic programs and configuration files. The laboratory hosts the research of mobile sensor platform for robots navigation. The laboratory disposes of a CNC machine with B&R control system for the realization of bachelor and diploma works. The equipment also consists of E-puck robots with Webots environment enabling testing of robotic swarm algorithms. The equipment includes a collaborative robot ABB IRB 14000, DC and AC electric motors and Mitsubishi frequency converters.

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, Linksys and Cisco, IEEE 802.11 wireless networks analyser. The technical equipment for industrial communication networks includes PROFIBUS and CAN protocol analysers. The area of radio-frequency identification (RFID) is covered by the ELATEC demonstration kits for ISO 14443, ISO 15693, ISO 18092, MIFARE Classic, MIFARE Desfire, Unique, EPC Global transponders.

Projects of International Programmes

HORIZON 2020

H2020-MSCA-RISE-2016 - 734331: SENSors and Intelligence in BuiLt Environment	
Summary:	The goal of this project is to develop novel information sensing research and innovation approaches for acquiring, communicating and processing a large volume of heterogeneous datasets in the context of smart buildings, by building an international, inter-disciplinary and inter-sectoral collaboration network through research and innovation staff exchanges and seamless exchange of ideas, expertise, data, testbeds, and know-how.
Realization:	01/2017 – 12/2020
Coordinator:	Ivan Glesk, (University of Strathclyde, Glasgow, UK)
Sub-Coordinator from FEE:	Juraj Machaj
Co-operators:	Peter Holečko, Michal Gregor, Vojtech Šimák

COST Projects

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

Other International Research Projects

AO8673: SALSA - Stratospheric Autonomous Landing System Application	
Summary:	The objective of this "SALSA" project is to define, develop and test an autonomous landing system of our stratospheric probe, making use of on-board GPS receivers (and other motion sensors such as gyroscopes and accelerometers), a gliding parachute driven by servomotors and an on-board computer with proper controlling software. Such a system would significantly shorten payload recovery times and most importantly reduce the risk of landing in danger zones (e.g. lakes, mountains, densely populated areas, etc.), allowing stratospheric flights to be conducted with increased safety and applicability to time-sensitive payloads.
Realization:	03/2018 – 12/2020
Coordinator:	GOSPACE Ltd.
Executive coordinator:	Benedikt Badánik, DAT, FPEDAS
FEEIT Coordinator:	Vojtech Šimák, DCIS
Co-operators:	Branislav Kandera, DAT, FPEDAS, Filip Škultéty, DAT, FPEDAS

Projects of National Programmes

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

014ŽU-4/2018: Broadening the content in a field of study with respect to the current requirements of the industry as regards artificial intelligence methods and IT	
Summary:	The objective of the project is to facilitate implementation of high-quality education it these areas – i.e. in the area of AI, ML and IT – with regard to the actual requirements of the industry. The second goal is to promote the transfer of progressive and innovative methods into industrial practice. The project reflects a feedback from the commercial sector (primarily within the Ready for Continental initiative and from other department industrial partners) and the feedback from international academic partners such as University of Patras, Greece; UC Berkeley, California, USA; Tongji University, Shanghai and others. The output of the project include new study materials, proper HW/SW education support and a catalogue of AI tasks and methods.
Realization:	01/2018 – 12/2020
Coordinator:	Aleš Janota
Co-operators:	Michal Gregor, (vice-coordinator), Juraj Spalek, Alžbeta Kanáliková, Emília Bubeníková, Vojtech Šimák, Jozef Hrbček, Marián Hruboš, Rastislav Pirník, Roman Michalík, Kamila Kršíková

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

038ŽU-4/2017: Laboratory education methods of automatic identification and localization using radiofrequency identification technology	
Summary:	Automatic identification systems currently represent an irreplaceable role in the automation of industrial production, transport, logistics and trade. Among the technical means allowing automatic identification of persons, objects or animals a radio frequency identification (RFID) dominates. Taking the importance of this technology into account it is necessary that graduates of the study field "Automation" and "Telecommunication and Radio Communication Engineering" that are accredited on the Faculty of Electrical Engineering, University of Žilina, have gained deep knowledge of the principles and applications of this modern technology. The presented project sets a number of scientific and pedagogical objectives. In the scientific objectives the mathematical modelling of RFID systems and their data

	channels, and also the development of digital signal processing algorithms in the field of RFID are dominant. The dominant educational objectives are the building of several laboratory workplaces enabling to demonstrate the basic physical principles of identification and localization of the RFID tags and to demonstrate the data structures of most commonly used identification cards such as Mifare and Desfire.
Realization:	01/2017 – 12/2019
Coordinator:	Peter Vestenický
Co-operators:	Martin Vestenický, (KMaIKT) until 13. 3. 2019, Michal Gregor, Peter Nagy, Dušan Nemec, Juraj Ždánsky, Michal Kuba, (KMaIKT), Jozef Valigurský

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

Research Projects Funded by the Slovak Research and Development Agency (APVV)

APVV-17-0014: Smart tunnel: telematic support for emergencies in the traffic tunnel	
Summary:	The objective of the project is to design of a unique and competitive system, which will enable to decrease safety risks resulting from the operation of a road tunnel. The system design and functional specification will be provided in a proper form for realisation of commercial solutions. The consumer will be provided by a integrated UML software specification with focus on identification and classification of safety critical events in tunnels.
Realization:	07/2018 – 12/2021
Coordinator:	Rastislav Pirník
Vice-coordinator	Jozef Svetlík
Co-operators:	Emília Bubeníková, Stanislava Gašpercová, Peter Holečko, Aleš Janota, Tomáš Loveček, Vladimír Mózer, Peter Nagy, Lenka Siváková, Juraj Spalek, Kamila Kršíková.

APVV-15-0441: Measurement system with optical sensor for the Weight In Motion systems	
Summary:	Proposed project of applied research will be focused on design, optimization and creation of a device for weight measurement of a vehicle (or its axle) in movement according to the currently valid traffic regulations on the road or highway. Project will discuss the selection of proper sensor hardware for the system, its mounting into existing solutions Measure-in-Motion® previously designed by project partner and compatibility of the used optical sensor output with the interface of the existing processing unit.
Realization:	7/2016 – 6/2020
Coordinator:	Daniel Káčik
Co-operators:	Aleš Janota, Juraj Spalek, Marián Hruboš, Rastislav Pirník, Peter Vestenický, Vojtech Šimák, Dušan Nemec, Jozef Hrbček

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

Projects of European Structural Funds

ITMS 313011B765: Universal virtual intelligent space for transport systems	
Summary:	The research objective is in creating a system environment of information sources based on IoE, its advanced processing, connection to other life areas, searching for correlations between things, processes (information), seemingly unrelated, using these discovered dependencies in technological innovations, decision making and process control in transport and in standard living of citizens.
Realization:	09/2017 – 08/2022
Coordinator (UNIZA):	Rastislav Pirník
Project manager (UNIZA)	Rastislav Pirník
Co-operators:	Aleš Janota, Juraj Spalek, Mária Franeková, Pavel Přibyl, Peter Vestenický, Marian Hruboš, Peter Holečko, Emília Bubeníková, Vojtech Šimák, Jozef Hrbček, Michal Gregor, Alžbeta Kanáliková, Dušan Nemec

Other National Non-research Projects

312011F057 – National project IT academy	
Summary:	Creating a model for education and preparation of young people for the current and perspective needs of knowledge oriented society and labour market with focus on informatics and ICT.
Realization:	09/2016 – 10/2020
Coordinator:	Michal Varga, FMI
Co-operators:	Alžbeta Kanáliková, Emil Kršák, Michal Varga, Norbert Adamko, (FMI)

Research for Practice; the Most Important Realized Outputs

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

Outputs from Solved Research Tasks

Publication activities at the FEE (based on registration at the University Library up to February 2019)

Kategória	Názov kategórie (podľa UK) Sumárnu tabuľku nevypĺňať, pripraví dekanát za celú EF podľa evidencie v Univerzitnej knižnici	Počet
AAA		
AAB		
ACA		
ACB		
ADC		
ADD		
ADE		
ADF		
ADM		
ADN		
AEC		
AED		
ADE		
ADF		
AGJ		
BCI		
...		

Monographs

[1]	NEMEC, Dušan – JANOTA, Aleš: Methods for localization and control of non-holonomic wheel robots (Metódy lokalizácie a riadenia neholonomických kolesových robotov), University of Žilina, 2019, ISBN 978-80-554-1605-2, 129 p.

Books and textbooks

[1]	GREGOR, Michal – JANOTA, Aleš: Artificial Intelligence: Select exercises manuals II (Umelá inteligencia: Návody na vybrané cvičenia II), University of Žilina, ISBN 978-80-554-1600-7, 141 p.

Current Content Journals

[1]	VESTENICKÝ, Peter – VESTENICKÝ, Martin: Optimization of receiving window width of the correlation receiver for radiofrequency identification marker localization. International Journal of Distributed Sensor Networks, ISSN 1550-1477, Vol. 15, Nr. 9 (2019), pp. [1-12], CC Q3, WoS, Scopus

Co-operation

Co-operation Partners in Slovakia

- ABB, s.r.o. Banská Bystrica
- Aliga, s.r.o. Martin
- AŽD Slovakia, Bratislava
- B+R automatizace, s.r.o. Nové Mesto nad Váhom
- Betamont, s.r.o. Zvolen
- Continental Matador Rubber, s.r.o., Púchov-Horné Kočkovce
- Department of cybernetics and artificial intelligence, FEI TU Košice
- ELTODO SK, s.r.o. Bratislava
- FMach, s.r.o., Žilina
- IBM Slovensko, Bratislava
- Institute of robotics and cybernetics, FEI STU Bratislava
- MTS Krivá
- National highway company, Bratislava
- PPA INŽINIERING, s.r.o., Bratislava
- Profibus SK association
- Scheidt & Bachmann Slovensko s. r. o., Žilina
- SICK Bratislava
- Siemens s. r. o., CEE RU-SK IC-MOL RA RA-COC
- Siemens s.r.o., Digital Factory/ Factory Automation/ Automation systems (IA&DT)
- SIMAP SK, s.r.o. Trenčín
- Slovak.AI
- SOITRON, s.r.o., Bratislava
- ŽSR, Bratislava

International Co-operation Partners

- AŽD Praha s.r.o., CR
- B&R Industrial Automation GmbH, Austria
- Faculty of Technical Sciences, University of Novi Sad, Serbia
- PanonIT, Serbia
- První Signální, a.s., CR
- SIEMENS Mobility GmbH, Austria
- University of Strathclyde, Glasgow, UK

Non-contractual Cooperation with Academic Institutions

- Berkeley Artificial Intelligence Research Laboratory, UC Berkeley, USA
- Department of Computer Science and Technology, Tongji Univesity, Shanghai
- FD ČVUT Prague, Czech Republic
- FEI STU Bratislava
- FEI VŠB -TU Ostrava, Czech Republic
- FEI TUKE Košice
- Laboratory for Automation and Robotics, University of Patras, Greece
- MTF STU Bratislava, detached in Trnava

Visitors to the Department

Name	Institution	Length of stay
Michal Žák	DT – Výhybkárna a strojírna, a.s., Czech republic	3 x 1 day
Jiří Žilka	První Signální, a.s., Czech republic	2 x 1 day
Jozef Jašek	Siemens Mobility Austria GmbH	1 day
Kamila Hulman	Voestalpine SIGNALING Zeltweg GmbH, Austria	2 x 1 day
Michal Řepka	Institute of Technology and Business in České Budějovice, Faculty of Technology, Department of Mechanical Engineering, Czech republic	2 days
Roman Danel	Institute of Technology and Business in České Budějovice, Faculty of Technology, Department of Mechanical Engineering, Czech republic	5 days
Stefanie Meyer	Continental Reifen Deutschland GmbH, Germany	1 day
Richard Feddeck	Continental Reifen Deutschland GmbH, Germany	1 day
Anna Baranová	Continental Reifen Deutschland GmbH, Germany	1 day

Visits to Foreign Institutions

Name	Institution	Length of stay
Michal Gregor	University of Lappeenranta, Finland	8 days
Michal Gregor	University of Strathclyde, Glasgow, UK	3 months
Vojtech Šimák	University of Lappeenranta, Finland	8 days
Peter Holečko	Fraunhofer IWU, Chemnitz, Germany	3 days
Karol Rástočný	DT – Výhybkárna a strojírna, a.s., Czech republic	1 day
Vojtech Šimák	Panonit, Univerzita Novi Sad, Novi Sad, Serbia	31 days
Michal Gregor	University of Lappeenranta, Finland	8 days
Michal Gregor	University of Strathclyde, Glasgow, UK	3 months
Vojtech Šimák	University of Lappeenranta, Finland	8 days

Contracts (Business Activities)

S-103-0009/18: Safety appraisal of railway crossing safety system BUES2000 with axis counters type AZSB 300	
Customer:	Scheidt & Bachmann Slovensko, s.r.o.
Coordinator:	Karol Rástočný

AH950 switchpoint joining to SIMIS W SK electronic interlocking box	
Customer:	Siemens Mobility Austria GmbH
Coordinator:	Karol Rástočný

P-103-002/2018: Overall appraisal of SIMIS W SK system – project stage 6	
Customer:	SIEMENS Mobility GmbH, Austria
Coordinator:	Karol Rástočný

Report on safety evaluation of specific RLC23 system application joint on a crossing at km 45,708 on the Levice – Štúrovo track and a Report on safety evaluation of specific RLC23 system application joint on a crossing at km 84,850 Devínska nová Ves – Štúrovo track	
Customer:	AP Signaling, s.r.o., Martin
Coordinator:	Karol Rástočný

5/Z-ÚTZT/2019: Technical safety appraisal of PZSBT for the use on a twin-rail track	
Customer:	BETAMONT s.r.o., Zvolen
Coordinator:	Karol Rástočný

Other Activities

Conferences, Workshops, Symposiums Organized by the Department

- Lecture and laboratory exercises on: Image processing in industrial applications, under the auspices of the SICK company, 14.3.201, AB317, coordinator: Emília Bubeníková.
- Specialised lecture on: Image processing in industrial applications, under the auspices of the FMACH Žilina company, 12.3.2019, AR1A1, coordinator: Emília Bubeníková.
- Co-organisation of Machine Learning Summer School 2019, 9. 9. – 13. 9. 2019, Žilina, coordinator: Michal Gregor.
- V4+9 Cross-Border InnoRail (within InnoRail 2019), 12.11.-14.11.2019, Budapest, Hungary, BALLA Agnes (Innorail Kiadó és Konferencia Kft.), co-organisation at DCIS: Juraj Spalek, Aleš Janota, Jozef Valigurský.
- Workshop „Ready for Conti 3": discussion meeting of the representation of German/Slovak division of Continental AG/Continental Matador Truck Tires, s.r.o., DCIS representation and 1st and 2nd grade master degree students on IoT, cloud, big data, industry 4.0 and others: 19.6.2019 – DCIS FEE UNIZA, within the KEGA 014ŽU-4/2018 project.

Specialised Lectures and Courses Organized by the Department

Control systems based on PLCs, its programming and utilisation for control – Motor control.	
Customer:	Experimental exercises for the Middle industrial schools of Jozef Murgaš
Lecturer:	Jozef Hrbček
Date:	6th February 2019

Technological equipment of city tunnels	
Lecturer:	Rastislav Pirník
Where:	ČVUT Faculty of transport, CR
Date:	13th March 2019

Biometry	
Customer:	Students of the Automation and Process control programmes
Lecturer:	Roman Danel, Institute of physics HGF VŠB-TU Ostrava
Date:	13th March 2019

Operational states and technological equipment of city tunnels	
Lecturer:	Rastislav Pirník
Where:	ČVUT Faculty of transport, CR
Date:	14th March 2019

New trends in industrial automation	
Customer:	Students of the Automation and Process control programmes
Lecturers:	Michal Bors, Andrej Šimo, B+R Automatizace s. r. o., organizer: Jozef Hrbček
Date:	13th November 2019

Cybersecurity in practice and industry	
Customer:	Students of the Applied telematics and Process control programmes
Lecturer:	Peter Peniak, Continental Matador Truck, Púchov
Date:	2nd December 2019

Information systems security management, penetration testing	
Customer:	Students of the Process control programme
Lecturer:	Martin Šuták, Aliga, s.r.o.
Date:	12th December 2019

Invited Lectures/Papers

Artificial intelligence - we should be afraid or cheering	
Lecturer:	Juraj Spalek
Where:	Universität Basel, Basel, Switzerland
Date:	26th April 2019

Membership in International Institutions/Committees

Membership of the Department in international organizations	Membership since
Slovak society for cybernetics and informatics at SAV (SSKI)	2000

Individual membership of employees of international organizations		Function
Aleš Janota	Polish Academy of Sciences (PAN) – Transportation Committee, Katowice, Poland	member

Aleš Janota	International Institute of Informatics and Systemics, USA	member
Aleš Janota	Association for Computing Machinery (ACM), USA	member
Rastislav Pirník	Cooperative systems (SDT), CR	member of workgroup

Individual membership of employees in scientific committees of international journals		Function
Juraj Spalek	Annals of Faculty Engineering Hunedoara – Journal of Engineering, ISSN 1584-2665, ISSN 1584-2673, indexed in Index Copernicus – Journal Master List, Romania	member of editorial board
Juraj Spalek	Acta Technica Corviniensis – Bulletin of Engineering, e-ISSN: 2067-3809, Edited by Faculty of Engineering Hunedoara University Politehnica Timisoara, Romania	member of scientific board
Juraj Spalek	Archives of Transport Systems Telematics, Polish Association of Transport Telematics, ISSN 1899-8208, Poland	member of international programme committee
Juraj Spalek	Archives of Transport Systems Telematics, ISSN 1899-8208, Poland	member of scientific-programme board
Karol Rástočný	Archives of Transport System Telematics, Polish Association of Transport Telematics, ISSN 1899-8208, Poland	member of editorial board
Karol Rástočný	Advances in Electrical and Electronic Engineering, ISSN 1804-3119, CR	member of editorial board
Karol Rástočný	Wspolczesne systemy transportowe, ISSN 2449-7851, Poland	member of editorial board
Karol Rástočný	Railway Reports, ISSN 0552-2145, Poland	member of editorial board
Aleš Janota	Archives of Transport System Telematics, ISSN 1899-8208, Poland	chair of scientific board
Aleš Janota	TransNav International Journal on Marine Navigation and Safety of Sea Transportation, ISSN 2083-6473, Poland	member of programme board
Aleš Janota	transEngin Journal of civil engineering and transport, ISSN 2658, e-ISSN 2658-2120, Poland	member of scientific board
Juraj Ždánsky	Archives of Transport System Telematics, Polish Association of Transport Telematics, ISSN 1899-8208, Poland	member of programme board
Michal Gregor	Applied Computer Science, ISSN 2353-6977	member of scientific board

Individual membership of employees in the scientific committees of international conferences		Function
Peter Holečko	3rd EAI International Conference on Intelligent Transport Systems (INTSYS 2019), Portugal	member of programme board
Aleš Janota	17th IEEE World Symposium on Applied Machine Intelligence and Informatics (SAMI 2019), Herľany, January 24-26, 2019	member of technical programme board

Aleš Janota	19th International Conference on Transport System Telematics (TST 2019), Krakow, Poland, 27. Feb – 2. March, 2019	member of programme board
Aleš Janota	XXIII. international conference TransComp 2019, Zakopané, 2-5.12.2019, Poland	member of scientific board
Aleš Janota	13th International Conference on Marine Navigation and Safety and Sea Transportation (TransNav 2019), Gdynia, Poland, 12-14 June 2019	member of scientific programme board
Karol Rástočný	International Conference „TRANSCOM 2019", Slovak republic	member of scientific board
Karol Rástočný	International Conference „Applied Electronics", AE 2019, Czech republic	member of scientific board
Karol Rástočný	19th International Conference „Transport Systems Telematics", TST 2019, Poland	member of programme board
Karol Rástočný	15th International Conference „Railway Telecommunication and Interlocking Systems", Slovak republic	chair of programme board
Juraj Spalek	16th International Conference on Programmable Devices and Embedded Systems, PDeS 2019, Slovak republic	member of scientific board
Juraj Spalek	XIV-th International Scientific and Technical Conference Computer Science and Information Technologies CSIT 2019, Lviv, Ukraine	member of scientific board
Juraj Spalek	World Symposium on Digital Intelligence for Systems and Machines DISA 2019, Košice, Slovak republic	member of scientific board
Juraj Spalek	19th International Conference on Transport Systems Telematics, TST 2019, Krakow, Poland	member of scientific board

Individual membership of employees in scientific boards and trade committees abroad		Function
Juraj Spalek	VŠB-TU Ostrava, HGF, CR	member of branch committee
Aleš Janota	Publication scientific board of UTH Radom (University Publishing Scientific Council of the Kazimierz Pułaski University of Technology and Humanities in Radom), Poland	member
Peter Vestenický	VŠB-TU Ostrava, HGF, CR	member of branch committee

Membership in National Institutions/Committees

Membership of the Department in organizations of the SR	Membership since
Slovak society for cybernetics and informatics at SAV (SSKI)	2000

Individual membership of employees in organizations of the SR		Function
Aleš Janota	National robotics centre, Bratislava	honorary member
Aleš Janota	Scientific-technical association at UNIZA, Žilina	member
Aleš Janota	Slovak society for cybernetics and informatics at SAV (SSKI), SR	member of main board
Juraj Spalek	National robotics centre, Bratislava	honorary member
Karol Rástočný	Technical standardisation committee TK 83, SÚTN Bratislava	member

| Emília Bubeníková | VTS association at UNIZA | member |
| Peter Holečko | Profibus SK association | member |

Individual membership of employees in editorial boards of national journals		**Function**
Karol Rástočný	AT&P Journal, ISSN 1335-2237	member of editorial board
Juraj Ždánsky	AT&P Journal, ISSN 1335-2237	member of editorial board
Rastislav Pirník	Acta Technológia, ISSN 2453-675X	member of editorial board

Individual membership of employees in the scientific committees of national conferences		**Function**
Rastislav Pirník	Automation and control in theory and praxis ARTEP 2019 SR	member of programme board
Alžbeta Kanáliková	14th IWKM - International Workshop on Knowledge Management, November 7-8 2019, Bratislava, Trenčín, Slovakia	member of programme board

Individual membership of employees in scientific boards and trade committees outside of FEE UNIZA		**Function**
Juraj Spalek	UNIZA FMI	member of branch committee
Juraj Spalek	UNIZA FSE	member of scientific board
Juraj Spalek	UNIZA	member of scientific board
Aleš Janota	Branch committee of study programme 9.2.9 Applied informatics, Faculty of management and informatics, UNIZA, Žilina	member
Aleš Janota	Branch board of study programme Cybernetics, FEI VŠB Ostrava, Czech republic	member

Awards

Michal Gregor	Acknowledgement of the rector for international cooperation
Juraj Ždánsky	Certificate of the project 034ŽU-4/2016: Implementation of modern technologies into education with focus on safety PLC control, on excellent project objectives accomplishment

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