DEPARTMENT OF CONTROL AND INFORMATION SYSTEMS

General Information

Department of Control and Information Systems (DCIS) provides education and research in the field 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 2022, the staff of the DCIS consisted of 14 pedagogical staff, 1 research fellow, 1 technician and administrative support and 7 full-time postgraduate students. The pedagogical staff consisted of 2 professors, 8 associate professors, 3 senior lecturers with PhD. degree, 1 research fellow with a PhD. degree.

Staff of the Department

Head of the Department:	Aleš Janota
Vice-head of the Department:	Rastislav Pirník
Technical Support	Kamila Baxová

Sections of the Department

Section of Automation and Signalling Systems

Head of the Section:	Dušan Nemec (since 1.7.2022), Karol Rástočný (until 30.6.2022)
Professors:	Aleš Janota, Karol Rástočný
Associate Professors:	Michal Gregor, Jozef Hrbček, Vojtech Šimák, Juraj Ždánsky
Senior Lecturers (with PhD):	Peter Nagy (until 30.6.2022)

Section of Communication and Information Systems

Head of the Section:	Peter Holečko (since 1.7.2022), Rastislav Pirník (until 30.6.2022)
Associate Professors:	Marián Hruboš, Peter Peniak, Rastislav Pirník, Peter Vestenický,
Research Fellows:	Dušan Nemec
Senior Lecturers (with PhD):	Emília Bubeníková, Peter Holečko, Alžbeta Kanáliková

Postgraduate Students

Internal (full-time):	Michal Mihálik (31.8.2022), Milan Medvedík (31.8.2022), Ján Andel, Marek Bujňák, Branislav Malobický, Pavol Kuchár, Michal Skuba

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			
3B00104	Algorithmisation and programming	1	2 − 2 − 0
3B0A101	Introduction to study for A	1	2 − 2 − 0
3B0A201	Object-oriented programming	2	2 − 2 − 0
3B0H201	Programming in C++	2	2 − 2 − 0
3B0A202	Computer technical and software environment	2	2 − 1 − 1
3B0A203	Professional praxis for A	2	60 h
3B00305	Theory of automated control	3	3 − 1 − 1
3B0A301	Data analytics basics	3	3 − 2 − 1
3B0A303	Logical and event control	3	2 − 1 − 1
3B0A302	Communication networks	3	3 − 1 − 1
3B0E302	Network security	3	2 − 0 − 2
3B00403	Sensor technology	4	3 − 0 − 1
3B0A401	Control systems	4	2 − 1 − 2
3B0A402	Reliability and safety of control systems	4	3 − 2 − 0
3B0A403	Actuators and their control	4	2 − 1 − 1
3B0A404	Theory of information and signals	4	3 − 2 − 1
3B0A406	Professional praxis for A	4	60 h
3B0A501	Control systems programming	5	2 − 0 − 2
3B0A502	Theory of signal processing in process control	5	2 − 1 − 1
3B0A503	Information systems	5	2 − 1 − 2
3B0A504	Communication security	5	3 − 1 − 1
3B0A505	Bachelor project 1	5	0 − 0 − 5
3B0A601	Automated identification	6	2 − 1 − 1
3B0A602	Bachelor project 2	6	0 − 0 − 5
3B0A603	Bachelor thesis and its presentation	6	0 − 20 − 0
3B0A604	State exam subject	6	0 − 4 − 0

Course ID	Name	Sem.	Hours/Week
3B0A605	Professional praxis for A	6	60 h

*(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			
3I00104	Artificial intelligence	1	2 − 0 − 2
3I0D107	Artificial intelligence	1	2 − 0 − 2
3I0A101	Advanced automated control methods	1	2 − 1 − 2
3I0A102	Control systems safety analysis	1	3 − 2 − 0
3I0A104	Systems development	1	2 − 0 − 2
3I0A105	Processes in production enterprise	1	2 − 1 − 0
3I0A201	Control systems with Safety PLC	2	2 − 0 − 2
3I0A202	Application of information systems in process control	2	2 − 0 − 2
3I0A204	Secure system communication	2	3 − 0 − 2
3I0A203	Machine learning	2	2 − 1 − 0
3I0A205	Railway traffic control	2	3 − 0 − 2
3I0A206	Road traffic control	2	3 − 1 − 1
3I0A207	Robotic systems	2	3 − 0 − 2
3I0A208	Web applications development	2	2 − 0 − 2
3I0A106	Professional praxis for RP	2	60 h
3I0A301	Diploma project 1	3	0 − 0 − 5
3I0A302	Visualisation of processes	3	2 − 0 − 2
3I0A304	Information systems security	3	2 − 0 − 2
3I00306	Embedded systems design	3	2 − 0 − 2
3I0A303	Computer vision	3	2 − 0 − 1
3I0A306	Interlocking systems	3	3 − 0 − 2
3I0A307	Intelligent traffic systems	3	2 − 1 − 1
3I0A308	Autonomous robotic systems	3	3 − 0 − 2
3I0A401	Diploma project 2	4	0 − 0 − 5
3I0A402	Elaboration and presentation of diploma thesis	4	0 − 20 − 0
3I0A403	State exam subject	4	0 − 4 − 0
3I0A404	Professional praxis for RP	4	60 h

*(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			
3D0A003	Control and automation of processes	1	0 − 2 − 0
3D0A004	Intelligent control systems	2	0 − 2 − 0
3D0A005	Risk analysis and control systems safety	2	0 − 2 − 0
3D0A006	Robotic and autonomous systems	2	0 − 2 − 0

3D0A001	Written exam for dissertation exam and defence	3	$0-0-0$
3D0A008	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 focused on the development and simulation of algorithms for controlling industrial processes. The basis of the technological equipment of the laboratory is PC, PLC and safety PLC from Siemens, expansion modules for connecting sensors and actuators, modules for connecting remote inputs and outputs, visualization panels, frequency converters, servo drives and software for programming and configuring the mentioned devices. The connection of individual components and workplaces is realized by industrial networks. Work with this technology is supported by real models of industrial processes.

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 areas of system identification, design of control algorithms and their implementation for the purpose of managing industrial and transport processes. The laboratory is equipped with B&R programmable logic controllers (PLCs), safety PLCs, communication and input-output modules, inverters, drives, a junction model and models of several industrial systems, such as: a mechanical model of motor control, a lever with tactile feedback, a ball-on-ball system discs, an elevator, temperature, speed and pressure control systems, a CNC multifunctional machine and its digital twin, a delta robot and a workplace for testing human physical strength. The laboratory is also equipped with specialized computers with software equipment: Automation Studio, Safe Designer, Scene Viewer, MATLAB.

Laboratory of microcomputers and robotics

The laboratory is intended for research and development in the field of robotics and microcomputers. It is equipped with computers and programming interfaces for programming microcomputers of the MICROCHIP AVR family, STM32 microcomputers and industrial robots from ABB. It is an exact copy of the real software

that controls the robot in production and enables very realistic simulations using real robot programs and configuration files. The laboratory is conducting research on a mobile sensor platform for robot navigation. The laboratory also has a CNC laser with a B&R control system, which is used for the realization of bachelor's and diploma theses. Other equipment includes E-puck robots with the Webots environment, enabling the testing of robotic swarm algorithms. The equipment also includes an ABB IRB 14000 collaborative robot, DC and AC electric motors for teaching the subject Action elements and Mitsubishi frequency converters. The laboratory is also equipped with teaching modules from Global Logic for teaching STM microcomputers.

Laboratory of automated control and signal processing

The laboratory is intended for the verification of theoretical foundations in the field of automatic control theory (continuous and discrete systems), information and signal theory and digital signal processing and computer vision in process control. Own user programs and SW tool MATLAB and its specialized toolboxes (Simulink, Control Toolbox, Signal Processing Toolbox, Image Processing Toolbox) are used in the teaching. The laboratory has real teaching models from Humusoft CE 151 with accessories (Extended Real Time Toolbox and Real Time Windows Target). In the laboratory there is a laboratory model of an industrial line as a result of the KEGA project. It is equipped with a B&R PLC, communication and input-output modules, converters, drives. The model includes automatic identification systems based on various object identification technologies (vision systems from SICK and B&R), object identification systems based on scanning RFID, QR and EAN codes, color scanning, inductive and IR scanning from SICK. The line model has PLC technology based on B&R elements, which ensures, in addition to visualization of the model, its control and tasks associated with sorting objects based on selected criteria. The laboratory is also used for the individual work of students when solving year projects and diploma theses.

Laboratory of modelling and simulation

The laboratory is mainly used for teaching professional subjects that require the support of software tools. It is primarily intended for modelling the functional properties of control systems (UML; software tool Rhapsody), reliability and safety properties (software tool CARE), control procedures and control structures (in the Matlab environment). If necessary, it can also be used to work with other types of applications - for example, design and work with database systems, expert systems, and the like. The laboratory is also equipped with technology used to protect objects (alarm systems, electric fire alarm, camera monitoring systems). The laboratory is also used for the individual work of students when solving year 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, 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.

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 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).

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.

Projects of International Programmes

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

NUT-UNIZA 17040: Memorandum of NUT China – UNIZA SR on cooperation in education in the area of transport engineering and technology transfer	
Summary:	The research project is focused on trajectories of knowledge/education in the field of transport construction and engineering, as well as on other fields of study and courses aimed at the field of transport at the level of universities and CŽV. Part of

	the project is research into the possibilities of use and the use of patents from NUT by entities on the Slovak market.
Realization:	01/2021 – 06/2023
Coordinator:	Tatiana Čorejová
Coordinator for FIIT	Aleš Janota
Co-operators:	Aleš Janota

Projects of National Programmes

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

1/0241/2022 Mobile robotic systems as support during crisis situations	
Summary:	The scientific project is focused on the research of methods and approaches in the field of mobile robotic systems for the needs of emergency services intervening in crisis situations, e.g. in case of fires, biological threats, etc. The aim of the project is to theoretically process and laboratory verify the methods of data acquisition, their processing and subsequent decision-making (control) of a mobile robot based on the information obtained during a crisis situation. In the first phase of the project, the critical parts of the robotic system are defined and the principles of their operation are proposed, taking into account the demanding operating conditions during a crisis situation. The second phase is the implementation of the proposed methods and the verification of their functionality with the help of team members from the FBI UNIZA faculty, who have direct influence on the creation of intervention plans of the rescue services of the Slovak Republic. It will be possible to apply the proposed methods in the development and construction of robotic systems for the support of rescue services intervening during particularly dangerous crisis situations.
Realization:	01/2022 – 12/2024
Coordinator:	Rastislav Pirník
Vice-coordinator:	Aleš Janota
Co-operators:	Gregor Michal, Nemec Dušan, Hruboš Marián, Šimák Vojtech, Bubeníková Emília, Kanáliková Alžbeta, Andel Ján, Bujňák Marek, Mihálik Michal, (until 08/2022). Pavol Kuchár Ing. (since 09/2022)

008KU-4/2020: Comprehensive innovation and educational support of the subjects of the "Informatics Teaching" study program with the inclusion of the "Internet of Things" issue	
Summary:	The basic goal of the project is to fundamentally innovate and modernize the current "Informatics Teaching" study program for the 1st and 2nd level of university studies based on the content integration of the "Internet of Things" issue across the entire program and with a close connection to creative use in practical life. By introducing the issue of the "Internet of Things" into the teaching process, the aim is to support the creativity and analytical thinking of students, which will be reflected in the meaningful integration of new information into already acquired skills and habits in accordance with current development trends. At the same time, the study program will become more attractive, the profile will improve and its graduates will be more employable in practice in the hard-to-predict future.
Realization:	01/2020 – 12/2022
Coordinator:	Igor Černák

Co-operators:	DCIS: Alžbeta Kanáliková

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

APVV-20-0626 HuDyM - Biofidelic human body surrogate to increase the objectivity within the forensic analysis of road traffic accidents.	
Summary:	Forensic analysis of road traffic accidents (TA) within the expert department "03 03 01 Road traffic accidents" is complex and interdisciplinary problematics with potentially extensive volume of input parameters within the axis "vehicle-human-road". Input parameters are often of partial character and with technical uncertainties. This has a negative influence with respect to unambiguity of technical reconstruction and analysis of TA, that serves as a basis for decision making in criminal justice system. Within the forensic analysis of TA with vulnerable road users (pedestrians, cyclists), influence of the element "human" is significant for reconstruction and analysis of this subset of TA. This is valid particularly regarding using the human body injuries as a basis for determining the course of TA. Suggested research deals with current problematics of virtual and real-world surrogates of human body that will serve primarily for interdisciplinary objective forensic analysis of TA with vulnerable road users, but with application in other fields that use knowledge of injury biomechanics. Mathematical-physical models and real-world surrogates of human body that currently exist do not provide level of commonly available and universally applicable tools for wide spectrum of applications. This argument is valid in international context. The goal of suggested project is integrated research and construction of simulation mathematical-physical model and real-world surrogate of adult human body with increased biomechanical fidelity for multidirectional mechanical loading with focus on dynamic impact loading of vulnerable road users within TA. Project outputs will be applied directly in traffic accident analysis, but also in analysis of human body movement in forensic reconstruction of criminal cases, analysis of other accident events (work injury) and biomechanical research of injury mechanisms in human body dynamic loading.
Realization:	07/2021 – 12/2024
Coordinator:	Eduard Kolla (UZVV)
Co-operators:	Peter Vestenický

Projects of European Structural Funds

313011ASK8: Independent research and development of technological assemblies based on wearable electronics products, as tools for increasing hygiene standards in society exposed to the virus causing the disease COVID-19	
Summary:	The main goal of the project is to bring new knowledge in the field of optimizing the integration options of selected sensory and informational elements and subsystems in the environment of wearable electronics that can be used in the fight against the spread of the SARS-COV-2 virus causing the disease COVID-19.
Realization:	06/2022 – 06/2023
Coordinator (UNIZA):	Peter Danišovič
Co-operators:	Aleš Janota, Karol Rástočný, Rastislav Pirník, Peter Holečko, Emília Bubeníková, Alžbeta Kanáliková

313011V334: Innovative solutions for propulsion, energy and safety components of vehicles (acronym: iCoTS)

Summary:	Industrial research into the durability of automotive components of the next generation of vehicles. Research and development of hydrodynamic converters for the efficiency of hybridization of powertrains. Research of electric drives control methods and development of new topological arrangements of traction converters. Research in the optimization of dynamics and energetics of electric traction. Research and development in the field of optimal operation of battery systems. Development of ICT for increasing the safety of operational properties and increasing intelligence through self-learning algorithms. Analysis of the mechanical properties of modern systems for means of transport in the form of HIL and PIL simulations and through test benches.
Realization:	09/2019 – 06/2023
Coordinator:	Pavol Špánik, Pavol Rafajdus
Co-operators:	Vojtech Šimách (since 11/2022)

Other National Research Projects

O-22-103/0011-07 Robotic systems for the support of rescue services

Summary:	In the project, we will focus on the research of inspection and rescue robots in an uncontrolled environment (SAR tasks, English Search and Rescue), especially for the applications of searching and mapping the space affected by a fire or other extraordinary event. The basic goal of the project is the design and construction of a rescue mobile robotic system with subsequent theoretical design and laboratory verification of data acquisition methods, their processing and subsequent decision-making (management) of the rescue mobile robotic system based on the information obtained during an emergency situation. The obtained information will subsequently be provided to members of the emergency services in real time, which will enable effective management of the intervention, and thus also the reduction of damage to health and property.
Realization:	02/2022 – 1/2025
Coordinator:	Dušan Nemec
Co-operators:	Emília Bubeníková, Vojtech Šimák, Peter Holečko, Marián Hruboš, Ján Andel, Branislav Malobický

Other National Non-research Projects

002ZU-2-1-2021: Hybrid education in artificial intelligence, machine learning and cybernetics at the UNIZA

Summary:	The project will provide courses in English that will provide participants with the necessary theoretical knowledge and practical skills in the field of artificial intelligence (AI), machine learning (ML) and cybernetics. The courses will be divided into three levels of difficulty: (i) basic, user-oriented, (ii) advanced, incorporating deeper theoretical knowledge and the ability to combine, more complexly parameterize and apply methods more effectively; (iii) expert, providing a detailed understanding, at the level required e.g. for research in the field. The courses will combine full-time and part-time, so that participants will be able to enter them as needed and proceed at their own pace. The modular nature of the courses will allow them to focus on areas that are a priority in terms of their needs. The educational content will focus on modern methods with high potential: they will be identified on the basis of recommendations from excellent workplaces (eg feedback from UC

Berkeley), practical requirements and analysis of quantitative indicators. The courses will enable continuous training of researchers, students and practitioners who will apply or develop AI and ML methods in their activities. They will enable them to acquire the knowledge and skills necessary for the effective use of methods, but also for the correct evaluation and interpretation of their results, and thus significantly streamline the transfer of the most current knowledge into practice. Due to the great diversity of participants, the preparation of the content will pay special attention to the pedagogical adequacy and quality of the content as well as the lecturer's own, which guarantees the involvement of experts in the field of lifelong learning. The resulting pilot project will be able to be expanded in the future to include other universities, which will also help reduce unwanted fragmentation, support the networking and coordination of national educational and research activities in the field of AI and ML, and help make the Slovak academic area more attractive as a whole.

Realization:	12/2020 – 12/2022
Coordinator:	Róbert Hudec
Co-operators:	DCIS: Michal Gregor, Aleš Janota, Dušan Nemec, Jozef Hrbček, Vojtech Šimák

UNIZA Grant Projects

14873: Safety features in the force testing process	
Summary:	The project is focused on the design and creation of an arm designed to measure a person's physical condition. The system will include security functions to ensure the safety of persons. The design and implementation will be based on a model that can be connected to the control system in simulation. This procedure will accelerate the development of the application implementation with the possibility of creating a control program for the PLC and tuning the system already in the design phase. The created system will be used for presentation activities and also as a teaching aid.
Realization:	09/2021 – 08/2022
Coordinator:	Marián Hruboš
Project leader:	Jozef Hrbček

12757: Spherical robot to support the resolution of emergencies in tunnel construction.	
Summary:	This project is focused on the design of a spherical robot that will move in a dangerous environment of a road tunnel during an accident. During its deployment, the environment will be scanned and the concentration and temperature of the gases will be measured.
Realization:	09/2021 – 08/2022
Coordinator:	Marek Bujňák
Project leader:	Rastislav Pirník

Outputs from Solved Research Tasks

Publication activities at the FEEIT in 2022 (based on registration at the University Library up to February 2023)

Kategória	Názov kategórie (podľa UK) Túto sumárnu tabuľku nevypĺňať, pripraví dekanát za celú FEIT podľa evidencie v Univerzitnej knižnici. Ostatné nasledujúce tabuľky – monografie, ..., vypĺňať	Počet
AAA		
AAB		
ACA		
ACB		
ADC		
ADD		
ADE		
ADF		
ADM		
ADN		
AEC		
AED		
ADE		
ADF		
AGJ		
BCI		
...		

Current Content Journals

[1]	JANOTA, Aleš – PIRNÍK, Rastislav – ŽDÁNSKY, Juraj – NAGY, Peter: Human factor analysis of the railway traffic operators. In: Machines, Vol. 10, Issue 9, 2022, ISSN 2075-1702, p. 1-25.
[2]	RÁSTOČNÝ, Karol – ŽDÁNSKY, Juraj – HRBČEK, Jozef – MEDVEDÍK, Milan: Calculation of the Dangerous Failure Rate of the Safety Function. In: Applied Sciences, Vol. 12, Issue 5, 2022, ISSN 2076-3417, p. 1-15. DOI:10.3390/app12052382.
[3]	PENIAK, Peter – RÁSTOČNÝ, Karol – KANÁLIKOVÁ, Alžbeta – BUBENÍKOVÁ, Emília: Simulation of Virtual Redundant Sensor Models for Safety-Related Applications. In: Sensors, Vol. 22, Issue 3, 2022, ISSN 1424-8220, p. 1-19. DOI:10.3390/s22030778.
[4]	MEDVEDÍK, Milan – ŽDÁNSKY, Juraj – RÁSTOČNÝ, Karol – HRBČEK, Jozef – GREGOR, Michal: Safety of Control Systems with Dual Architecture Based on PLCs. In: Applied Sciences, Vol. 12, Issue 19, 2022, ISSN 2076-3417, p. 1-18. DOI: 10.3390/app12199799
[5]	ANDEL, Ján – ŠIMÁK, Vojtech – KANÁLIKOVÁ, Alžbeta – PIRNÍK, Rastislav: GNSS Based Low-Cost Magnetometer Calibration. In: Sensors, Vol. 22, Issue 11, 2022, ISSN 1424-8220 p. 1-10. DOI: 10.3390/s22218447
[6]	BUJŇÁK, Marek – PIRNÍK, Rastislav – RÁSTOČNÝ, Karol – JANOTA, Aleš – NEMEC, Dušan – TICHÝ, Tomáš – KUCHÁR, Pavol – LUKASIK, Zbigniew: Spherical Robots for Special Purposes. A review on current possibilities. In: Sensors, Vol. 22, Issue 4, 1413, 2022, ISSN 1424-8220, p. 1-36. DOI: 10.3390/s22041413
[7]	MIHÁLIK, Michal – HRUBOŠ, Marián – VESTENICKÝ, Peter – HOLEČKO, Peter – NEMEC, Dušan – MALOBICKÝ, Branislav – MIHÁLIK, Ján: A Method for Detecting Dynamic Objects Using 2D LiDAR Based on Scan Matching. In: Applied Sciences, Vol. 12, Issue 11, 5641, 2022, ISSN 2076-3417, p. 1-19. DOI:10.3390/app12115641

[8]	MIHÁLIK, Michal – MALOBICKÝ, Branislav – PENIAK, Peter – VESTENICKÝ, Peter: The New Method of Active SLAM for Mapping Using LiDAR. In: Electronics, Vol. 11, Issue 7, 1082, 2022, ISSN 2079-9292, p. 1-15. DOI: 10.3390/electronics 11071082

Patents, Industrial Designs, Author's Certificates and Discoveries

Submitted in 2022:

[1]	Category: patent Application number: PP 35-2022 Authors: Marián Hruboš, Marek Bujňák, Dušan Nemec, Rastislav Pirník, Pavol Kuchár, Michal Gregor Title: Hazardous environment survey equipment
[2]	Category: industrial design Application number: PUV 36-2022 Authors: Marián Hruboš, Marek Bujňák, Dušan Nemec, Rastislav Pirník, Pavol Kuchár, Michal Gregor Title: Hazardous environment survey equipment

Granted in 2022:

[1]	Category: industrial design Application number: PUV 36-2022 Authors: Marián Hruboš, Marek Bujňák, Dušan Nemec, Rastislav Pirník, Pavol Kuchár, Michal Gregor Title: Hazardous environment survey equipment

Specific Realization Outputs

Output type: Prototype development

Output description: Prototype of an automatic measuring table for checking safety relay parameters, including operating software for PC.

Co-operation

Co-operation Partners in Slovakia

- ai crowd, s.r.o. Žilina
- AISlovakIA, AI4SK
- 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
- Global Logic, Źilina
- HMH s.r.o., Bratislava
- IBM Slovensko, Bratislava
- Institute of robotics and cybernetics, FEI STU Bratislava

- KUMAT spol. s r. o., 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
- TeZaSig s.r.o., Czech republic
- University of Strathclyde, Glasgow, UK

Non-contractual Cooperation with Academic Institutions

- FD ČVUT Prague, Czech Republic
- FEI STU Bratislava
- FEI VŠB - TU Ostrava, Czech Republic
- FEI TUKE Košice
- MTF STU Bratislava, detached in Trnava

Visits from Foreign Institutions

Name	Institution	Length of stay
Richard Feddeck	Continental – Group sector Tire Hannover, Germany	2x 1 day
Katja Faelski	Continental – Group sector Tire Hannover, Germany	1 day
Stefanie Meyer	Continental – Group sector Tire Hannover, Germany	1 day

Visits to Foreign Institutions

Name	Institution	Length of stay
Aleš Janota	FD ČVUT Prague, Czech republic	4x 1 day
Aleš Janota	UTH Radom, Poland (Erasmus)	5 days
Michal Gregor	Sangmyung University, South Korea	1 day
Michal Gregor	UPENN, Philadelphia, USA	1 day
Michal Gregor	CIIRC, ČVUT Prague, Czech republic	2 days

Contracts (Business Activities)

FEIT/XX/2022: Technical safety solution of GP JAZZ (Generic product JAZZ-Kernel)	
Customer:	AŽD Praha
Coordinator:	Karol Rástočný

FEIT/XX/2022: Safety appraisal of circuits of PZS type BUES 2000 – specific application for PZS in žkm 30,411 TÚ ŽST Kapušany pri Prešove – ŽST Bardejov	
Customer:	AŽD Praha s.r.o., Žirovnická 3146/2, Záběhlice, 106 00 Praha 10
Coordinator:	Karol Rástočný

Other Activities

Conferences, Workshops, Symposiums Organized by the Department

- 16th international conference on railway communication and safety technology, 23.05. – 24.05.22, Košice, main organizer: Betamont s.r.o., Zvolen, co-organizer for DCIS: Aleš Janota.

Specialised Lectures and Courses Organized by the Department

Summer machine learning school @UNIZA 2022	
Customer:	Participation open to students from any institution; held blended in English
Lecturer:	Michal Gregor, Milan Straka (FMI UNIZA)
Date:	05.09.2022 – 30.11.2022

Use of safety PLC Simatic to control a safety-critical process	
Customer:	Schaeffler Kysuce, spol. s r.o.
Lecturer:	Juraj Ždánsky
31.08.2022	31.08.2022

Practical inspection tasks with COGNEX cameras	
Customer:	Specialized course for students of the Automation study program
Lecturer:	Michal Tuhý (MTS spol. s.r.o., Krivá)
Date:	20.10.2022

Object identification solution by SICK systems in industry	
Customer:	Specialized course for students of the Automation study program
Lecturer:	Ing. Adam Brňo (SICK spol. s r.o. Bratislava)
Date:	25.10.2022

New trends in industrial automation	
Customer:	Specialized course for students of the Automation and Process Control study program
Lecturer:	Michal Bors, B+R automatizace, spol. s r.o.
Date:	8.11.2022

Invited Lectures

History of teaching communication and interlocking technology	
Lecturer:	Aleš Janota
Location/Date:	Betamont, Zvolen / 22.5.2022

Membership in International Institutions/Committees

Membership of the Department in international organizations	**Membership since**
Transport telematics association, CR	2007

Individual membership of employees of international organizations		**Function**
Aleš Janota	Association for Computing Machinery (ACM), USA	member
Aleš Janota	International Institute of Informatics and Systemics, USA	member

Individual membership of employees in scientific committees of international journals		**Function**
Aleš Janota	TransNav – International Journal on Marine Navigation and Safety of Sea Transportation, ISSN 2083-6473, e-ISSN 2083-6481, Poland	member of programme board
Aleš Janota	TransEngin – Journal of civil engineering and transport, ISSN 2658-1698, e-ISSN 2658-2120, Poland	member of scientific board
Aleš Janota	Journal of Automation, Electronics and Electrical Engineering, p-ISSN 2658-2058, e-ISSN 2719-2954, Poland	member of scientific board
Karol Rástočný	Advanced in Electrical and Electronic Engineering, ISSN 1804-3119, CR	member of editorial board
Karol Rástočný	WST Journal, ISSN 2449-7851, Poland	member of editorial board
Karol Rástočný	Railway Reports, ISSN 0552-2145, Poland	member of editorial board
Karol Rástočný	Applied Computer Science, ISSN 2353-6977, Poland	member of scientific board

Individual membership of employees in the scientific/programme committees of international conferences		**Function**
Aleš Janota	XXV International Conference „Computer Systems Aided Science, Industry and Transport" (TransComp), TST2022, Zakopané, Poland	member of scientific board
Aleš Janota	IEEE 20th Jubilee World Symposium on Applied Machine Intelligence and Informatics (SAMI 2022), 2.3.-5.3.2022, Poprad, Slovakia	member of technical programme board
Aleš Janota	14th International Conference ELEKTRO 2022, 23.5.-26.5.2022, Krakow, Poland	member scientific board
Karol Rástočný	International Conference „Applied Electronics", AE 2022, 6.9.2022 – 7.9.2022, CR	member scientific board
Karol Rástočný	14th International Conference ELEKTRO 2022, 23.5.-26.5.2022, Krakow, Poland	member scientific board

Peter Holečko	EAI INTSYS 2023 – 7th EAI International Conference on Intelligent Transport Systems, 6.-7.9.2023, Molde, Norway	member technical programme board
Rastislav Pirník	14th International Conference ELEKTRO 2022, 23.5.-26.5.2022, Krakow, Poland	member scientific board
Emília Bubeníková	XIX. International Conference Multidisciplinary Aspects of Production Engineering, MAPE 2022, 13.9.-16.9.2022, Poland	member of scientific board

Individual membership of employees in scientific boards and trade committees abroad		Function
Aleš Janota	ČVUT Praha, Faculty of Transport, Czech republic	member
Aleš Janota	ČVUT Praha, Faculty of Transport, Czech republic, branch board of the doctoral study programme Smart Cities	member
Aleš Janota	VŠB-TU Ostrava, FEI, Czech republic, branch board of the Cybernetics study programme	member
Peter Vestenický	VŠB-TU Ostrava, HGF, CR	member of branch committee
Rastislav Pirník	Evaluation board within the institutionally accredited areas of education of the Czech Technical University in Prague.	external evaluator

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
Dušan Nemec	National robotics centre, Bratislava	member
Michal Gregor	AI4SK	member of executional board
Emília Bubeníková	Association VTS at UNIZA	member
Peter Holečko	Profibus SK association	member
Rastislav Pirník	National robotics centre, Bratislava	member

Individual membership of employees in editorial boards of national journals		Function
Karol Rástočný	AT&P Journal, ISSN 1336-233	member of editorial board
Juraj Ždánsky	ATP Journal, ISSN 1335-2237	member of editorial board

Individual membership of employees in scientific boards and trade committees outside of FEE UNIZA		Function
Aleš Janota	FRI ŽU, Žilina, branch committee for study programme 9.2.9 Applied informatics	member
Aleš Janota	ŽU, Žilina, scientific board	member

Aleš Janota	STU, Bratislava, branch committee of doctoral study branch Cybernetics	member
Karol Rástočný	STU, Bratislava, branch committee of doctoral study branch Cybernetics	member
Rastislav Pirník	STU, Bratislava, branch committee of doctoral study branch Cybernetics	member

Awards

Aleš Janota	Commemorative medal for lifelong contribution in signalling and security technology - an important part of the railway infrastructure, 22/05/2022. The medal was awarded by the Ministry of Transport and Construction of the Slovak Republic and the Railways of the Slovak Republic.
Karol Rástočný	Commemorative medal for lifelong contribution in signalling and security technology - an important part of the railway infrastructure, 22/05/2022. The medal was awarded by the Ministry of Transport and Construction of the Slovak Republic and the Railways of the Slovak Republic.
Peter Nagy	Commemorative medal for lifelong contribution in signalling and security technology - an important part of the railway infrastructure, 22/05/2022. The medal was awarded by the Ministry of Transport and Construction of the Slovak Republic and the Railways of the Slovak Republic.
KRIS FEIT UNIZA	STU FCHPT Institute of Informatization, Automation and Mathematics - Director's Award for extraordinary development of mutual cooperation, 23/06/2022
Marek Bujňák	Award for 1st place in the category: doctoral grant projects, call no. 1/2021. The award was given by the rector of the University of Žilina in Žilina.

Contact Address

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