

**Faculty of Informatics  
and Information Technologies**

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# **ANNUAL REPORT 2015**



© 2016, Mária Bieliková, Pavel Čičák, Daniela Chudá, Ladislav Hudec,  
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# CONTENTS

MESSAGE FROM THE DEAN .....	5
FACULTY MANAGEMENT BODIES .....	7
STUDY .....	11
RESEARCH.....	17
NATIONAL AND INTERNATIONAL RELATIONS .....	23
FACULTY SERVICES.....	25
INSTITUTE OF APPLIED INFORMATICS.....	27
INSTITUTE OF INFORMATICS AND SOFTWARE ENGINEERING .....	33
INSTITUTE OF COMPUTER SYSTEMS AND NETWORKS .....	51
NETWORKING ACADEMY.....	61
PHOTO GALLERY .....	63
FIIT PERSONNEL.....	65



## MESSAGE FROM THE DEAN



As we well remembered, the year 2014 was for the Faculty of Informatics and Information technologies STU interpreted as important and successful. Several new industry cooperations and research laboratories were established. All these activities not only significantly improved the quality of education and research at our faculty, but designated a very good startpoint for the past year 2015. Firstly, we have managed finally to complete our auditoria (size fo 400 and 120). Auditoria opening ceremony at the end of the year 2015 partially finalized our new building, so we can now use the whole space of the building. New auditoria have opened our building along its primary educational purpose also for the community meeting purposes including academic ceremonies.

Next very important fact was the completion of the University Scientific Park. As part of the University Scientific Park four research laboratories specialized at user experience and interaction, computer vision and graphics, computer networks and embedded systems and a modern data centre with the cloud computer system were established.

We appreciate that increased number of companies expressed their interest to collaborate with our faculty. Thanks to this fact we managed to establish Information Security research lab. This lab has created an environment for the new bachelor study program Information Security accredited in 2015. It is a great sign that we are on the right way.

Last but not least, year 2015 was year of the results of complex accreditation process, which evaluated past six years (2008-2013). We are proud that our faculty was evaluated among the best in Slovakia marked by A category.

This is the Report on elaboration of which “two deans participated”. On December 1, 2015 ended the term of Prof. Pavel Čičák. The Academic senate of the Faculty has elected the new dean Prof. Mária Bielíková, whose term has started on December 2, 2015.

Current situation at Slovak universities is influenced by a decreasing number of students in basic and secondary schools. Declining demographic curve delivers a lower number of secondary school students, who continue their studies at universities. Almost all schools in Slovakia recorded the loss of perspective university students. So we are glad that our faculty still keeps the number of students interested in the studies, what is more the interest is slightly growing.

To the next period we expect several challenges related also to the number of students. We should concentrate on gaining more well motivated applicants for study, keep our students to study hard, as well as work hard for acquiring research grants, especially in frame of Horizon 2020 programme, all with aim to continue providing the quality education and research in informatics and information technologies, to generate new knowledge and educate professionals capable to take leading industry and research positions.

Prof. Pavel Čičák  
Dean of the FIIT STU

Prof. Mária Bielíková  
Dean of the FIIT STU



# FACULTY MANAGEMENT BODIES

According to the Act No. 131 of February 21, 2002 (the University Code and Amendments and Supplements to some Acts and subsequent acts that have amended them), the faculty management is to be formed out of its academic community members. It is composed of lecturers and research workers (representing the employee part of the academic community of the faculty) and of students (representing the student part of the academic community of the faculty).

According to the University Code, academic management bodies of a faculty are the following:

- the Academic Senate of the faculty,
- the Dean,
- the Scientific Board of the faculty,
- the Disciplinary Commission of the faculty for students.

## I. Academic Senate of the Faculty

The Academic Senate of a faculty is a representative body of the faculty. It comprises of the employee part and the student part.

### I.1 Members of the Academic Senate

#### **Presidium of the Academic Senate**

presidium@as.fiit.stuba.sk

#### **chair**

Pavol Návrát, Professor (till October 2015)

Peter Lacko, PhD. (since November 2015)

#### **chairman of the employee section**

Ladislav Hudec, Assoc. Professor (till Oct. 2015)

Peter Trúchly, PhD. (since November 2015)

#### **chairman of the student section**

Jakub Ševcech (till October 2015)

Lukáš Csóka (since November 2015)

#### **Secretary of the Academic Senate**

Viera Danišová

#### **Members**

Vanda Benešová, PhD. (since November 2015)

Mária Bielíková, Professor (till November 2015)

Ladislav Hudec, Assoc. Professor (till Oct. 2015)

Gabriela Grmanová, PhD. (till October 2015)

Peter Kapec, PhD. (since October 2015)

Alena Kovárová, PhD. (since November 2015)

Peter Lacko, PhD. (since October 2014)

Pavol Návrát, Professor (till October 2015)

Jakub Šimko, PhD.

Marián Šimko, PhD. (till November 2015)

Peter Trúchly, PhD. (since July 2014)

Jozef Tvarožek, PhD. (since October 2015)

Valentino Vranić, Assoc. Professor (since October 2015)

#### **Members of the student section**

Lukáš Csóka

Marek Galinski

Barbora Pavlíková

Juraj Petrík (since October 2015)

Jakub Ševcech (till October 2015)

### I.2 Activities of the Academic Senate

The Academic Senate of the Faculty of Informatics and Information Technologies in 2015

- discussed the proposal of Rules for forming study plans, conditions for continuation of study and for regular completion of study, and took note of the proposed recommended study plans for each study programme as presented by the Dean,
- approved the additional conditions for admission to the study programmes offered by the faculty, presented by the Dean,
- approved the budget of the Faculty,
- approved the annual report on activities and annual financial report of the Faculty,
- submitted the annual report on its activity to the academic community of the Faculty,
- approved new members of the Disciplinary Commission of the Faculty,
- elected the nominee for the office of Dean for the term 2015-2019,
- elected the chairman of the student section,
- elected the chairman of the employee section and chair of the Academic Senate
- elected Vice-Deans and members of the Scientific Board of the faculty

Dr. Peter Lacko

Chair Academic Senate FIIT STU

## II. Dean

The Dean is the representative of the Faculty who manages, represents and acts on behalf of the

faculty. The current Dean was elected by the Academic Senate of the Faculty in its meeting held on October 20, 2015 and appointed by the Rector to

his office on December 2, 2015 for a four year office term. Vice-Deans were approved by the Academic Senate in December 2015.



Pavel Čičák, Professor



Mária Bielíková, Professor



Daniela Chudá, Assoc. Professor



Ivan Kotuliak, Assoc. Professor



Tibor Krajčovič, Assoc. Professor



Peter Pišteň, PhD.



Pavol Návrát, Professor



Viera Rozinajová, Assoc. Professor



Marián Šimko, PhD.

**Dean and Vice-Deans in office till Dec. 1, 2015**

**Dean**

Pavel Čičák, Professor

**Vice-Dean for Research**

Viera Rozinajová, Assoc. Professor

**Vice-Dean for National and International Relations and for Public Relations**

Ivan Kotuliak, Assoc. Professor

**Vice-Dean for Education**

Daniela Chudá, Assoc. Professor

**Vice-Dean for Services and Development**

Tibor Krajčovič, Assoc. Professor

**Dean and Vice-Deans in office since Dec. 2, 2015**

**Dean**

Mária Bielíková, Professor

**Vice-Dean for Human Resources and International Cooperation**

Pavol Návrát, Professor

**Vice-Dean for Research, Projects and Cooperation with Industry**

Viera Rozinajová, Assoc. Professor

**Vice-Dean for Doctoral Studies and Coordination of Mobilities**

Daniela Chudá, Assoc. Professor

**Vice-Dean for Bachelor Studies and Study Advertising**

Peter Pišteň, PhD.

**Vice-Dean for Master Studies and Collaboration with Alumni**

Marián Šimko, PhD.



### III. Scientific Board of the Faculty

#### III.1 Members of the Scientific Board

##### **Chair of the Scientific Board**

Pavel Čičák, Professor (till Dec 2015 )

Mária Bielíková, Professor (since Dec 2015 )

##### **Deputy chair of the Scientific Board**

Viera Rozinajová, Assoc. Professor

##### **Members from the academic community of the Slovak University of Technology**

Mária Bielíková, Professor

Pavel Čičák, Professor

Ladislav Hudec, Assoc. Professor

Daniela Chudá, Assoc. Professor

Gabriel Juhás, Professor

Ivan Kotuliak, Assoc. Professor

Tibor Krajčovič, Assoc. Professor

Mária Lucká, Assoc. Professor (since Dec 2015 )

Radko Mesiar, Professor (since Dec 2015 )

Oliver Moravčík, Professor (since Dec 2015 )

Ján Murgaš, Professor (till May 2015 )

Pavol Návrát, Professor

Miloš Oravec, Professor

Gregor Rozinaj, Assoc. Professor

Viera Rozinajová, Assoc. Professor

Valentino Vranič, Assoc. Professor

##### **External members**

Ladislav Hluchý, Assoc. Professor

- *Institute of Inf., Slovak Academy of Sciences*

Tomáš Hruška, Professor

- *Brno University of Technology*

Ivan Kalaš, Professor

- *Comenius University in Bratislava*

Emil Kršák, Assoc. Professor

- *University of Žilina*

Karol Matiaško, Professor

- *University of Žilina*

Daniel Olejár, Assoc. Professor

- *Comenius University in Bratislava*

Jiří Šafařík, Professor

- *University of West Bohemia in Pilsen*

Jaroslav Šušol, Professor

- *Comenius University in Bratislava*

Pavel Tvrđík, Professor

- *Czech Technical University in Prague*

Liberios Vokorokos, Professor

- *Technical University in Košice*

Pavel Zemčík, Professor

- *Brno University of Technology*

##### **Honourable members**

Pavol Horváth, Professor

Ľudovít Molnár, Professor

#### III.2 Activities of the Scientific Board

The Scientific Board of the Faculty of Informatics and Information Technologies in 2015:

- evaluated the level of the Faculty regarding its educational activity and activities in the field of science and technology,
- discussed and approved the proposal of the study programmes for the academic year 2015/16 offered by the Faculty,
- endorsed other experts with the right to conduct Final examinations in the study programmes offered by the Faculty (in accordance with the University Code),
- endorsed members of the Board of Specialists for doctoral study programmes,
- endorsed supervisors for doctoral study programmes (in accordance with the University Code),
- endorsed the habilitation board.

Professor Pavel Čičák

Chair of the Scientific Board FIIT STU

### IV. Disciplinary Commission for Students

The Disciplinary Commission of a faculty according to the University Code shall discuss misdemeanours of students and submit the proposal to the Dean who will resolve on it.

##### **Chair**

Ladislav Hudec, Assoc. Professor

##### **Members**

Anna Bou Ezzeddine, PhD.

Ján Hudec, PhD.

Ivan Kapustík

##### **Members - students**

Jozef Filipek – doctoral degree programme

Ladislav Gallay –bachelor degree programme

Martin Janík –master degree programme

Jana Podlúcká –master degree programme

Assoc. Prof. Ladislav Hudec

Chair Disciplinary Commission for Students



# STUDY

## I. Undergraduate Study (Bc)

In the academic year 2014/15 two accredited study programmes with regular length three or four years were offered:

### Informatics

The study programme leads to a complete undergraduate level university education in Informatics/Computer Science in an engineering profession oriented chiefly to software systems and processes. The graduate will acquire deep knowledge from theoretical foundations of Computer Science, data structures, programming languages, analysis and design of software systems and their management, and architecture of computer systems and networks. The graduate is able to analyse, design, implement and verify software systems, to work effectively as a member of a development team, to work with tools used in developing and documenting of software. The graduate is prepared for a possible postgraduate study or for a direct entry into the labour market. The graduate is able to assume responsibility as a software system designer, programmer or maintenance specialist of information technologies systems. The graduate is aware of the social, legal and economical context of the profession.

### Computer and Communication Systems and Networks

The graduate masters various skills in the field of Computer Engineering. During the study he gains theoretical knowledge, practical abilities and skills in the field of Computer and Communication Systems and Networks, and much additional knowledge, capabilities and skills with the similar branches. The graduate is able to work as expert in the field of computer systems and networks and its components, expert on deployment and installation of modern information technologies, system expert creating configuration, realization of installation of computers and computer networks, the member of team performing support activities for complex design and projecting of control and information systems and its implementation environment, manager, consultant, dealer or distributor in the information technologies market network, educational position in non university institutions aimed on informatics. The

graduate is also prepared for possible second level university study.

In June 2015 the students defended their bachelor theses and passed the final examination.

The following students were conferred awards for their excellent study results:

- *“Magna cum laude”*: Róbert Cuprík, Mário Csaplár, Ondrej Čerman, Peter Dubec, Tomáš Farkaš, Tomáš Chovaňák, Jakub Mačina, Lukáš Miškovský, Peter Vrana, Jakub Benjamín Vrba
- *“Cum laude”*: Ladislav Gallay, Adrián Huňa, Zoltán Rusnák
- *Dean’s Award for Excellent Bachelor Thesis*: Tomáš Farkaš, Jakub Mačina, Zoltán Rusnák
- *Dean’s Commendatory Letter for Bachelor Thesis*: Martin Baňas, Richard Belan, Róbert Birkus, Róbert Cuprík, Ondrej Čerman, Matúš Demko, Tomáš Farkaš, Ladislav Gallay, Adrián Huňa, Tomáš Chovaňák, Ľubomír Kaplán, Jakub Mačina, Lukáš Marták, Lukáš Miškovský, Zoltán Rusnák, Monika Sanyová, Gabriel Takács, Miroslav Takács, Peter Vrana

## II. Master Study (Ing)

In 2015, FIIT STU offered three accredited study programmes with regular length two or three years<sup>1</sup>:

### Software Engineering (SI)

Study programme leads to a complete graduate level university education in the area of Computing and Information Technologies in an engineering profession dealing with analysing, designing, developing and maintaining large software systems. The graduate will acquire deep knowledge enabling to manage teams, to lead independently large projects and assume responsibility for complex solutions. The graduate is able to devise and present own solutions, develop, modify or implement contemporary information technologies. The graduate will work efficiently individually and also as a member or a leader of a software team. The graduate is able to analyse critically and apply a whole range of concepts, principles and practices of software engineering. The graduate is aware

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<sup>1</sup> Three years for students who have not obtained their first degree in related field.

of the social, moral, legal and economical context of the profession. The graduate is also prepared for a possible doctoral study.

#### **Computer and Communication Systems and Networks (CCSN)**

The study program leads to a complete graduate level university education in the field of informatics focused mainly to digital computer systems and computer and communication networks. The study program provides a possibility to gain the knowledge in computer systems architecture and structure design, the knowledge in design, development and maintenance of advanced hardware and software tools for standard and specific applications, using advanced information technologies and taking in account security aspects as well. The graduate obtains also knowledge in applied mathematics, management and entrepreneurship, and gets prepared to broader understanding to social, moral, legal and economics context of his future profession. The study program provides the preparation for carrying out research and development works with high rate of creativity and selfreliance.

#### **Information Systems (IS)**

Study programme leads to a complete graduate level university education in the area of Computing and Information Technologies in an engineering profession dealing with analysing, designing, developing and maintaining large information systems. The graduate is able to devise and present own solutions in research, development and construction of information systems. The graduate is able apply creatively knowledge on technological, software and business processes to enhance ways to achieve organisation's goals and improve its productivity. The graduate is able to work individually and also as a member or a leader of a software or information system team. The graduate has deep knowledge enabling to manage teams, to lead independently large projects and assume responsibility for complex solutions. The graduate is also prepared for a possible doctoral study.

In these study programmes the students graduated in June 2015.

- *"Suma cum laude"*: Patrik Polatsek, Kamil Burda
- *"Cum laude"*: Peter Demčák, Štefan Linner, Miroslav Šimek, Matej Štetiar
- *Dean's Award for Excellent Master Thesis*: Kamil Burda, Ivan Martoš, Patrik Polatsek

- *Dean's Commendatory Letter for Master Thesis*: Tomáš Boros, Kamil Burda, Peter Demčák, Zuzana Grešlíková, Marek Jakab, Ján Kebísek, Lukáš Kohútka, Štefan Linner, Jozef Marcin, Ivan Martoš, Samuel Molnár, Patrik Polatsek, Lukáš Sekerák, Daniel Soós, Juraj Vincúr, Miroslav Vojtuš

### **III. Doctoral Study (PhD)**

Quality and number of doctoral students significantly influence the results obtained in research. We still observe an insufficient number of motivated doctoral students in the fields of informatics and information technologies. The graduates have excellent opportunities in finding positions in the labour market, therefore, even if they are interested in further studies they often prefer to be admitted as part-time students.

This trend has been slightly reversed in recent years. Number of applicants increased 2 times compared to year 2008 and for several years we maintain a stable number of accepted applicants. We worked towards motivating students to finish their theses. This resulted in increased number of defended dissertation theses – 7 this year (most doctoral students who finished their study this year started doctoral study more than three years ago).

In 2015 two accredited study programmes were offered:

#### **Applied Informatics**

Study programme Applied Informatics in the third (doctoral) level of university education creates for students a space to build up and to profound knowledge and abilities of methods and tools of informatics and their applications in a broad spectrum of areas. It is built up on study programmes where students get basic methods and tools of informatics from specification of problems, through design and implementation of their algorithmic and non algorithmic solutions, analysis of solution properties, up to properties of program and technical tools of informatics. The methods of scientific work, current state of research in a particular area, looking for open problems and research work is a part of the study as well. The graduate is able to solve scientific problems in a broad scale of applied informatics areas independently, utilize advance methods and tools of design and development of information technologies applications creatively. The graduate can enter trade market directly as well.

### Program Systems

Doctoral studies in Software Systems lead towards highest university education in the area of Computing and Information Technologies particularly in the field of software engineering, dealing with analysing, designing, developing and maintaining large software systems. The study programme Software Systems is a continuation of the programme Software and Information Systems which has been offered before. Students can orient in their research towards any of open research problems related to the concept of software system in general, its properties and methodology of its development. In particular, research concentrates on such software systems that embody some information system, whereas the information systems themselves are usually designed for an environment of heterogeneous information sources, including internet. The graduate is able to solve independently difficult scientific problems of its field, having acquired its theoretical principles and methodology.

Regular length of all doctoral study programmes is 3 years for full-time study and 5 years for part-time study.

In 2015 following dissertations were defended:

- *Miroslav Siebert*: Methods of Critical Paths Delay Faults Testing in Digital Systems (Applied Informatics, supervisor: E. Gramatová)
- *Štefan Krištofik*: A Contribution Towards Architectures and Algorithms for Self Repair of RAMs (Applied Informatics, E. Gramatová)
- *Dominik Macko*: Contribution to System-Level Design and Verification of Low-Power Digital Systems (Applied Informatics, P. Čičák)
- *Roman Krakovský*: Processing of Information in Multidimensional Data Space by Projective Art Neural Network (Applied Informatics, I. Mokriš)
- *Ladislav Clementis*: Study of Game Strategy Emergence by Using Neural Networks (Applied Informatics, V. Kvasnička)
- *Ján Murányi*: Optimization of Multimedia Flows in Multipath Networks (Applied Informatics, I. Kotuliak)
- *Roman Broniš*: Data Delivery in HBB-Next Architecture (Applied Informatics, I. Kotuliak)

Numbers of the full-time bachelor programme students

Academic year	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year <sup>2</sup>
2005/2006	344 (230/114)	262 (176/86)	91 (54/37)	92
2006/2007	332 (221/111)	269 (192/77)	246 (163/83)	19
2007/2008	290 (195/95)	272 (188/84)	266 (186/80)	1
2008/2009	265 (181/84)	229 (159/70)	308 (215/93)	-
2009/2010	291 (189/102)	169 (124/45)	244 (170/74)	-
2010/2011	253 (172/81)	196 (143/53)	190 (141/49)	-
2011/2012	444 (291/153)	173 (123/50)	198 (142/56)	-
2012/2013	492 (305+52+110+25)	214 (161/53)	156 (109/47)	-
2013/2014	501 (258+67+127+49)	262 (177+55+18+12)	199 (142+57)	-
2014/2015	436 (241+124+71+0)	321 (192+70+39+20)	254 (174+14+54+12)	-
2015/2016	416 (261+85+43+27)	274 (176+59+39+0)	288 (183+50+42+13)	16(5+11)

Note: First number in parentheses refers to number students in study programme Informatics, second number refers to number students in study programmes Computer Systems and Networks or Computer and Communication Systems and Networks.

<sup>2</sup> Only the students in study programme Informatics.

Numbers of the full-time master programme SI, CSN (CCSN), IS students

		all	SI	CSN or CCSN	IS
Academic year	2005/2006	231	119	73	39
	2006/2007	290	124	106	60
	2007/2008	326	141	113	72
	2008/2009	362	154	110	98
	2009/2010	394	160	128	106
	2010/2011	395	157	126	112
	2011/2012	355	155	100	100
	2012/2013	149	74+2	42+1	29+1
	2013/2014	287	115	74	98
	2014/2015	298	74+1+2	73+1	143+4
	2015/2016	327	117+1	51+1	156+1

Evolution of number of doctoral full-time students (year-end figures)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Num of students	22	24	25	30	34	43	48	47	47	61	53

#### IV. Student Conferences and Competitions

The Faculty organised and supported in 2015 several student competitions and conferences. The importance of involvement of the students in such events is very high. Students took active participation in various technical and research activities (co)organised by the Faculty. We are proud to list also successes of our students in national and international competitions organized outside our university.

##### Imagine Cup

- category Pich video challenge and Project blueprint challenge: Jozef Gáborik, Matej Leško, Jakub Mačina, Jozef Staňo

##### IIT.SRC 2015

- Informatics and Information Technologies Student Research Conference (to be mentioned in the following section in more detail)

##### NAG 2015 – national CISCO competition

- Jakub Pullmann – 2nd place in category UNI

##### ACM SPY – Student Project of the Year Czech and Slovak Competition

- Patrik Polatsek – 4<sup>th</sup> place with diploma project Spatiotemporal Saliency Model of Human

Attention in Video Sequences. (supervised by V. Benešová)

##### RoboCup, Soccer Simulation League

- Winners of the Slovak University of Technology RoboCup 2015, 3D: Team Infinity: Peter Filípek, Metod Rybár, Michal Segeč, Juraj Šimek, Martin Vrabc, Miroslav Wolf

##### TP Cup

- Best Team of the year 2015 winners: Igor Jurík, Matej Liskovec, Jaroslav Loeb, Martin Tamajka, Peter Truchan, Ľubomír Vnenk: Check-mates, supervisor: M. Šimko

##### ACM ICPC

- 1<sup>st</sup> place within participating slovak universities, advanced to Middle European regional round (Ladislav Gallay, Martin Kalužník, Tibor Žuffa)

#### V. Awarded Theses

##### V.1 Excellent Bachelor Theses

**Tomáš Farkaš: Parallel Data Sorting** (M. Lucká), Informatics

**Annotation:** In the modern computer era, parallelism tends to be the most dominant way of increasing computing capabilities. Various programming models to allow parallel computing have been developed to enable various sorting

algorithms to run parallel. The purpose of this thesis is to test their performance in bioinformatic data parallel sorting. After the parts dedicated to theoretical concepts of related disciplines, the thesis follows with three main parts describing three main iterations: First, we need to find a suitable comparative sorting algorithm to serve for finalstep sorting in described noncomparative algorithm. In both iterations, our implementations are based on already published algorithms, and discuss some improvements. Next, we will parallelize the resulting algorithm on multi-processor cluster machine and also test if GPUs can be used for this purpose. The subsequent part is concerned about an alternative approach that uses treelike structure to store, sort and index data entries. In the end, we will apply the resulting algorithm for a practical issue of counting the frequency of entities in bio-informatic data.

**Jakub Mačina: Innovative Application within an International Competition** (J. Šimko), Informatics

**Annotation:** When working with a computer, one repeatedly lose consciousness about her posture. On a long term basis, sitting in a bad posture causes back pain, decrease in a productivity or even serious health disorders. Our goal was to propose and implement application for an international competition, which prevents health problems related to wrong sitting habits. Application uses camera to monitor user's upper body in real time. When it detects a wrong sitting posture, it alerts the user to correct his body alignment. Application has several approaches of stream analysis from RGB and depth cameras, which are combined together into overall evaluation of user's sitting posture quality. Alongside overall description of our project, the thesis concerns about posture classification that uses machine learning algorithms. In the thesis we propose two feature extraction methods from depth maps. These feature vectors are an input for the classification of user's sitting posture using neural networks. Proposed solution was evaluated. Our experiments report 82 % accuracy of sitting posture classification for the best detection method.

**Zoltán Rusnák: Control System of Automatic Mapping Platform** (F. Kudlačák), Computer and Communication Systems and Networks

**Annotation:** This bachelor work contains analysis of controlling mobile robot and analysis of environment mapping by usage of suitable sensors. Design and implementation of control system for Arduino platform and system for environment

mapping. Output of this work will be mobile robot, program for development board Arduino and application which can process data from sensors and construct map of environment. Bachelor work consists of a few sections. In first section there is analysis of existing methods for mapping and comparison of sensors. In second section there is described design of control and mapping system. Third section contains specification of those systems. Fourth section contains description of implementation of these two systems. In fifth section there is description of testing of resulting product. Last sixth section describes conclusion.

## V.2 Excellent Master Theses

**Kamil Burda: Port Control Protocol in Software Defined Networks** (M. Nagy), Computer and Communication Systems and Networks

**Annotation:** The goal of this thesis is to present to the reader User applications, such as instant messaging or VoIP, may have problems traversing the network through middleboxes (NAT gateways, firewalls). Several mitigation techniques exist, including a relatively new protocol called Port Control Protocol (PCP). PCP allows user applications to receive IP address and port mapping directly from the middleboxes. Additionally, PCP allows user applications to optimize the number of keepalive messages sent to the network in order to maintain the connection, reducing the network load and prolonging battery life in mobile devices. Software defined networking (SDN) is a new paradigm in computer networks that allows the network behavior to be programmed. SDN networks increase flexibility and vendor compatibility by providing a standard communication interface for the network elements. The goal of the diploma thesis is to implement PCP over an SDN network (using the OpenFlow protocol) and to measure the reduction of keepalive traffic with PCP enabled in the implemented network, focusing on mobile networks, where the impact of the reduction of the signaling traffic may be considerable.

**Ivan Martoš: Software Services Recommendation Using Context** (V. Rozinajová), Software Engineering

**Annotation:** Nowadays a great number of different software services are available for usage. These services have different attributes and proper selection of software service for solving given problem is very difficult and nontrivial task. This

thesis focuses on recommending software services. By recommendation, we want to achieve selection of software service that fulfills the needs of the user as much as possible. We plan to recommend ordered list of software services, where services are ordered by our estimate of likelihood that software service fulfills user needs. Recommendation will be based on semantic descriptions of software services. In recommendation we plan to use modern and still evolving approach based on context. We plan to model context of a problem and context of a software service. We also focus on automatic clarification of contexts.

**Patrik Polatsek: Spatiotemporal Saliency Model of Human Attention in Video Sequences**  
(V. Benešová), Information Systems

**Annotation:** One of the most important senses is our vision. Human eyes receive a huge amount of visual information every second. Processing such amount of data is very demanding, thus visual attention provides our brain the ability to select the most important aspects of a scene. Models that predict visual attention create a saliency

map. Standard hierarchical saliency methods do not respect the shape of objects and model saliency as the pixel-by-pixel difference between the centre and its surround. The aim of this master thesis is to improve the saliency prediction using a superpixel-based approach. Their key benefit is that their boundaries should correspond to object's contours. Our proposed saliency model combines a hierarchical processing of visual features and a superpixel-based segmentation. Our perception is influenced by dynamic stimuli too. Thus, we have extended our method to consider dynamic impacts of attention using optical flow maps to predict visual attention also in video sequences.

Assoc. Prof. Daniela Chudá  
Vice-Dean for Education (first and second levels)

Assoc. Prof. Viera Rozinajová  
Vice-Dean for Research (including the third level education)



# RESEARCH

## I. Research Areas

The economic and social development is featured by an exponential growth of new scientific knowledge today. Informatics and information technologies are playing the key role. They boost the development of all scientific branches with the creation of new methodological base to do research and development. The development time decreases and the traditional theoretical and experimental abilities are extended broadly.

Informatics has developed to be an autonomous scientific area, which supports success not only in the branch of information technologies, but it also has wide consequences as for the lives of individuals and society. It is not a mere coincidence that research in the IIT area has become the priority among the research topics in the European Union.

Research at FIIT STU is oriented on these main research areas that respect the organisation, existing technical and laboratory equipment and professional skills:

- intelligent information analysis and processing in large information spaces, e.g. the World Wide Web,
- user experience design,
- personalized context-aware information and knowledge retrieval and recommendation for the adaptive social semantic web,
- Big Data analytics,
- methods for distributed information processing,
- advanced methods and tools for software systems design, development and integration,
- computer vision and computer graphics in virtual and augmented reality systems,
- advanced methods of computational intelligence oriented to “echo state” neural networks, recurrent neural networks, evolutionary algorithms,
- methods and tools for security and administration of network and mobile computer systems,
- formal specification and automated engineering tasks in the area of HW/SW co-design of the mobile computing systems,

- security, reliability and fault tolerance in distributed computer systems and mobile computer networks,
- methods for improvement of quality of service in the Next Generation Networks,
- design of digital systems and embedded systems.

FIIT STU recognizes as part of its mission to serve the broader academic community in Slovakia and also internationally in promoting cooperation in relevant fields. In 2015 FIIT STU supported the Slovak ACM Chapter activities. FIIT STU supported also the publishing Bulletin “Information Sciences and Technologies” – a web based scientific journal, activity initiated and executed by the ACM Slovakia Chapter.

## II. Scientific Activities

Regular scientific seminars organized at FIIT STU on:

- Personalized Web,
- Big Data Analytics,
- Artificial Intelligence,
- Vision and Computer Graphics.

The Faculty took part in providing technical and scientific programmes, especially through the work in programme committees of more than 35 conferences, mostly international:

- ABIS – International Workshop on Adaptivity and User Modeling,
- ACIIDS – Asian Conference on Intelligent Information and Database Systems,
- ADBIS – East-European Conference on Advances in Databases and Information Systems,
- ADVANSO – Advanced Software Development Research Group seminar
- BCI – Balkan Conference in Informatics,
- BIS – International Conference on Business Information Systems,
- CompSysTech – International Conference on Computer Systems and Technologies,
- DATA a ZNALOSTI – Annual Conference on Data and Knowledge,
- DDECS – IEEE Symposium on Design and Diagnostics of Electronic Circuits and Systems,

- DSAA – International Conference on Data Science and Advanced Analytics,
  - ECBS-EERC – Eastern European Regional Conference on the Engineering of Computer Based Systems,
  - e-Learning – International Conference on e-Learning,
  - ENIC – European Network Intelligence Conference,
  - ECBS-EERC - Eastern European Regional Conference on the Engineering of Computer Based Systems,
  - EWDTs - East-West Design & Test Symposium,
  - HT – ACM Conference on Hypertext and Hypermedia,
  - ICALT – IEEE International Conference on Advanced Learning Technologies,
  - ICCI – International Conference on Collective Intelligence Technologies and Applications,
  - ICETA – International Conference on Emerging E-Learning Technologies and Applications,
  - ICSLE – International Conference on Smart Learning Environments,
  - ICWE – International Conference on Web Engineering,
  - IDA – International Symposium on Intelligent Data Analysis,
  - IKC – International KEYSTONE Conference,
  - ISMIS – International Symposium on Methodologies for Intelligent Systems,
  - ITAT – Workshop on Information Technologies – Applications and Theory,
  - JCDL – Joint Conference on Digital Libraries, Knoxville,
  - KDWEB – International Workshop on Knowledge Discovery on the Web,
  - PAD – Czech and Slovak Seminar on Computer Architectures and Diagnostics,
  - PALE@UMAP – International Workshop on Personalization Approaches in Learning Environments (UMAP 2015),
  - PRASAE@ICSLE – International Workshop on Peer Review, Peer Assessment, and Self Assessment in Education (ICSLE 2015),
  - RecSys – ACM Conference on Recommender Systems,
  - SCLIT – Symposium on Computer Languages, Implementations and Tools,
  - SQAMIA – Workshop on Software Quality Analysis, Monitoring, Improvement, and Applications,
  - SMAP – International Workshop on Semantic Media Adaptation and Personalization,
  - TPDL – International Conference on Theory and Practice of Digital Libraries,
  - UMAP – International Conference on User Modelling, Adaptation and Personalization,
  - WIKT – Workshop on Intelligent and Knowledge oriented Technologies,
  - WMNC, IFIP Wireless and Mobile Networking Conference.
- In 2015, FIIT STU organised or co-organised several events aimed at exhibition of students' research work. Above all, the most important event was the 11th Informatics and Information Technologies Students Research Conference – IIT.SRC 2015, which was held on April 23, 2015.
- At IIT.SRC 2015 were accepted 76 papers (25 bachelor, 37 master, 14 doctoral students as authors).
- Papers were in two categories: full papers (further organized as researching solutions and developing innovative solutions) and extended abstracts.
- The conference was organized in seven sections:
- Web Science and Engineering
  - Intelligent Information Processing
  - Software Engineering
  - Computer Networks, Computer Systems and Security
  - Computer Graphics, Multimedia and Computer Vision
  - Computer Science and Artificial Intelligence
  - Innovative Applications and Technologies.
- The Conference was opened by a keynote of Jan van Leeuwen (Utrecht University in The Netherlands) titled: "The Philosophy of Computation".
- The excellent student papers were awarded. The best paper award was conferred to:
- **category of doctoral students** – Ondrej Kaššák (Students' Behaviour Analysis in e-Learning System, supervisor M. Bieliková)
  - **category of master students** – Patrik Polatsek (Hierarchical Superpixel-based Saliency Model, supervisor V. Benešová)
  - **category of bachelor students** – Jakub Gedera (Automatic Diacritics Reconstruction in Slovak Texts, supervisor M. Šimko)
- Dean's award was the highest appreciation. It was conferred to:
- Peter Demčák (Evaluating Learnability of Games, supervisor: J. Šimko)
  - Matej Chlebana (Source Code Review Recommendation, supervisor: K. Rástočný)

- Ivan Srba (Towards Preservation of Sustainability in Community Question Answering Tree, supervisor: M. Bieliková)
- Daniel Kíř (Refinement of Methods for DNA Sequencing, supervisor: P. Lacko)

Besides the papers presented at the conference in two poster sessions several accompanied events were organized

- **RoboCup Exhibition**, where students presented interesting results in simulated league both 2D and 3D; RoboCup is an attractive project with free participation, designed to support education and research in artificial intelligence, robotics and information technologies,
- **TP-Cup Showcase**, where eleven teams presented their projects; TP-Cup is a competition of master students' teams aimed at excellence in development information technologies solutions within two semester long team project module in master study programs.

IIT.SRC 2015 accompanying events included also programming competition, FiitaPixel – photo contest best pictures exhibition, RoboCup and JUNIOR IIT.SRC 2015.

FIIT STU initiated in 2010 a join of two student competitions ACM CZ Student Research Competition organized by Czech ACM Chapter and Czech and Slovak Universities and Diploma Thesis Competition organized by IT company Profinit, which resulted in establishment of

- Czech ACM Chapter & Slovakia ACM Chapter Student Project of the Year Competition – ACM SPY

The ACM SPY 2015 Finals were organized in November 2015 in Prague. The finalists projects were selected by the judges from the best thesis submitted by Czech and Slovak universities based on successfully defended master thesis in 2014/15.

The project

- Time and space model of significant features of human attention in videosequences authored by Patrik Polatsek (supervisor V. Benešová) won the 4th prize

In September 2015 we actively participated in “The Night of Researcher”, event supported by European Commission. This event was organized in more than 150 European cities. Researchers in many countries prepared presentations from the

field of science and research for the general public.

We are proud of five FIIT STU student teams who presented their interesting research projects to public:

- *We know how much you blink* – **Andrej Fogelton**
- *SWIPS* – Igor Jurik, Matej Liskovec, Jaroslav Loebel, Martin Tamajka, Peter Truchan, Ľubomír Vnenk, **Marián Šimko**
- *Amusement during travelling* – **Peter Pišteň**
- *Spine Hero* – Jozef Gáborík, Jakub Mačina, Matej Leško, Jozef Staňo, **Jakub Šimko**
- *Follow your Beacon using your mobile phone* – **Alena Kovárová**

### III. Publications

Results of our research were published in 236 publications. 212 scientific contributions were published in conference proceedings, 62 out of which were published in reviewed proceedings of international conferences. 19 scientific contributions were published in scientific journals and we have authors (co-authors or editors) of 2 books or book chapters.

FIIT STU is a co-publisher of the international scientific journal “Computing and Informatics” (until 2001 Computers and Artificial Intelligence). Three faculty staff members, P. Návrat and V. Kvasnička were active in the editorial team in 2015 – P. Návrat as an Associate Editor and V. Kvasnička as a member of Editorial Board. Moreover, the faculty participates in editorial and advisory boards of eleven other scientific journals.

### IV. Research Projects

Research projects constitute an important basis for research realization and research funding. Life cycle of a research project includes its preparation, submission, acceptance of the project followed by the project realization. Because these periods take often several years, activities in certain period influence significantly results in the following period.

Projects of the Scientific Grant Agency of the Ministry of Education and the Slovak Academy of Sciences (VEGA) formed an essential form of research organisation and scientific projects funding at the FIIT STU.

<b>Number of publications</b>	<b>UAPI<sup>3</sup></b>	<b>UI SI</b>	<b>UPSS</b>	<b>FIIT</b>
Books and parts of books published by international/national publisher	-/2	-/1	-/-	-/2
Scientific works published in international/ national scientific journals	1/2	11/-	1/4	13/6
Scientific works published in international conference proceedings	4	33	25	62
Scientific works published in national or local conference proceedings	8	117	25	150
Conference proceedings editors	-	3	-	3

<b>Overview of other most significant activities</b>	<b>UAPI</b>	<b>UI SI</b>	<b>UPSS</b>	<b>FIIT</b>
Membership in editorial boards of scientific journals	7	6	1	14
Membership in programme committees of international scientific conferences	2	35	8	45
Membership in programme committees of national or local scientific conferences	0	29	8	37
Membership in steering committees of scientific conferences	0	3	1	4

<b>Number of projects funded</b>	<b>UAPI</b>	<b>UI SI</b>	<b>UPSS</b>
VEGA <sup>4</sup>	2	3	2
KEGA	-	1	-
APVV	-	-	1
European Structural Funds	-	2 <sup>†</sup>	1
International projects	-	3	1
Others /Tatra banka, grants for young scientific researchers	1	8	5
<b>FIIT STU</b>	<b>3</b>	<b>17</b>	<b>10</b>

<sup>†</sup> common projects

<b>Overview of funds (in Eur)</b>	<b>UAPI</b>	<b>UI SI</b>	<b>UPSS</b>	<b>SUM</b>
VEGA	6 407	44 468	12 692	63 567
KEGA	-	16 844	-	16 844
APVV	-	-	2 436,56	2 436,56
European Structural Funds	-	394 962,21	4 602,17	399 564,38
Others	1 000	11 088 ,62	12 825,41	24 914,03
<b>FIIT STU</b>	<b>7 407</b>	<b>468 362,83</b>	<b>32 556,14</b>	<b>508 325,97</b>

<sup>3</sup> UAPI – Institute of Applied Informatics

UI SI – Institute of Informatics and Software Engineering

UPSS – Institute of Computer Systems and Networks

<sup>4</sup> VEGA – Scientific Grant Agency of the Ministry of Education of Slovak Republic and the Slovak Academy of Sciences, KEGA – Cultural and Educational Grand Agency of the Ministry of Education of Slovak Republic, APVV – Slovak Research and Development Agency

Institute of Informatics and Software Engineering continued research project PerConIK – “Research of methods for Acquisition, Analysis and Personalized Conveying of Information and Knowledge” acquired in the Call of the ERDF Agency directed towards applied research in collaboration with industry. This project led by Gratex Ltd. was approved in 2010 for financing for period of 2011-2015 (supervisor M. Bieliková). The institute also actively participates in the research project “International Centre of Excellence for Research of Intelligent and Secure Information-Communication Technologies and Systems”, ITMS 26240120039, co-funded by the ERDF (supervisor V. Rozinajová)

The projects are realized in our research laboratories (description can be found in the parts devoted to individual institutes). In 2015 the following laboratories were operated:

- 3D UML Laboratory (I. Polášek)
- Advanced Software and Web Technologies Laboratory (M. Bieliková)
- Big Data Processing Laboratory (V. Rozinajová)
- Communication Technologies Laboratory (I. Kotuliak)
- Digital Systems Design Laboratory (K. Jelemská)
- Embedded Systems Laboratory (T. Krajčovič)
- ESET Research Centre (L. Hudec)
- FIIT – Molpir, Ltd. Laboratory (P. Pišteň)
- Forming the Future of Finance with IT (FFF IT) Laboratory (T. Kováčik)
- Grid Computing Laboratory (L. Hudec)
- Intelligent Systems Laboratory (P. Návrat)
- Laboratory of Computer Vision and Graphics (V. Benešová)
- Laboratory of Computer Graphics, Vision and Interaction (University scientific park)(V. Benešová,
- Mobile Computing Laboratory (M. Čerňanský, V. Vranič, I. Kotuliak)
- Networks Technology Laboratory I and II (P. Trúchly)
- Siemens research laboratory (V. Benešová)
- User Experience and Interaction Research Center (M. Bieliková)
  - Engelbarts’s Laboratory of User Experience Research (UX Lab)
  - Simon’s Laboratory of personalized learning (UX Group)

Assoc. Prof. Viera Rozinajová  
Vice-Dean for Research



# NATIONAL AND INTERNATIONAL RELATIONS

Cooperation of FIIT STU can be characterised from several viewpoints as cooperation with secondary schools, other higher education institutions, research institutes and cooperation with industry (a list of cooperating institutions can be found in the parts devoted to individual institutes)

## I. Cooperation with Secondary Schools

Cooperation with secondary schools lies in preparation for study at the university especially at the FIIT STU, organising a programming contest ProFIIT, and in technical cooperation. Technical cooperation with secondary schools is achieved especially through the Networking Academy Programme. FIIT STU, as the Regional Networking Academy, guarantees publicity, programme quality, guidance of Local Academies, and regular technical training and consultations for teachers/instructors of secondary schools. In this way the Faculty leads, methodologically supervises and technically trains 24 secondary schools. Two very successful activities are yearly organised at the Faculty: TP CUP final in June and Open Day of the Faculty in December. Both events were organized also for students of secondary schools. Beside this, faculty is active in propagation of IT between secondary school girls students under umbrella of Aj Ty v IT initiative and propagating IT in general in Digipoint space in Polus commercial centre

## II. Cooperation with Industry

Cooperation with industry is oriented towards training and consultation activities and educational cooperation.

### II.1 Training and Consultation Activities

FIIT STU has been very successful in training and consultations in cooperation with the companies Cisco System Slovakia, GTEC and Microsoft Slovakia. In cooperation with Cisco the Faculty has been integrated into the world-wide academy programme oriented to training in network technologies. Nowadays FIIT STU Regional Networking Academy offers a full 4-semester programmes CCNA (Cisco Certified Networking Associate) and CCNP (Cisco Certified Networking Professional).

Except above mentioned programmes FIIT STU offers programmes for IP Telephony, WiFi Communication, Network Security and other special courses.

In co-operation with GTEC Common Training and Consultation Centre (CTCC) offers various programmes. The main purpose of this centre is to offer technical training for the non-academy sphere.

### II.2 Educational Cooperation

In the field of education and other activities the Faculty has been cooperating with important Slovak companies for many years. Academy training programmes were developed thanks to the support of cooperation with Cisco Systems Slovakia, Soitron, Siemens Enterprise Communications, DITEC, DATALAN, ASSECO Slovakia, HP Slovakia, Goldstein Fuchs, Tempest, Morgan Stanley Budapest

Some of above mentioned companies have directly co-operated in Faculty education.

Other remarkable support the Faculty has obtained in cooperation with IBM Slovakia, Microsoft Slovakia, SIEMENS, GRATEX, ACCENTURE, Q-Products. Cooperation with the above mentioned companies is based on special agreements.

### II.3 Aj Ty v IT (You too in IT)

Aj Ty v IT (You too in IT) is a successful project of our faculty focused on attracting high school girls choosing their study in informatics. This project is a reaction to the low percentage of girls studying at FIIT – only 3%.

AJ Ty v IT prepares for girls various activities, such as discussions with women working in IT sector, computer science workshops, mentoring as a possibility to see the real life of students and courses. The aim is to show them that working in IT means having an interesting job, meeting interesting people and growing professionally. This project wants to demonstrate that girls and women are welcome in IT sector and they are able to find their place there.

The project started in March 2013. During one year, it grows on whole Slovakia and actually cooperates with partners Slovak universities oriented

to computer science. The result after this period of activities is a growth of girl's student number to 13% in the first year of bachelor study.

#### II.4 Digipoint

FIIT STU is persuaded about the necessity to present informatics, effort and results of our students to the general public, make an education point for them. For this purpose the faculty opened DIGI-POINT – a space for education in IT, presentations of new devices, debates about different subjects related to IT and the study at our faculty. DIGI-POINT was opened in October 2013 in a Polus shopping center in Bratislava and allowed us to communicate with different target groups.

### III. Mobility programmes

FIIT STU is using the cooperation within the mobility programme LLP/Erasmus. In year 2015, this programme was contracted with these European universities (Erasmus code included):

- Angel Kanchev University of Rousse – BG ROUSSE01
- Tallinn University of Technology – EE TALLINN04
- Ecole Pour l'Informatique et les Techniques Avancées – F BICETRE02
- Institut Catholique de Paris – F PARIS376
- Telecom SudParis – F EVRY11
- University of Zagreb – HR ZAGREB01
- Brandenburgische Technische Universität Cottbus – D COTTBUS01
- Hochschule für Telekommunikation Leipzig – D LEIPZIG10

- Jade University of Applied Sciences – D WILHELM02
- Technische Universität Darmstadt – D DARMSTA01
- University of Bergen – N BERGEN01
- Akademia Techniczno-Humanistyczna w Bielsku-Białej – PL BIELSKO02
- Univerza v Mariboru – SI MARIBOR01
- Universidad Politécnica de Madrid – E MADRID05
- Universitat Politècnica de Catalunya – E BARCEL003
- Hogskolan Halmstad – S HALMSTA01
- Linnaeus university – S VAXJO03
- Budapest University of Technology and Economics – HU BUDAPES02
- Medimurje University of Applied Sciences of Cakovec – HL CAKOVEC01
- Istanbul Sehir University – TR ISTANBU33
- AGH University of Science and Technology – PL KRAKOW01
- Université de La Rochelle – F LAROCHE08
- KU Leuven Faculty of Engineering Science – B LEUVEN01

In 2015, 1 incoming Erasmus student has visited FIIT STU. In 2015, 8 students of our faculty were approved for Erasmus+mobility abroad for various destinations.

Assoc. Prof. Ivan Kotuliak  
Vice-Dean for Public Relations

Barbara Drnajová  
Erasmus+ Coordinator



# FACULTY SERVICES

## I. Slovak Informatics Library

Academic Senate of the faculty approved on April 9, 2010 the incorporation of the Slovak Informatics Library in the organizational structure of the faculty as a faculty department. Dean subsequently established the Slovak Informatics Library using the certificate of incorporation with effect from May 1, 2010.

Slovak Informatics Library was established at the Faculty of Informatics and Information Technologies, Slovak Technical University in Bratislava in response to the faculty needs for research and training of experts in the field of informatics and information technologies for knowledge-based economy and for building an inclusive information society in Slovak Republic. The library is the central library to work with the scientific and professional literature in computer science and information technologies in the Slovak Republic. This library extends the scope of previous library at FIIT STU from faculty level to nationwide level. Library:

- stores and registers qualification theses,
- is a workplace for central evidence of faculty publications and their references,
- provides acquisition services, books lending services and interlibrary loans,
- offers research consultation service to faculty, staff, and students.

The library catalogue contains more than 10 000 items, which are freely available in the Library. The catalogue can be found on <http://kis.cvt.stuba.sk/arl-stu/>. The Library purchased and acquired thanks to donation 30 titles of professional journals in various languages (5 out of them are in Slovak). Journals are located in the Study Room. Electronic services are available mainly through these databases: ACM Digital Library, IEEE/IET Electronic Library, Springer Link, Science Direct, Scopus, ISI Web of Knowledge, Wiley Online Library which are the part of a national project NISPEZ.

The Library cooperates with other faculty libraries of the Slovak Technical University, and with Slovak Centre of Scientific and Technical Information.

## II. Computing and Communication Services

The Centre for Computing and Communication Services at the Faculty of Informatics and Information Technologies provides the following services for educational and research purposes at FIIT STU:

- functioning of the faculty central servers and services,
- functioning of the faculty system and network infrastructure,
- functioning of the information systems,
- new servers, computers, printers, scanners etc. installation,
- operating systems and specialized software installation,
- upgrading and maintenance of computers,
- user support,
- services for faculty wire and wireless access points to the Internet,
- functioning of the camera security system,
- functioning of the IP telephony system,
- data-projectors installation.

The faculty computer network is based on a structured cable system and it is using 100 Mbps, 1 Gbps and 10 Gbps transfer speeds. It consists of approximately 200 personal computers and notebooks of the faculty staff and PhD. students, 250 personal computers and workstations in the education and research laboratories and 30 specialized servers. The Centre for Computing and Communication Services also provides full service for educational computer laboratories and full or partial service for research laboratories of the faculty institutes.

Assoc. Prof. Tibor Krajčovič  
Head of Centre for Computing and  
Communication Services

Lucia Falbová  
Slovak Informatics Library



# INSTITUTE OF APPLIED INFORMATICS

<http://www.uapi.fiit.stuba.sk/>

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## Director of the Institute

**Ladislav Hudec, Assoc. Professor** (till November 2015)

**Katarína Jelemenská, PhD.** (since December 2015)

e-mail: [ladislav.hudec@stuba.sk](mailto:ladislav.hudec@stuba.sk),  
[katarina.jelemenska@stuba.sk](mailto:katarina.jelemenska@stuba.sk)

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## Deputy Director:

**Ladislav Hudec, Assoc. Professor**

e-mail: [ladislav.hudec@stuba.sk](mailto:ladislav.hudec@stuba.sk)

**Secretary of the Institute:** Tatiana Šípková

Tel: +421 2 210 22 506

## I. General Information

The scientific and professional activities of the institute concentrate mainly on the specific areas of computational intelligence, computer graphics and vision, parallel and mobile computing and computer, computer and network security.

In computational intelligence our researchers specialize in heuristics used in evolutionary optimization, machine learning and in adaptation of neural networks, which is mostly applied in artificial life, social systems and cognitive science modeling and simulations.

Activities related to mobile computing and mobile application development concentrate on research of new methods and approaches to the design, development and implementation of mobile computing applications in various application domains, most notably in public transportation.

In the field of computer graphics and vision the research and development involves computer vision applications (object detection, object recognition), computer graphics, visualization of the data, new methods of human-computer interaction (augmented reality).

Activities related to security cover the methods for analyzing and modeling of security of network protocols, development of procedures for certificate based access control to resources in mobile ad-hoc network and procedures for computer system security level evaluation based on appropriate objective security metrics.

The institute is responsible for the following degree programme:

- Applied informatics (doctoral degree)

## II. Staff

### Administrative Department

Tatiana Šípková

### Teaching Staff

Vanda Benešová, PhD.

Michal Čerňanský, Assoc. Professor (part time)

Peter Drahoš, PhD.

Ladislav Hudec, Assoc. Professor

Peter Kapec, PhD.

Vladimír Kvasnička, Professor (part time)

Pavel Petrovič, PhD. (part time, till Sept. 2015)

Viliam Solčány, PhD. (part time)

Branislav Steinmüller (part time)

Ondrej Strnád (part time till Sept. 2015)

### Full time PhD Students

Ladislav Clementis, Jozef Filipek, Andrej Fogelton, Marek Jakab, Ján Kvak, Ján Laštinec, Patrik Polatsek, Lukáš Turský

## III. TEACHING

### III.1 Undergraduate Study (Bc.)

*Course (Lecturer - semester, credits)*

- |                                     |                  |
|-------------------------------------|------------------|
| ▪ <b>Human-Computer Interaction</b> | <b>Autumn, 6</b> |
| V. Benešová                         |                  |
| ▪ <b>Management of IT security</b>  | <b>Spring, 5</b> |
| O. Strnád                           |                  |

▪ <b>Mathematical Logic I</b> V. Kvasnička	<b>Spring, 6</b>	<i>Study Programme Informatics</i>
▪ <b>Law of Information and Communications Technologies</b> M. Daňko	<b>Autumn, 5</b>	
▪ <b>Operating Systems</b> V. Solčány	<b>Autumn, 6</b>	
▪ <b>Parallel Programming</b> M. Čerňanský	<b>Autumn, 6</b>	
▪ <b>Principles of Information Security</b> L. Hudec	<b>Autumn, 6</b>	
▪ <b>Principles of Computer Graphics and Image Processing</b> P. Drahoš	<b>Autumn, 6</b>	
▪ <b>Basic Methods of Multimedial Content Development</b> P. Kapec	<b>Autumn, 6</b>	
▪ <b>Basic of Interactive Application Development</b> P. Drahoš	<b>Spring, 6</b>	

### III.2 Master Study (Ing.)

*Course (Lecturer - semester, credits)*

▪ <b>Evolutionary Algorithms</b> M. Markošová	<b>Spring, 6</b>	<ul style="list-style-type: none"> <li>▪ <i>Bendík, J.:</i> Automated text document generation. (J. Laštinec)</li> <li>▪ <i>Birkus, R.:</i> Image Segmentation Using Graphics Processing Unit. (V. Benešová)</li> <li>▪ <i>Dekan, M.:</i> Support of the Creation of Electronic Timetables for Public Transport. (M. Čerňanský)</li> <li>▪ <i>Farkaš, M.:</i> Developing Player for Pac-Man Game. (J. Pospíchal)</li> <li>▪ <i>Gazdík, J.:</i> Visual People Detection in Crowd Using Kinect Sensor. (V. Benešová)</li> <li>▪ <i>Hagara, J.:</i> Supporting tools for visualization software, (P. Kapec)</li> <li>▪ <i>Hudec, L.:</i> Visual Detection of People Flow with Use of Kinect Sensor. (V. Benešová)</li> <li>▪ <i>Jandura, F.:</i> Test Automation in Context of Mobile Applications. (L. Turský)</li> <li>▪ <i>Jurík, M.:</i> Support for Programming Cluster Applications Using Opencl. (P. Drahoš)</li> <li>▪ <i>Karásek, R.:</i> Generating Documentation from Source Code. (P. Kapec)</li> <li>▪ <i>Kutlíková, L.:</i> Evaluation of Intrusiveness of Notifications. (A. Fogelton)</li> <li>▪ <i>Makšín, M.:</i> Verification of Potential Uses of the Tools for the Education Support in Preparation, Creation and Modification of Schedules. (M. Galbavý)</li> <li>▪ <i>Marák, J.:</i> Interactive Manipulation with Graph in Augmented Reality. (P. Kapec)</li> <li>▪ <i>Petráš, M.:</i> Generating Real-time Soft Shadows. (P. Drahoš)</li> <li>▪ <i>Šarišský, P.:</i> Eye-blink Detection Using Webcam. (A. Fogelton)</li> <li>▪ <i>Štefánik, M.:</i> Visualization Activity of Routing Protocols in MANET Networks. (L. Hudec)</li> <li>▪ <i>Zsemlye, V.:</i> Automatized Distribution and Testing of Software Packages. (P. Drahoš)</li> <li>▪ <i>Žalondek, M.:</i> Object-oriented Image Segmentation. (V. Benešová)</li> </ul>
▪ <b>Computer Vision</b> V. Benešová	<b>Spring, 6</b>	
▪ <b>Image Processing, Graphics and Multimedia</b> V. Benešová	<b>Autumn, 6</b>	
▪ <b>Security of Systems of information and communication technologies</b> L. Hudec	<b>Autumn, 6</b>	
▪ <b>Security in Internet</b> L. Hudec	<b>Spring, 6</b>	
▪ <b>Advanced Methods of Computer Graphics</b> P. Drahoš	<b>Autumn, 6</b>	
▪ <b>Data Visualisation</b> P. Kapec	<b>Spring, 6</b>	

## IV. Theses

### IV.1 Bachelor (Bc.) Theses

*Study Programme Computer and Communication Systems and Networks*

- *Janočko, M.:* Embedded Application Realizing its Power Consumption. (J. Laštinec)
- *Kapusta, A.:* System for the Automativ Management and Vulnerability Assessment of Computer System. (L. Hudec)
- *Mlynčár, A.:* Detection of Attacks on User Accounts of Computer System with Support of Security Metrics. (L. Hudec)
- *Turay, D.:* Modeling the Structure of a Web Application by Analyzing HTTP Queries. (R. Szabó)

### IV.2 Master (Ing.) Theses

*Study Programme Information Systems*

- *Adámik, M.:* Object Recognition and Rock Textures Detection. (J. Štefanovič)
- *Brndiarová, G.:* Improving Readability of Graph Visualizations in 3D Space. (P. Kapec)
- *Cáder, L.:* User Identification through Biometric and Photometric Data Obtained by Kinect Sensor. (J. Štefanovič)
- *Durčák, D.:* Method of Interactive Manipulation of Text Describable by a Grammar. (P. Drahoš)

- *Galbavý, O.:* Visual Analysis of a Robot Movement Using Methods of 3D Stereo Reconstruction. (V. Benešová)
- *Grešlíková, Z.:* Learning Finite-state Machines by Ant Colony. (J. Pospíchal)
- *Handzuš, J.:* Visualisation of Virtual Objects by Light Fields. (P. Drahoš)
- *Jakab, M.:* Visual Detection, Recognition and Tracking of Three-dimensional Objects. (V. Benešová)
- *Juranyi, M.:* Innovative Method for Text Manipulation with Visual Aids. (P. Drahoš)
- *Kabátová, M.:* Human Figure Animation with Muscle System Simulation. (P. Drahoš)
- *Kuruc, M.:* Gesture-based Language and its Application in a Game. (J. Štefanovič)
- *Linner, Š.:* Visual Fire and Smoke Detection Using Computer Vision Methods. (V. Benešová)
- *Londák, M.:* Recognition of Bird Species Based on Acoustic Recording. (J. Štefanovič)
- *Mészáros, M.:* Evolutionary Optimization of Spacecraft Trajectory around Jupiter's Moons. (J. Pospíchal)
- *Muránsky, J.:* Modeling of Global Illumination of Dynamic Environment in Realtime. (P. Drahoš)
- *Polatsek, P.:* Spatiotemporal Saliency Model of Human Attention in Video Sequences. (V. Benešová)
- *Sudor, V.:* Searching Connections in Public Transport Networks. (M. Čerňanský)
- *Štetiar, M.:* Learning of Finite State Automaton Using Grammatical Evolution. (J. Pospíchal)
- *Štrba, P.:* Effective Authorization at the Level of All Operations. (B. Steinmüller)

#### Study Programme Computer and Communication Systems and Networks

- *Rybár, M.:* IPv6 Security. (L. Hudec)

#### Study Programme Software Engineering

- *Gloger, M.:* Visualization of Metrics and Structure of Software Systems in Three-dimensional Space. (P. Kapec)
- *Jánošík, T.:* Adaptation of Recurrent Neural Networks Using Methods and Tools of Massive Parallelism. (M. Čerňanský)
- *Molnár, M.:* Efficient Processing of Data Transport on Mobile Devices. (M. Čerňanský)
- *Nagy, G.:* Mobile Application Testing. (M. Čerňanský)

- *Scholtz, M.:* Code Parsing in an Innovative Development Environment. (P. Kapec)

#### IV.3 Doctoral (PhD.) Theses

- *Clementis, L.:* Study of Game Strategy Emergence by Using Neural Networks. (V. Kvasnička, Applied Informatics August 24, 2015)

### V. IIT.SRC

#### Full papers

- *Farkaš, M.:* Usage of Hyperneat to Train Evasive Behaviour in Ms. Pac-Man Videogame. (J. Pospíchal)
- *Birkus, R.:* Fast gSlic Superpixels Used for Object Segmentation. (V. Benešová)
- *Jakab, M.:* 3D Object Recognition Based on Local Descriptors. (V. Benešová)
- *Polatsek, P.:* Hierarchical Superpixel-based Saliency Model. (V. Benešová)
- *Kuruc, M.:* Gesture Library and its Application in a Game. (J. Štefanovič)
- *Rybár, M.:* IPv6 Security. (L. Hudec)
- *Laštinec, J.:* Realization of Experimental Gateway between CAN and Ethernet Networks. (L. Hudec)

#### Extended abstracts

- *Filipek, J.:* Distributed Firewall in Mobile Ad Hoc Networks. (L. Hudec)
- *Molnár, M.:* Efficient Processing of Data Transport on Mobile Devices. (M. Čerňanský)

#### TP CUP Competition

- *Cihák, M. – Gajdoš, M. – Masár, L. – Michálek, P. – Osvald, V. – Pikuliak, M. – Sýkora, T.:* Hapen: Event Based Social Network. (L. Turský)
- *Poljak, P. – Piliár, A. – Putala, L. – Smoleňák, M. – Melaga, D.:* Eyeblink - Evaluation of the User's Eye Blinking Frequency. (A. Fogelton)

### VI. Research Laboratories

#### Mobile Computing Laboratory (M. Čerňanský)

The main purpose of the laboratory is to support research and teaching process related to mobile computing. Laboratory supports research and student projects from multiple domains that can greatly benefit from mobile computing technology such as computer vision, computer graphics, machine learning and augmented reality. Currently the laboratory equipment consists of several iOS mobile phone and tablet PC devices (Apple iPhone, Apple iPad) and computers used for development applications for mobile devices. In near

future laboratory will be equipped with devices running Android (Google), Symbian OS (Nokia) and eventually other major mobile computing platforms (Windows Phone 7, RIM Blackberry, Samsung Bada).

#### **Grid Computing Laboratory (L. Hudec)**

The research and teaching laboratory is devoted to teaching distributed processing and parallel programming graduate modules and experimental lab for project on Grid Computing and its components. Grid consists of two independent parts. The first part is testing grid equipped 20 CPUs, 1Gb network interconnection, frontend server with UPS, Globus Toolkit software and VMWare software. The second part is production grid equipped 40 CPUs, 1Gb network connection, frontend server with UPS, Globus Toolkit software and VMWare software. Grid is connected to Internet and is going to be as a part of SlovakGrid national grid structure.

#### **Laboratory of Computer Vision and Graphics (V. Benešová)**

Laboratory of computer vision and graphics serves for the teaching as well as for the research. Students and team work projects activities cover the field of computer vision, computer graphics, virtual reality, augmented reality and new methods of Human-Computer Interaction. The laboratory provides the facility for the research of Augmented reality systems using a large-sized transparent projection foils, multiple projectors, four Kinect sensors, and cameras such as power-full PC with NVIDIA GPU.

#### **Laboratory of Computer Graphics, Vision and Interaction (University scientific park) (V. Benešová)**

Augmented reality module provides a variety of devices for the research of augmented reality: AR glasses, AR interactive holographic foil, etc. Virtual reality module includes VR glasses, multiple projection for the simulation of immersive VR. Computer vision module includes high-resolution and high-speed cameras, eye tracker glasses, colorimetric devices etc. Computer graphics module offers the possibility of powerful GPU computing. Interaction module consist of several interaction devices like 3D mouse, Leap sensor etc.

#### **Siemens research laboratory (V. Benešová)**

Siemens research laboratory is a centre of the research of computer vision methods in the area of medical imaging applications. The main focuses of the research in the laboratory are methods of

segmentation in the 3D visual medical data data (CT, MRI). Laboratory equipment consists mainly of powerful PCs.

#### **ESET Research Centre (L. Hudec)**

The ESET Research Centre is a joint project of ESET Ltd company, Slovak University of Technology and Comenius University. Common workplace allows closer links between university and industry and brings to university interesting problems and allows to create conditions (material, technical, know-how, personnel) for problems solution. Centre differs from others labs in a way that it does not offer only technical equipment, but also know-how in the form of specialized teaching modules. Alongside with lectures Eset will also provide guidance of exercises and consultations. In addition to lectures joint workplace develops other forms of cooperation - experts from ESET, STU and UK lead jointly diploma and bachelor thesis. In the ESET Research Centre Lab the 12 workstations for students, one teacher's workstation, server, and Internet connection is installed. On workstations Windows operating system with applications for carrying out a reverse engineering (machine code analysis) is installed.

## **VII. Research Projects**

#### **Extension of Theory of Multi-agent Systems by Collective Memory (VEGA 1/0458/13) (V. Kvasnička), Duration: 2013 –2015**

The goal of the proposed project is an extension of a standard theory of multiagent systems by a notion of collective memory, which serves as an important acceleration factor of adaptation of multiagent systems. The principle of collective memory approach was adopted from social sciences, where Halwachs idea of collective serves as an important part of explanation of cohesion of social groups. One can state, that multiagent approach towards presentation of collective memory creates an important innovative element in explanation of its importance. The presented approach is an original first attempt for application of artificial intelligence in social science for a construction of a theoretic model of collective memory of Halbwachsian type.

#### **Visual Object Class Recognition in Video Sequences Using a Linkage of Information Derived by a Semantic Local Segmentation and a Global Segmentation of Visual Saliency (VEGA 1/0625/14) (V. Benešová), Duration: 2014 –2016**

Visual class objects recognition is one of the biggest challenges of current research in the field of computer vision. This project aims to explore new methods of recognizing classes of objects in video sequences. In the center of research focus will be the research of new methods of semantic segmentation at the local level approach and segmentation of the visual saliency at the global level. An integrating part of the project proposal will be research of intelligent methods of transfer of information, which will be obtained by the local and global approach using the principle of cooperative agents.

## VIII. Publications

### VIII.1 Journals

- [1] MARTIN-GUTIERREZ, J. - FABIANI, P. - BENEŠOVÁ, V. - MENESES, D.M. - MORA, C.E.: Augmented Reality to Promote Collaborative and Autonomous Learning in Higher Education. In: *Computers in Human Behavior*. Vol. 51, part: B (2015), ISSN 0747-5632, 2015, pp. 752-761.

### VIII.2 Conference Proceedings

- [1] FILIPEK, J. - HUDEC, L.: Distributed Firewall in Mobile Ad Hoc Networks. In: *SAMI 2015*. IEEE 13<sup>th</sup> International Symposium on Applied Machine Intelligence and Informatics, Herľany, Slovakia. IEEE, 2015, pp. 233-238.
- [2] FILIPEK, J. - HUDEC, L.: Distributed Firewall Using PKI in Mobile Ad Hoc Networks. In: *CompSysTech'15*. Proceedings of the 16<sup>th</sup> International Conference on Computer Systems and Technologies CompSysTech '15, Dublin, Ireland. New York : ACM, 2015, pp. 292-298.
- [3] JAKAB, M. - BENEŠOVÁ, V. - RAČEV, M.: 3D Object Recognition Based on Local Descriptors. In: *Proceedings of SPIE: Intelligent Robots and Computer Vision XXXII: Algorithms and Techniques*, San Francisco, United States. Bellingham : SPIE - The International Society for Optical Engineering, 2015.
- [4] KAPEC, P. - BRNDIAROVÁ, G. - GLOGER, M. - MARÁK, J.: Visual Analysis of Software Systems in Virtual and Augmented Reality. In: *INES 2015*, 19<sup>th</sup> International Conference on Intelligent Engineering Systems. Bratislava, Slovakia. Danvers : IEEE, 2015, pp. 307-312.
- [5] KVASNIČKA, V. - POSPÍČHAL, J.: Artificial Intelligence and Collective Memory. In: *Emergent Trends in Robotics and Intelligent Systems : Where is the Role of Intelligent Technologies in the Next Generation of Robots?* Cham : Springer, 2015, pp. 283-291.
- [6] LAŠTINEC, J. - HUDEC, L.: A Performance Analysis of IPSec/AH Protocol for Automotive Environment. In: *CompSysTech'15*. Proceedings of the 16<sup>th</sup> International Conference on Computer Systems and Technologies, Dublin, Ireland. New York : ACM, 2015, pp. 299-304.
- [7] POLATSEK, P. - BENEŠOVÁ, V. : Bottom-up saliency model generation using superpixels. In: *SCCG 2015*. Proceedings of the 31<sup>st</sup> Spring Conference on Computer Graphics. 1. vyd. New York : ACM, 2015, pp. 121-129.
- [8] UHLÍKOVÁ, I. - BENEŠOVÁ, V. - POLEC, J. - CSÓKA, T.: Texture Aware Image Error Concealment. In: *EUROCON 2015*, International Conference on Computer as a Tool. Salamanca, Spain. Danvers : IEEE, 2015, pp. 88-93.

## IX. Cooperation

### Cooperation in Slovakia

- Faculty of Mathematics, Physics and Informatics, Comenius University Bratislava
- Faculty of Electrical Engineering, Technical University of Košice
- Ministry of Economy of the Slovak Republic
- Alfa Base Ltd., Bratislava
- Kybernetika Ltd., Košice
- Research Institute of Nuclear Power Engineering Inc., Trnava
- Schneider Electric Slovakia Ltd.
- Start Automation Ltd., Malacky
- Termoreg Ltd., Bratislava
- ui42, Bratislava
- Siemens Ltd, Bratislava
- ESET Ltd, Bratislava

### International Cooperation

- University of Zagreb, Croatia
- Institute of Software Technology and Interactive Systems, Vienna University of Technology, Austria
- Institute Supérieur d'Electronique de Paris (I.S.E.P.), Paris, France
- Institute Central European Initiative in Cognitive Science Education (joining universities in Vienna, Budapest, Zagreb and Bratislava)
- Faculty of Philosophy and Science, Silesian University in Opava
- Faculty of Informatics, Humboldt University in Berlin
- Rockwell Automation – Allen Bradley, USA

- Schneider Electric Deutschland, Germany
- Brno University of Technology, Czech Republic
- Technical University of Liberec, Czech Republic
- Technical University of Ostrava, Czech Republic
- Morgan Stanley Hungary
- Joanneum Research Graz, Austria

## X. Visits of Staff Members

- *L. Hudec*: Visegrad 4 for Secure Data, Brussel, Belgium, May 27-28, 2015
- *J. Laštinec*: Compsystech 2015, Dublin, Ireland, June 24-27, 2015
- *J. Laštinec*: Formula student, Győr, Hungary, August 20-23, 2015
- *J. Laštinec*: Formula student, Most, Czech Republic, September 3-6, 2015
- *V. Benešová*: Interact 2015, 15<sup>th</sup> IFIP TC.13 International Conference on Human-Computer Interaction, Bamberg, Germany, September 11-20, 2015
- *V. Benešová, P. Polatsek*: Technische Universität Wien, Austria, October 9, 2015
- *P. Polatsek*: ACM SPY 2015, Prague, Czech Republic, December 1-4, 2015

## XI. Membership

### Slovak Professional Organisations and Societies

- ACM, Association for Computing Machinery (V. Benešová)
- Slovak Association for Information Security (L. Hudec)
- Slovak Chapter of the ISACA (L. Hudec)
- Slovak Academic Society (V. Kvasnička)
- Slovak Artificial Intelligence Society (V. Kvasnička)
- Slovak Computer Science Society (V. Kvasnička)
- IEEE, Institute of Electrical and Electronic Engineers (V. Benešová)
- Member of the TC13 - Human-Computer Interaction (V. Benešová)

### International Professional Organisations and Societies

- INNS, International Neural Network Society (M. Čerňanský)
- Information Systems Audit and Control Association (L. Hudec)
- ACM, Association for Computing Machinery (V. Solčány)

## XII. Other Activities

- Artificial Intelligence Seminar – V. Kvasnička (organizer)  
[www.fiit.stuba.sk/~kvasnicka/Seminar\\_of\\_AI](http://www.fiit.stuba.sk/~kvasnicka/Seminar_of_AI)
- Journal of Computing and Information Technology – V. Kvasnička (since 2005): members of advisory board
- Information Sciences and Computing – V. Kvasnička, editor
- Journal of Electrical Engineering – L. Hudec, editor
- MATCH Communications in Mathematical Chemistry – V. Kvasnička (since 1998): member of advisory board
- Neural Network World – V. Kvasnička (since 2001): member of advisory board
- Croatica Chimica Acta - V. Kvasnička (since 2002): member of advisory board
- *CompSysTech'15*, 16<sup>th</sup> International Conference on Computer Systems and Technologies, June 25-27, 2015, Dublin, Ireland – L. Hudec: member of programme committee
- *Computing and Informatics (CAI)* – V. Kvasnička: member of editorial board
- *SAMI 2015* – IEEE 13<sup>th</sup> International Symposium on Applied Machine Intelligence and Informatics, January 22-24, 2015, Herl'any, Slovakia – V. Kvasnička: member of programme committee
- Organisation of regular scientific seminar on Vision and Computer Graphics (at FIIT STU) – organiser V. Benešová
- Organisation of the World Usability Day (at FIIT STU) Nov.2015



# INSTITUTE OF INFORMATICS AND SOFTWARE ENGINEERING

<http://www.uisi.fiit.stuba.sk/>

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## Director of the Institute

**Pavol Návrat, Professor**

e-mail: [pavol.navrat@stuba.sk](mailto:pavol.navrat@stuba.sk)

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## Deputy Director:

**Mária Bieliková, Professor**

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**Viera Rozinajová, Assoc. Professor**

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**Secretary of the Institute:** Zuzana Macková

Tel: +421-2-21 022 306,

## I. General Information

The main mission of the Institute of Informatics and Software Engineering is to contribute to the mission of Slovak University of Technology and to the mission of the Faculty of Informatics and Information Technologies in the range of its competencies, in areas bounded by and related to informatics, information systems and software engineering. Among the related areas, it is oriented especially to artificial intelligence in research of knowledge approaches in solving problems of informatics, information systems and software engineering, and to information systems respecting their close relation to typical problem domains in software engineering.

Within the mission, the institute especially

- contributes through its research to development of knowledge in the areas of science and technologies belonging to the mentioned areas,
- provides successful and high-quality study programmes in areas of its competencies at each of the three levels of university education, in which
  - bachelor study graduates are excellently prepared for both the national and international labour market and are able to take care of themselves in their own business and also to create employment opportunities to others,

- master study graduates acquire competencies and abilities to be leaders of specialist teams with deep expert knowledge and ability of high creativity,
- doctoral study graduates are able to bring new original and innovative solutions of complex problems.

The institute is responsible for education in the following accredited degree programmes:

- Informatics (bachelor degree),
- Information Systems (master degree),
- Software Engineering (master degree),
- Software Systems (doctoral degree).

The Institute of Informatics and Software Engineering fulfils the mission through the research activities relevant both in a national and international context and by extending, deepening and improving the offer of courses provided to students at all the three levels of university studies.

The Institute endeavours actively to cooperate. It includes interdisciplinary research and studies at other similar institutes, institutions and departments of its Faculty, its University, in Slovakia, in Europe and throughout the world. In particular, the Institute is part of the international consortium of research institutions devoted to *Web Intelligence*. The Institute represents Slovakia in the consortium and contributes to promoting research in Web Intelligence worldwide. In 2009 the Institute has become partner of *European Network of Excellence on Aspect-Oriented Software*

*Development, AOSD-Europe*, which integrates and coordinates research, education and dissemination activities of its members in the area of aspect oriented development of software. Originally, it has been a 7th Framework Programme project.

The Institute aims at becoming the leading Slovak institution in the areas of its competencies with ambitions to positively influence their development. The Institute is conscious of its high responsibility to the public and it provides expert services to it, thus improving life of the town, the region, the country and the mankind. The Institute looks for synergies with industry and enterprise community, and jointly tries to raise research and education quality in the areas of informatics and information technologies.

## II. Staff

### Administrative Department

Eva Džupinová (since April 2015)  
Zuzana Macková  
Mária Matfiaková (since May 2015)  
Alexandra Zakálová

### Teaching Staff

Nadežda Andrejčíková, PhD. (part time)  
Michal Barla, PhD. (part time)  
Martin Bečka, PhD. (part time)  
Mária Bieliková, Professor  
Anna Bou Ezzeddine, PhD.  
Marek Ciglan, PhD. (part time)  
Lucia Falbová (part time)  
Pavol Frič, PhD. (part time)  
Marta Gnipová (part time)  
Gabriela Grmanová, PhD.  
Daniela Chudá, Assoc. Professor  
Jaroslav Jakubík, PhD. (part time)  
Ivan Kapustík  
Michal Kompan, PhD.  
Alena Kovárová, PhD.  
Dušan Krajčovič, PhD. (part time)  
Rastislav Královič, Professor (part time)  
Tomáš Kramár, PhD. (part time)  
Peter Lacko, PhD.  
Michal Laclavík, Assoc. Professor (part time - till Sept. 2015)  
Ján Lang, PhD.  
Marián Lekavý PhD. (part time)  
Mária Lucká, Assoc. Professor  
Robert Lukočka, PhD. (part time)  
Ľudovít Molnár, Professor Emeritus  
Pavol Návrat, Professor  
Jaroslav Pokorný, Professor (part time)

Ivan Polášek, PhD.  
Anna Považanová (part time)  
Viera Rozinajová, Assoc. Professor  
Petr Šaloun, Assoc. Professor (part time)  
Ľubor Šešera, PhD. (part time)  
Jakub Šimko, PhD.  
Marián Šimko, PhD.  
Danica Šoltéssová, PhD. (part time)  
Jozef Tvarožek, PhD.  
Valentino Vranić, Assoc. Professor  
Michal Winczer, PhD. (part time)  
Dušan Zeleník, PhD. (part time - till August 2015)

### Full time PhD Students

Miroslav Blšták, Kamil Burda, Michal Bystrický, Tomáš Frála, Zoltán Harsányi, Patrik Hlaváč, Michal Holub, Ondrej Kaššák, Martin Konôpka, Peter Krátky, Peter Kubán, Tomáš Kučečka, Eduard Kuric, Martin Labaj, Peter Laurinec, Marek Lóderer, Róbert Móro, Aurel Paulovič, Juraj Petrik, Juraj Rabčan, Karol Rástočný, Štefan Sabo, Ivan Srba, Mária Šajgalík, Roman Šelmeci, Jakub Ševcech, Juraj Vincúr, Petra Vrabecová

## III. TEACHING

### III.1 Undergraduate Study (Bc.)

*Course (Lecturer - semester, credits)*

Course	Lecturer	Semester	Credits
Artificial Intelligence	P. Návrat	Spring	6
Basics of Procedural Programming	G. Grmanová	Autumn	6
Communication in Culture History	D. Šoltéssová	Spring	3
Construction of Effective Algorithms	R. Královič	Spring	6
Database Systems	M. Barla	Spring	6
Data Structures and Algorithms	P. Návrat	Autumn	6
Development of Applications with a Multilayer Architecture	J. Jakubík	Spring	6
Entrepreneurship and Management	J. Papula	Autumn	5
Final Bachelor Project 0-II	P. Návrat	Autumn, Spring	3-3-9
Functional and Logic Programming	M. Bieliková	Spring	6
Introduction to Foundations of Mathematic	M. Lucká	Autumn	6
Management of Social Systems	E. Letovancová	Spring	3

▪ <b>Managerial Economics</b> V. Mlynarovič	<b>Autumn, 5</b>	▪ <b>Industry Project</b> I. Polášek	<b>Spring, 5</b>
▪ <b>Object-Oriented Programming</b> V. Vranič	<b>Spring, 6</b>	▪ <b>Knowledge Discovery</b> G. Grmanová	<b>Autumn, 6</b>
▪ <b>Principles of Information Systems</b> V. Rozinajová	<b>Autumn, 5</b>	▪ <b>Management of Software and Information System Projects</b> M. Šimko	<b>Spring, 6</b>
▪ <b>Principles of Software Engineering</b> M. Bieliková	<b>Spring, 7</b>	▪ <b>Object-Oriented Analysis and Design</b> I. Polášek	<b>Autumn, 6</b>
▪ <b>Procedural Programming</b> A. Bou Ezzeddine	<b>Autumn, 6</b>	▪ <b>Quality of Program and Information Systems</b> D. Chudá	<b>Spring, 6</b>
▪ <b>Procedural Programming Seminar</b> J. Tvarožek	<b>Autumn, 0</b>	▪ <b>Research of Information Systems</b> M. Bieliková	<b>Autumn, 2</b>
▪ <b>Research Seminar I-IV</b> M. Bieliková	<b>Autumn, Spring, 0-3- 3-3</b>	▪ <b>Research of Software Systems</b> P. Návrat	<b>Autumn, 2</b>
▪ <b>Seminar of Mathematic</b> M. Lucká	<b>Autumn, 3</b>	▪ <b>Rhetoric</b> M. Šuráb	<b>Autumn, 5</b>
▪ <b>Software Systems Development</b> M. Bieliková	<b>Spring, 3</b>	▪ <b>Software Languages</b> P. Lacko	<b>Autumn, 6</b>
▪ <b>Specification Methods and Tools</b> V. Vranič	<b>Spring, 5</b>	▪ <b>Team Project I-II (Information Systems, Software Engineering)</b> M. Bieliková	<b>Autumn, Spring, 7-5</b>
▪ <b>Social Connotations of Informatics and Information and Communication Technologies</b> M. Winczer	<b>Spring, 3</b>		
▪ <b>Theoretical Foundations of Informatics</b> D. Chudá	<b>Spring, 6</b>		
▪ <b>Web Publishing</b> P. Šaloun	<b>Spring, 6</b>		

### III.2 Master Study (Ing.)

#### Course (Lecturer - semester, credits)

▪ <b>Advanced Database Systems</b> J. Pokorný	<b>Autumn, 6</b>
▪ <b>Architecture of Information Systems</b> V. Rozinajová	<b>Autumn, 4</b>
▪ <b>Architecture of Software Systems</b> I. Polášek	<b>Autumn, 4</b>
▪ <b>Application Architectures of Software Systems</b> Ľ. Šešera	<b>Spring, 6</b>
▪ <b>Aspect-Oriented Software Development</b> V. Vranič	<b>Autumn, 6</b>
▪ <b>Diploma Project I-III (Information Systems)</b> P. Návrat	<b>Autumn, Spring, 8-12-20</b>
▪ <b>Diploma Project I-III (Software Engineering)</b> M. Bieliková	<b>Autumn, Spring, 8-12-20</b>
▪ <b>Distributed Software Systems</b> P. Lacko	<b>Autumn, 6</b>
▪ <b>History of Design</b> D. Šoltésová	<b>Autumn, 5</b>
▪ <b>Information Processing in Business and Public Sector</b> P. Frič	<b>Spring, 6</b>
▪ <b>Information Search</b> M. Laclavík	<b>Autumn, 5</b>

## IV. Theses

### IV.1 Bachelor (Bc.) Theses

#### Study Programme Informatics

- *Adamko, M.*: Recommendation Personified by Statements on Social Network. (P. Návrat)
- *Antl, O.*: Recommendation Using Graph Data Structures. (D. Zeleník)
- *Bacho, A.*: Popularity Prediction of Scientific Publications. (R. Móro)
- *Belan, R.*: Editing of Three-dimensional UML Diagrams. (I. Polášek)
- *Beňovic, I.*: Generating Source Code and XML Files from UML 2.4 Diagrams. (I. Polášek)
- *Beťák, P.*: Searching of Source Code Based on his Properties. (K. Rástočný)
- *Borák, M.*: Predicting Content Quality in Community Question Answering. (I. Srba)
- *Brza, T.*: Student Motivation in Interactive Online Learning. (J. Tvarožek)
- *Buček, B.*: Standardized Websites. (A. Považanová)
- *Bujna, E.*: Creating Natural Language Database Queries. (P. Lacko)
- *Bystričan, J.*: Recommendation Personified by Expressions on Social Network. (P. Návrat)
- *Cagáň, T.*: Evaluation of Text Similarity in Web Search of Plagiaries. (D. Chudá)
- *Cimerman, M.*: Data Stream Analysis. (J. Ševcech)

- *Csóka, L.*: Parallel Methods for Clustering Large Data Corpora. (M. Lucká)
- *Cuprik, R.*: Motif Finding in DNA Sequences. (P. Návrat)
- *Čerman, O.*: Key Information Provider for Google Glass. (A. Kovárová)
- *Černák, M.*: Dynamic Recommendation. (P. Návrat)
- *Daabousova, R.*: Prediction Models of Electricity Consumption by Intelligent Analysis of Large Corpus of Data. (M. Lucká)
- *Ďaďo, J.*: Personalized Recommendation of TV Relations. (M. Bieliková)
- *Donko, T.*: Multidimensional View of Model in UML. (I. Polášek)
- *Dubec, P.*: TV Program Metadata Acquisition. (M. Bieliková)
- *Dzurňak, E.*: Personalized Recommendation of TV Programme. (M. Bieliková)
- *Erdelyi, J.*: Analysis Methods of Solutions of Interactive Educational Task. (J. Tvarožek)
- *Farkaš, T.*: Parallel Data Sorting. (M. Lucká)
- *Fašánek, M.*: Regression Analysis Relation Modeling. (G. Grmanová)
- *Gáborik, J.*: Innovative Application within an International Competition. (J. Šimko)
- *Gajdošík, P.*: Slovak Web-based Encyclopedia. (M. Holub)
- *Galbavý, M.*: Graphic Representation of Relationships between Records. (N. Andrejčíková)
- *Gallay, L.*: Utilizing Vector Models for Processing Text on the Web. (M. Šimko)
- *Gaššo, T.*: Enterprise Architecture as an Instrument of Reengineering. (V. Rozinajová)
- *Gedera, J.*: Automatic Diacritics Reconstruction in Slovak Texts. (M. Šimko)
- *Grošaft, M.*: Analysis of Studying Methods in Online Learning Environment. (J. Tvarožek)
- *Gubík, L.*: Synchronization of Textual and Diagram Models of Use Cases. (V. Vranič)
- *Hajdu, D.*: Enhancement of a Player of Simulated Robotic Soccer. (I. Kapustík)
- *Halaš, P.*: Big Data in Power Engineering: Analysis of Seasonal Effects on Power Consumption. (P. Vrabecová)
- *Hamacek, L.*: Application of Technologies of Web 3.0 in Commercial Sphere. (M. Líška)
- *Heršel, M.*: Extraction of Pure Text from Web Pages. (M. Kompan)
- *Hlava, M.*: Key Information Provider for Google Glass. (A. Kovárová)
- *Hnilicová, E.*: Reporting Tools. (N. Andrejčíková)
- *Hnojčík, T.*: Mining relationships of information fragments and their mapping in ontologies. (J. Lang)
- *Huba, R.*: Image Segmentation. (A. Bou Ezzeddine)
- *Huňa, A.*: User Reputation in Community Question Answering. (I. Srba)
- *Chovaňák, T.*: Reporting Tools. (N. Andrejčíková)
- *Illés, D.*: Approximate String Matching Using Graphics Processing Unit. (P. Kubán)
- *Jambor, A.*: Gmail Gadget: Event Extraction from Email Communication and Integration with Calendar. (M. Laclavík)
- *Janečková, K.*: Time Series Analysis. (G. Grmanová)
- *Jenis, M.*: Editing Of Three-dimensional UML Diagrams. (I. Polášek)
- *Jurčacko, F.*: Decompiler for MIPS Architecture. (P. Lacko)
- *Kislan, M.*: Support Tool for Testing SQL Queries and Supporting Teaching. (M. Barla)
- *Korbel, M.*: Household Categorization and Visualization Based on Electricity Consumption. (A. Kovárová)
- *Košút, M.*: Extracting Keywords from Movie Subtitles. (M. Šimko)
- *Kováč, M.*: Goalkeeper for Simulated Robotics Football. (I. Kapustík)
- *Kovalčík, K.*: Utilization of enterprise architecture tools for business processes reengineering. (V. Rozinajová)
- *Kulišek, A.*: Interactive Visualization of Software Project Development over Time. (A. Kovárová)
- *Lang, R.*: Combined Use of Sensors in Mobile Devices. (V. Vranič)
- *Leško, M.*: Innovative Application within an International Competition. (J. Šimko)
- *Mačina, J.*: Innovative Application within an International Competition. (J. Šimko)
- *Mäsiar, A.*: Game for Connection of Metadata and Sources in the Domain of Multimedia. (J. Šimko)
- *Mészáros, D.*: Determining the Parts of Speech in Slovak Language. (M. Šajgalík)
- *Miškovský, L.*: The Effect of User's Biometric Characteristics on Authentication under Smartphone Platform. (D. Chudá)
- *Mrocek, J.*: Image Recognition on Mobile Devices. (P. Lacko)
- *Nagy, G.*: Voice Control of Smart Room. (G. Rozinaj)

- *Pastorek, R.*: System for Generating Distribution Schedule of Medicaments in Hospital. (I. Budinská)
- *Paška, P.*: System to Prepare the Schedule of Distribution of Medicines to Patients in Hospitals. (I. Budinská)
- *Pecár, S.*: Building Database of Conferences. (Z. Harsányi)
- *Pikna, R.*: Remote Control Robot Using Mobile Device. (P. Lacko)
- *Posch, H.*: Extraction of Pure Text from Web Pages. (M. Kompan)
- *Roba, R.*: Processing of Large Graphs with Application to Financial Flows of Cryptocurrencies and Analysis of Blockchains. (M. Lucká)
- *Slezák, D.*: Recommendation Using Graph Data Structures. (D. Zeleník)
- *Sluka, P.*: Model-driven Development of Mobile Applications. (V. Vranić)
- *Spišák, D.*: Defining and Applying Use Case Modeling Conventions. (V. Vranić)
- *Staňo, J.*: Innovative Application within an International Competition. (J. Šimko)
- *Šandor, F.*: Improvement of Simulated Robotic Soccer Player. (I. Kapustík)
- *Šmidová, L.*: DNA Fragment Assembly Using Bio-inspired Algorithms. (A. Bou Ezzeddine)
- *Špáňik, I.*: Tag Recommendation for Resources in Digital Library. (R. Móro)
- *Takács, G.*: Personalised Recommendations Using Machine Learning Techniques. (V. Rozinajová)
- *Takács, M.*: Mobile Application Based on a Combined Use of Sensors. (V. Vranić)
- *Trizna, J.*: Simulator of Counter Machines. (D. Chudá)
- *Uhrin, J.*: Image Recognition on Mobile Device. (P. Lacko)
- *Valocký, D.*: Synchronization of Textual and Diagrammatic Part of Use Case Models. (V. Vranić)
- *Vlček, O.*: Web Content Extraction. (M. Kompan)
- *Vrana, P.*: Analysis of Work with Source Code. (J. Tvarožek)
- *Vrba, J.B.*: Parallel Image Classification with Use of Random Forests Method. (M. Lucká)
- *Zaťko, J.*: Study of Software Development According to the DCI Approach. (V. Vranić)
- *Žalondek, M.*: Object-oriented Image Segmentation. (V. Benešová)
- *Žigo, T.*: Approximate String Matching with Use Graphics Processing Unit. (P. Kubán)
- *Žuffa, T.*: Time Series and Forecasting. (A. Bou Ezzeddine)

## IV.2 Master (Ing.) Theses

### Study Programme Information Systems

- *Černý, R.*: Processing and Analyzing Large Volumes of Data. (A. Bou Ezzeddine)
- *Červeňová, D.*: Syntactic Text Analysis in Natural Language. (M. Šimko)
- *Demčák, P.*: Methodics of Game Evaluation Based on Implicit Feedback. (J. Šimko)
- *Grznár, M.*: Adaptive Collaboration Support in Community Question Answering. (I. Srba)
- *Hamar, P.*: Discovering Experts in a Research Community by Ranking Authors. (Z. Harsányi)
- *Harinek, J.*: Crowdsourcing for Large Scale Texts Annotation. (M. Šimko)
- *Hlaváč, P.*: Analysing User Gaze on the Web. (M. Šimko)
- *Chlebana, M.*: Source Code Review Recommendation. (K. Rástočný)
- *Jurkovič, P.*: Models for Supporting of Online Social Learning. (J. Tvarožek)
- *Kocian, R.*: Personalized Recommendation Using Context for New Users. (M. Kompan)
- *Kompas, Š.*: Methods of DNA Sequence Assembly. (G. Grmanová)
- *Kubica, S.*: Enhancing Data Quality in the Field of Science Using Big Data. (N. Andrejčíková)
- *Kvitkovič, M.*: Keyword Extraction from Documents Using Negation Detection. (I. Polášek)
- *Marcin, J.*: Refining Interest of Information Seekers on the Web by Implicit Feedback. (P. Návrat)
- *Marcoňák, M.*: Activity Recognition Using Smartphone Sensors. (G. Grmanová)
- *Maruna, V.*: Similarities in Slovak Texts. (D. Chudá)
- *Mišíková, K.*: Big Data Analytics. (V. Rozinajová)
- *Molnár, S.*: Activity-based Search Session Identification. (T. Kramár)
- *Noga, M.*: Similarity in Source Code. (D. Chudá)
- *Petluš, M.*: Identification of Search Episodes with Use of Semantic Text Models. (T. Kramár)
- *Petráš, M.*: User Model to Identify his States. (D. Chudá)
- *Piták, J.*: Evaluation of Products by Using Search Engines that Analyze Text from the Web. (Š. Sabo)

- *Podmajerský, J.:* Methods for Selection and Generation of Learning Assistance. (J. Tvarožek)
- *Rabčan, J.:* Creating Visual Codebooks. (G. Grmanová)
- *Samuhel, P.:* Similarity Search in Slovak Texts. (D. Chudá)
- *Sekerák, L.:* Interactive Visualization of Developer's Actions. (A. Kovárová)
- *Soós, D.:* Stochastic Optimization Algorithm Solution for Restriction Mapping Of DNA Fragments. (M. Lucká)
- *Šimek, M.:* Processing and Comparing of Sequential Data Using Machine Learning. (M. Barla)
- *Štajer, A.:* Visual Analytics of Big Data. (V. Rozinajová)
- *Štrbáková, V.:* Implicit Feedback-based Estimation of Student's Knowledge. (M. Bieliková)
- *Tibenský, M.:* Software Visualization Using Voronoi Diagram. (A. Kovárová)
- *Toma, M.:* Using Parallel Web Browsing Patterns on Adaptive Web. (M. Labaj)
- *Vangel, M.:* Determining the Relevancy of Important Words in a Digital Library. (R. Móro)
- *Petrík, J.:* Complex Data Structures in Web Interfaces. (P. Lacko)
- *Pidanič, P.:* Kick Skills Augmentation for a Simulated Robotic Soccer Player. (I. Kapustík)
- *Skrisa, J.:* Improving Robot Soccer Player by Practicing and Learning. (I. Kapustík)
- *Šuta, E.:* Organizational Unit Structure and Provisioning in Federated Identity Management. (P. Mederly)
- *Toma, M.:* Service Composition for Processing Big Data. (V. Rozinajová)
- *Vincúr, J.:* Source Code Topics Identifying. (I. Polášek)
- *Vojtuš, M.:* Support of Software Refactoring. (I. Polášek)

## V. IIT.SRC

### Full papers

- *Bacho, A.:* Popularity Prediction of Scientific Publications. (R. Móro)
- *Belan, R.:* Transformation of UML Combined Fragments from 2D to 3D. (I. Polášek)
- *Cuprik, R.:* Motif Finding in DNA Sequences. (P. Návrat)
- *Demčák, P.:* Evaluating Learnability of Games. (J. Šimko)
- *Dubec, P.:* TV Program Guide Metadata Acquisition. (M. Bieliková)
- *Farkaš, T.:* Parallel Bucket Sort Algorithm for Ordering DNA Short Reads Data Sequences. (M. Lucká)
- *Gajdošík, P.:* Slovak Web-based Encyclopedia. (M. Holub)
- *Gedera, J.:* Automatic Diacritics Reconstruction in Slovak Texts. (M. Šimko)
- *Grznár, M.:* Question Routing Based on Non-QA Data in Community Question Answering. (I. Srba)
- *Harínek, J.:* Crowdsourcing for Large Scale Texts Annotation. (M. Šimko)
- *Hlava, M.:* Recognition of User's Identity or Activity by Analyzing Sensor Data from Smart Glasses. (A. Kovárová)
- *Hlaváč, P.:* Analyzing User Gaze on the Web. (M. Šimko)
- *Huňa, A.:* User Reputation in Community Question Answering. (I. Srba)
- *Chlebana, M.:* Source Code Review Recommendation. (K. Rástočný)
- *Jurčák, O.:* Collaboration in Development of Active Conceptual Model and its Management. (J. Lang)
- *Bádal, M.:* Translation of Design Models to Higher Programming Language. (P. Lacko)
- *Čerešňák, M.:* Automatic Creation of Movements Annotations of the Robotic Soccer Player. (I. Kapustík)
- *Daráž, J.:* Parallel Models Solving Large-scale Optimization Tasks Using Ant Colony Optimization. (M. Lucká)
- *Gregorovič, L.:* Advanced Methods of Analysis and Design Using Multidimensional UML. (I. Polášek)
- *Jurčák, O.:* Collaboration in Development of Active Conceptual Model and its Management. (J. Lang)
- *Kalmár, J.:* Improving Robotic Goalkeeper. (I. Kapustík)
- *Kebísek, J.:* Processing of Large Amount of Data Used to Predict the Trajectory of Movement. (P. Lacko)
- *Kepič, T.:* Three-dimensional Orientation in Complex Conceptual Models. (J. Lang)
- *Klč, D.:* Sequencing DNA with Extensive Usage of Parallelization Tools. (P. Lacko)
- *Mančík, G.:* Detecting Relations among Documents. (T. Kučečka)
- *Martaš, I.:* Software Services Recommendation Using Context. (V. Rozinajová)

- *Kaššák, O.*: Students' Behaviour Analysis in e-Learning System. (M. Bieliková)
  - *Kepič, T.*: Irrlicht Based Three-Dimensional Complex Conceptual Models Visualization. (J. Lang)
  - *Klč, D.*: Refinement of Methods for DNA Sequencing. (P. Lacko)
  - *Konôpka, M.*: Employing Software Developer's Activity and Gaze Tracking to Describe Source Code. (P. Návrat)
  - *Košút, M.*: Extracting Keywords from Movie Subtitles. (M. Šimko)
  - *Kysel, P.*: Use Case Based Approach in Conceptual Modeling. (J. Lang)
  - *Laurinec, P.*: Application of Genetic Algorithm on Model-based Cluster Analysis. (M. Lucká)
  - *Mačina, J. – Staňo, J. – Leško, M.*: Sitting Posture Quality Evaluation Using Depth Camera. (J. Šimko)
  - *Marcin, J.*: Refining Interest of Information Seekers on the Web by Eye-tracking Feedback and Groupisation. (P. Návrat)
  - *Mäsiar, A.*: Game for Connection of Metadata and Sources in the Domain of Multimedia. (J. Šimko)
  - *Mészáros, D.*: Determining the Parts of Speech in Slovak Language. (M. Šajgalík)
  - *Móro, R.*: Considering Navigational Value of Keywords in the Process of Navigational Leads Selection. (M. Bieliková)
  - *Mrocek, J.*: Vehicle Recognition in Image Sequences Using Mobile Devices. (P. Lacko)
  - *Paulovič, A.*: Eventually Consistent Distributed Transactional Memory. (P. Lacko)
  - *Petluš, M.*: Identification of Search Sessions with Use of Semantic Text Models. (T. Kramár)
  - *Petráš, M.*: User Model to Identify his States. (D. Chudá)
  - *Pidanič, P.*: Exploring Possibilities for Symmetric Implementation of Aspect-Oriented Design Patterns in Scala. (V. Vranič)
  - *Rabčan, J.*: Visual Codebook Generation by Self-organizing Map. (G. Kosková)
  - *Sekerák, L.*: Interactive Visualization of Developer's Actions. (A. Kovárová)
  - *Soós, D.*: Partial Digest Problem: A Simplified Heuristic Approach. (M. Lucká)
  - *Srba, I.*: Towards Preservation of Sustainability in Community Question Answering. (M. Bieliková)
  - *Šajgalík, M.*: Modelling User Interests in Latent Feature Vector Space based on Document Categorisation. (M. Bieliková)
  - *Ševcech, J.*: Repeating Sequence Length Estimation in Time Series. (M. Bieliková)
  - *Šimek, M.*: Processing and Comparing of Eye-tracking Data Using Machine Learning. (M. Barla)
  - *Štajer, A.*: Visual Analytics Tool for Energy Consumption Data Set. (V. Rozinajová)
  - *Štrbáková, V.*: Implicit Feedback-based Estimation of Student's Knowledge. (M. Bieliková)
- Extended abstracts**
- *Gallay, L.*: Utilizing Vector Models for Automatic Text Lemmatization. (M. Šimko)
  - *Krátky, P.*: Issues of Computer Mouse Data for Related Applications. (D. Chudá)
  - *Martoš, I.*: Software Services Recommendation Using Context. (V. Rozinajová)
  - *Miškovský, L.*: Touchscreen Authentication Using Keystroke Dynamics and Other Touch Based Features. (D. Chudá)
  - *Šuta, E.*: Organizational Unit Structure and Provisioning in Federated Identity Management. (P. Mederly)
  - *Toma, M.*: Using Parallel Web Browsing Patterns on Adaptive Web. (M. Labaj)
  - *Vangel, M.*: The Impact of Citation and Co-Citation Analysis on the Relevancy of Keywords in Digital Libraries. (R. Móro)
  - *Vrablecová, P.*: Power Demand Forecasting from Stream Data with Concept Drifts. (V. Rozinajová)
- TP CUP Competition**
- *Andrášik, D. – Csóka, B. – Grman, E. – Kubinec, E. – Nemeč, R. – Ogurčák, V.*: ProjectAid a Web Portal to Support Growth of IT. (K. Rástočný)
  - *Baranovičová, H. – Kudláč, M. – Juras, F. – Markovič, L. – Melis, M. – Valovič, M. – Železnák, A.*: 3D UML. (I. Polášek)
  - *Brisuda, R. – Drutarovský, T. – Lenčucha, A. – Podoláček, L. – Rykalský, S. – Susko, M.*: Make Games a Better Fun. (Peter Krátky)
  - *Brocková, B. – Čaja, M. – Číž, M. – Kysel, P. – Lieskovský, A. – Uderman, D. – Viskup, M.*: Appmonitor: Replacing Traditional Logging Mechanisms in Software Applications Monitoring. (J. Ševcech)
  - *Cibula, M. – Černák, M. – Demčák, V. – Krivý, J. – Melko, J. – Šustek, M.*: Automated Exploration of Citation Data for the Purpose of Assessment Factors Acquisition. (N. Andrejčíková)
  - *Cymorek, D. – Gašpar, P. – Lalík, V. – Polko, M. – Šafárik, M. – Šárik, S. – Šmihla, Š.*: Crowdex:

- A Crowd Work Management System. (M. Kompan)
- Čurilla, P. – Gallik, P. – Kaššay, M. – Kloska, M. – Kochjar, J. – Roštár, R.: Web Interface for Distributed Platform for Volunteer Computing - BOINC. (P Lacko)
- Egriová, J. – Ferenčík, A. – Filipčík, R. – Melicher, T. – Slavíček, J. – Zigo, J.: AdHunter – Outdoor Crowdsourcing of Visual Smog. (J. Šimko)
- Jurík, I. – Liskovec, M. – Loebel, J. – Tamajka, M. – Truchan, P. – Vnenk, L.: Advanced Chess Tournament Manager and Pairing Engine. (M. Šimko)
- Kiš, P. – Kucek, M. – Kušnir, P. – Lovasová, V. – Svrček, M. – Šulek, M. – Valíček, Š.n: Collecting the Implicit and Explicit User Feedback on the Web by Means of Eye Tracking. (R. Móro)
- Mazán, F. – Olešová, V. – Šoltés, F. – Kučera, M. – Pribul, D. – Karas, J.: Beacon Indoor Localization. (A. Kovárová)

## VI. Research Laboratories

### Intelligent Systems Laboratory (P. Návrat)

The laboratory is used for research of a wide spectrum of problems that fall into the field of program and information systems mainly in the scope of artificial intelligence. The projects solved are concerned with the methods of knowledge system development with a special focus on multi-agent systems and their collaboration, as well as intelligent search, delivery, and presentation of heterogeneous information in a distributed environment such as Internet, including categorisation and recommendation of the information. The laboratory is equipped with fairly powerful computer systems and advanced software tools that correspond to the demands of the projects being solved. The equipment is regularly renewed thanks mainly to continuous success in grants including international ones.

### 3D UML Laboratory (I. Poláček)

The laboratory is used for research in the area of UML modeling using multidimensional space to support analysis and design of the large software systems. The laboratory is equipped with new powerful computer system and various I/O devices (leap motion, 3D mouse SpaceNavigator and 3 interconnected 3D monitors). Many students in their bachelor, team and diploma projects help us create first prototypes. In the next period, research projects will make use of the facilities

available in the laboratory. Collaboration with other research teams with similar laboratories is also envisaged. We shall also seek collaboration with companies from IT sector for validation and deployment our prototypes. We plan to create a working prototype of a CASE system to support the development of software products using 3D UML and offer it to the partners and IT companies.

### Advanced Software and Web Technologies Laboratory (M. Bieliková)

The laboratory is used for research of a wide spectrum of problems that fall into the field of program and information systems mainly in the scope of software engineering. The projects being solved were concerned with the methods and tools of software system development with a special focus on the structure design of component-based and structure and presentation design of hypermedia systems. The laboratory is used also for research projects in the field of advanced software technologies for master degree students. The laboratory is equipped with fairly powerful computer systems and advanced CASE tools. The equipment is regularly renewed thanks mainly to continuous success in grants including international ones.

### User Experience and Interaction Research Center (M. Bieliková)

User Experience and Interaction Research Center consists of two labs:

1) Engelbarts's Laboratory of User Experience Research (nicknamed UX Lab). Named after Douglas Engelbart, the creator of a first computer mouse, the lab is primarily focused on detailed monitoring of behaviour of an individual computer user. It is ideal for qualitative user studies. The highly precise sensors, devices and software in the lab are suitable for investigation, what experience the user has, when he interacts with given applications, performs given tasks or even spends his leisure time. The sensors not only track the user's gaze, but also expression of his face, physiology and neuroelectrical activity. The lab consists of multiple rooms connected with semi-transparent glass, which enables observation of the experiment participant's behaviour without disturbances.

2) Simon's Laboratory of personalized learning (nicknamed UX Group). Named after Nobel Prize laureate Herbert A. Simon, the classroom-style lab is designed for simultaneous monitoring of behaviour of groups of users. It especially enables largescaled quantitative user studies. It comprises



twenty workstations, each equipped with an eye-tracker and a depth camera. All workstations are connected to a single information system, which is capable of real-time transfer of all necessary data to central storage, from where they can be further analysed.

## VII. Research Projects

**Intelligent Analysis of Big Data by Semantic-oriented and Bio-inspired Methods in a Parallel Environment (VEGA, 1/0752/14)** (P. Návrát), Duration: 2014–2017

The currently used methods of data analysis, extraction, data mining and automated support for domain modeling can no longer effectively support the processing of nowadays commonly available datasets, which arise in every field of human activity. One of the advantages of the work with large datasets is the potential to acquire often better or even completely new results of the data processing, e.g. finding new patterns, obtaining more accurate results or achieving greater statistical significance. In this project we will focus on intelligent analysis of large bodies of medical data as well as modeling of big data available on the Internet. We will focus on the area of DNA sequencing and pattern extraction from medical imaging. Another source of data will be the actual content of the Web, user access logs and records of user preferences. To support the processing of such large datasets we will study the potential of parallel and distributed computing models and new approaches to software design.

**Advanced Methods in Software Evolution: Variants, Composition, and Integration (VEGA, 1/1221/12)** (V. Vranić), Duration: 2012–2015

Software evolution embraces initial software development and its recurring modifications. What is characteristic for software evolution is an emphasis on maintenance, the longest phase in software development life cycle. Sometimes, the whole software development process can be perceived as maintenance because the development of what is considered as a new software is most often based on the existing code or models. Software maintenance can be perceived as naturally agile: oriented on the product and customer. The project aims at the research of advanced methods in software evolution both at the programming and modeling level. A special attention is paid to the use of advanced composition mechanisms and explicit and early dealing with variability. Specific

project objectives include the support of aspect-oriented (AO) change realization process, using AO approaches to deal with variability, proposal of advanced approaches to integration and composition, and using AO approach in information content modeling.

**Adaptation of Access to Information and Knowledge Artifacts Based on Interaction and Collaboration within Web (VEGA, 1/0646/15)** (M. Bieliková), Duration: 2015–2018

During common use of Web (searching, learning and task solving), users are confronted with problems of information overload, loss in information space and insufficient collaboration support. These problems are not novel and were addressed in various specific domains with varying degrees of success. However, new challenges and possible solutions are opening in the form of new types of approaches for interaction of users, new means for gathering feedback and new methods to work with big data and data streams. Based on the results of our research team in this field, in this project we focus on using these means for introducing new methods for adaptation of content, navigation and form of the information space, with the goal of improving orientation and collaboration of users in the information space. We will also research options for supporting information space analysis (metadata acquisition, text analysis) and user's behaviour analysis concerning interaction with information spaces.

**Virtual Learning Software Lab for Collaborative Task Solving (KEGA, 009STU-4/2014)** (M. Bieliková), Duration: 2014–2016

Interaction and collaboration between students and teacher and among students themselves are important elements of the learning process. Presently, the support for collaboration in learning is limited to standard communication tools such as discussion and to only some environments. The goal of the project is to extend an existing software platform for learning support with features for interaction and collaboration at the level of learning materials, task solving or question answering. The platform will not only support enhancements of learning process such as social dimension, interaction and collaboration with active features attached to learning materials (annotation of learning materials, question creation, search and evaluation of external resources suitable for learning), but will also enable working with selected features on portable devices. We evaluate the platform using existing learning ma-

materials in the domain of programming, which we will extend by new materials from the domain of software engineering.

**Future Education and Training in Computing: How to Support Learning at Anytime Anywhere (539461-LLP-1-2013-1-BG-ERASMUS-ENW)**

(D. Chudá), Duration: 2013 – 2016

The main objectives of this proposal is to introduce innovative technologies in education, develop an integrated environment for computing education, which includes curricula, syllabi, e-learning, resources, student exhibition forums, which will significantly raise education quality. It will also propose a set of recommendations for future Digital Curricula in Computing Education and Training 2020 and will develop new didactical theories and learning models for using social media in education. The project involves 67 partners from 35 countries. All of them are active players in the field of Computing Education. Representatives of these partners will work on the reorganisation of the teaching process by changing teaching methods, developing new didactical theories and learning models for using social media in education and new Digital Curricula in Computing Education and Training. This will strengthen and further develop the European Higher Education Area in Computing.

**International Center of Excellence for Research on Intelligent and Secure Information and Communications Technologies and Systems (ITMS 26240120039)** (V. Rozinajová for FIIT STU), Duration: 2014 – 2015

The goal of the project is to establish a research centre focused on basic research in energy domain, Big Data and CyberSecurity. Our part of the project is to provide an overview of the current state and research challenges in Big Data area and to propose solutions to particular tasks of Big Data processing. The topics of interest cover specific parts of the data value chain, such as data acquisition, data quality, data analytics with special focus on predictive modeling and data visualization. The models are investigated in the domain of power engineering, as huge amount of data is daily generated from smart meters and smart grid environment. In order to deliver real value from these data new analytic models are needed.

**Research of Methods for Acquisition, Analysis and Personalized Conveying of Information and Knowledge (ITMS: 26240220039)** (M. Bieliková for FIIT STU), Duration: 2011 – 2015

The purpose of the project is to develop new methods of acquisition, search, and recommendation of information and knowledge. The need for such methods comes from a huge range of the data available in different domains when their manual search for a human is not possible. Contemporary methods have enabled a remarkable move in this field, but they still do not enable to effective information providing so that this would include the context: the user, his or her goals, properties, and capabilities, as well as parameters of the environment in which information processing takes part (time, place, and technical resources).

**PARSING and Multi-word Expressions: Towards Linguistic Precision and Computational Efficiency in Natural Language Processing (COST Action IC 1207)** (M. Šimko), Duration: 2014 – 2017

The general aim of PARSEME is increasing and enhancing the ICT support of the European multilingual heritage. This aim is pursued via more detailed objectives: (outreach) to put multilingualism in focus of linguistic and technological studies, (networking) to establish a long-lasting cross-lingual, cross-theoretical and cross-methodological research network in natural language processing (NLP), (scientific) to bridge the gap between linguistic precision and computational efficiency in NLP applications.

**Semantic Keyword-based Search on Structured Data Sources (COST Action IC 1302)** (M. Bieliková), Duration: 2014 – 2017

The main objective of the Action is complemented by the following secondary objectives: Promote the development of novel techniques for keyword-based search over structured data sources. Facilitate the transfer of knowledge and technology to the scientific community, practitioners and the enterprises. Build a critical mass of research activities and outcomes that achieve the sustainability of the research themes beyond the Action.

**Innovative teaching curricula, methods and infrastructures for computer science and software engineering (SCOPES)** (M. Bieliková), Duration: 2015 – 2018

The main goal of the project is to innovate the teaching infrastructures at partner institutions based on the knowledge and experience of individual partners acquired mostly by the research activities. This goal will be achieved by transferring and integrating content, best practices, methods and existing learning support research

infrastructure in the context of selected computer science and software engineering courses. In this project we aim to transfer our know-how embedded in several learning support software systems, and also build a long-term research cooperation through the integration and cross-utilization of these systems, which serve as working prototypes in research activities in domain of personalized learning. In particular, we include learning support systems that enable interactive lectures that improve focus and engagement of students as well as increase teacher awareness of student progress; automatic assessment systems that enable thorough testing and feedback on student's solutions, and social support systems that enable increased engagement of students with teachers and more in-depth communication. We aim to innovate: teaching methods, material and content used in selected computer science and software engineering courses and transfer best practices in the software infrastructures used at each partner institution. We focus on thematically common courses for programming and software development offered at each institution: introductory programming and programming fundamentals courses, and software and/or web engineering courses.

## VIII. Publications

### VIII.1 Journals

- [1] ADAMKO, M. - NÁVRAT, P. - KOVÁROVÁ, A.: Personalised Recommendation of Who to Follow Based on Fellowship of Followers. In: *Computing and Information Systems Journal*. Vol. 19, no. 1 (2015), ISSN 1352-9404. pp. 1-5.
- [2] BIELIKOVÁ, M. - MÓRO, R. - ŠIMKO, J. - TVAROŽEK, J.: Adaptive Web-based Textbook Utilizing Gaze Data (abstract). In: *Journal of Eye Movement Research*. Vol. 8, Iss. 4 (2015), ISSN 1995-8692, p. 1.
- [3] KAŠŠÁK, O. - KOMPAN, M. - BIELIKOVÁ, M.: User Preference Modeling by Global and Individual Weights for Personalized Recommendation. In: *Acta Polytechnica Hungarica*. Vol. 12, no. 8 (2015), ISSN 1785-8860, pp. 27-41.
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- [5] KURIC, E. - BIELIKOVÁ, M.: Annor: Efficient Image Annotation Based on Combining Local and Global Features. In: *Computers and Graphics*. Vol. 47, No. 2 (2015), pp. 1-15.
- [6] MAZÁN, F. - KOVÁROVÁ, A.: A Study of Devising Neural Network Based Indoor Localization Using Beacons: First Results. In: *Computing and Information Systems Journal*. Vol. 19, no. 1 (2015), ISSN 1352-9404, pp. 15-20.
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- [8] SABO, Š. - KOVÁROVÁ, A. - NÁVRAT, P.: Multiple Developing News Stories Identified and Tracked by Social Insects and Visualized Using the New Galactic Streams and Concurrent Streams Metaphors. In: *International Journal of Hybrid Intelligent Systems*. 12, 1 (2015), ISSN 1448-5869, pp. 27-39.
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- [10] STARÁČEK, Ľ. - VRANIČ, V.: MDA Based Multiplatform Mobile Application Modeling with Platform Compliant User Interfaces. In: *INFO-COMP Journal of Computer Science*. Vol. 13, no. 2 (2014), ISSN 1982-3363, pp. 34-43. (Published in 2015)
- [11] VRANIČ, V. - PORUBĀN, J. - BYSTRICKÝ, M. - FRŤALA, T. - POLÁŠEK, I. - NOSÁL, M. - LANG, J.: Challenges in Preserving Intent Comprehensibility in Software. In: *Acta Polytechnica Hungarica*. Vol. 12, no. 7 (2015), ISSN 1785-8860, pp. 57-75.
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### VIII.2 Conference Proceedings

- [1] BYSTRICKÝ, M. - VRANIČ, V.: Preserving Use Case Flows in Source Code. In: *ECBS-EERC 2015*. 2015 IEEE Fourth Eastern European Regional Conference on the Engineering of Computer Based Systems. Brno, Czech Republic. Los Alamitos : IEEE, 2015, pp. 9-16.

- [2] FRŤALA, T. - VRANIĆ, V.: Animating Organizational Patterns. In: *Proceedings of Eighth International Workshop on Cooperative and Human Aspects of Software Engineering CHASE 2015*. Florence, Italy. Los Alamitos : IEEE, 2015, pp. 8-14.
- [3] GREGOROVIČ, L. - POLÁŠEK, I. - SOBOTA, B.: Software Model Creation with Multidimensional UML. In: *Information and Communication Technology*. Third IFIP TC 5/8 International Conference, ICT-EurAsia 2015, and 9th IFIP WG 8.9 Working Conference, CONFENIS 2015, Held as Part of WCC 2015. Daejeon, Korea, Cham : Springer, 2015, pp. 234-352.
- [4] GREGOROVIČ, L. - POLÁŠEK, I.: Analysis and Design of Object-oriented Software Using Multidimensional UML. In: *15<sup>th</sup> International Conference on Knowledge Technologies and Data-driven Business, i-KNOW 2015*. Graz, Austria. New York : ACM, 2015, p. 4.
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- [10] CHUDÁ, D. - KRÁTKY, P.: Grouping Instances in kNN for Classification Based on Computer Mouse Features. In: *CompSysTech'15*. 16<sup>th</sup> International Conference on Computer Systems and Technologies. Dublin, Ireland. New York : ACM, 2015, pp. 214-220.
- [11] JAKAB, M. - BENEŠOVÁ, V. - RAČEV, M.: 3D Object Recognition Based on Local Descriptors. In: *Proceedings of SPIE: Intelligent Robots and Computer Vision XXXII: Algorithms and Techniques*, 94060L. San Francisco, United States Bellingham : SPIE - The International Society for Optical Engineering, 2015.
- [12] KAPUSTÍK, I. - HUDEC, J. - NÁVRAT, P.: Stabilized Walking for Nao Robot. In: *SAMI 2015*. IEEE 13<sup>th</sup> International Symposium on Applied Machine Intelligence and Informatics. Herľany, Slovakia. IEEE, 2015, pp. 115-118.
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### VIII.3 Edited Books

- [1] RYŠAVÝ, O. - POPOVIČ, M. - VRANIČ, V.: Proceedings of *ECBS-EERC 2015*. 2015 IEEE Fourth

Eastern European Regional Conference on the Engineering of Computer Based Systems. Brno, Czech Republic. Los Alamitos : IEEE, 2015, ISBN-13: 978-1-4673-7967-0.

## IX. Cooperation

### Cooperation in Slovakia

- Institute of Informatics, Slovak Academy of Sciences, Bratislava
- Department of Library and Information Science, Faculty of Letters, Comenius University, Bratislava
- Institute of Informatics, Faculty of Science, Pavol Jozef Šafárik University in Košice
- Faculty of Electrical Engineering and Information Technologies Technical University of Košice
- Faculty of Management Science and Informatics, University of Žilina
- Ardaco
- Asseco
- ATOS IT Solutions and Services
- BIZZdesign
- Ditec
- Datalan
- Gratex International
- GBSW
- Hewlett-Packard Slovakia
- IBM Slovakia
- Microsoft Slovakia
- mimacon
- Oracle Slovakia
- PosAm
- SAP
- Siemens
- SOFTEC
- Soitron
- Slovak Telecom
- Tempest
- Unicorn
- Unify

### International Cooperation

- MIR Labs, Machine Intelligence Research Labs, global not-for-profit academic consortium oriented to innovation and research in various areas of machine intelligence. The Institute is part of the MIR Labs Network with Pavol Návrát serving as coordinator for Slovakia
- WIC, Web Intelligence Consortium, an international not-for-profit organisation devoted to scientific research and industry development in the area of web intelligence. The Institute

plays a role of Slovak Research Centre of the Consortium.

- AOSD-Europe, integrates and coordinates research, education and dissemination activities of its members in the area of aspect oriented development of software. Originally, it has been a 7. Framework Programme project.
- School of Information Sciences, University of Pittsburgh, Pittsburgh, USA
- Institute of Software Technology and Interactive Systems, Faculty of Informatics, Vienna University of Technology
- Department of Software Technology and Methodology, Faculty of Informatics, Eötvös Loránd University, Budapest
- Faculty of Information Technologies, Czech University of Technology, Prague
- Department of Computers, Faculty of Electrical Engineering, Czech Technical University in Prague, Czech Republic
- Institute of Information Systems, Faculty of Information Technologies, Brno University of Technology, Czech Republic
- Institute of Intelligent Systems, Faculty of Information Technologies, Brno University of Technology, Czech Republic
- Department of Computers, Faculty of Applied Science, University of West Bohemia in Pilsen, Czech Republic
- Department of Computer Science, Faculty of Electrical Engineering and Computer Science, Technical Univ. of Ostrava, Czech Republic
- Faculty of Informatics, Masaryk University, Brno, Czech Republic
- Department of Software Engineering, Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic
- UNESCO–Division of Information and Informatics, Paris, France
- University of Maribor, Slovenia
- Division of Computer Science, National Technical University of Athens, Greece
- Department of Information and Communication Systems Engineering, University of the Aegean, Greece
- Institute of Computer Science, Faculty of Philosophy and Natural Sciences,
- Silesian University in Opava, Czech Republic
- Lancaster University, United Kingdom
- Faculty of Electrical and Electronic Engineering and Automation, Univ. of Rousse, Bulgaria
- Faculty of Sciences, University of Novi Sad, Serbia
- Universität Leipzig, Germany

- Lancaster University, UK
- expressFlow, Austria
- Serbian Object Laboratories, Serbia
- Fraunhofer, Germany

## X. Visits of Staff Members

- *M. Šimko*: Parseme Training School, Charles University, Prague, Czech Republic, January 18-23, 2015
- *M. Bieliková, M. Holub, M. Konôpka, M. Labaj*: SOFSEM 2015, Prague, Czech Republic, January 24-29, 2015
- *Ľ. Molnár*: UNESCO, Ben Gurion University of the Negev in Beer Sheba, Izrael, February 16-20, 2015
- *Ľ. Molnár*: UNESCO, Bonn, Germany, February 4-6, 2015
- *V. Vranić, J. Lang*: IEEE CE Workshop 2015, RT-RK Institute for Computer Based Systems, Novi Sad, Serbia, March 10-13, 2015
- *I. Srba*: CSCW 2015, Simon Fraser University, Canada, March 13-22, 2015
- *Ľ. Molnár*: UNESCO, France, April 12-16, 2015
- *M. Bieliková, P. Návrat*: Brno University of Technology, Brno, Czech Rep., April 15, 2015
- *P. Návrat*: Charles University, Prague, Czech Republic, April 28, 2015
- *P. Návrat*: Brno University of Technology, Brno, Czech Republic, May 13, 2015
- *M. Konôpka*: ICSE 2015, Italy, May 15-23, 2015
- *P. Návrat, D. Chudá, A. Kovárová, M. Bieliková, J. Šimko, R. Móra, P. Krátky*: World Wide Web Conf. 2015, Florence, Italy, May 17-23, 2015
- *V. Vranić, T. Frtala*: ICSE 2015 - 37<sup>th</sup> conference, Florence, Italy, May 17-23, 2015
- *V. Rozinajová, A. Bou Ezzeddine, M. Lucká*: IDC DATA HUB 2015, Wien, Austria, May 21, 2015
- *J. Tvarožek, M. Barla*: APCPP 2015, Masaryk University, Brno, Czech Rep., May 21-22, 2015
- *Ľ. Molnár*: UNESCO, France, June 15-18, 2015
- *D. Chudá, P. Návrat, P. Krátky*: Compsystech 2015, Dublin, Ireland, June 23-27, 2015
- *V. Vranić, V. Rozinajová, M. Lucká*: Brno University of Technology, Brno, Czech Republic, June 24, 2015
- *M. Bieliková*: UMAP 2015, Trinity College, School of Computer Science, Dublin, Ireland, June 28 - July 4, 2015
- *O. Kaššák, M. Šajgalík*: 1<sup>st</sup> Keystone Training School Keyword Search over Big Data, University of Malta, Malta, July 19-25, 2015
- *M. Konôpka*: Microsoft Research, Redmond, WA, USA, July 26 - August 5, 2015
- *M. Bieliková, J. Šimko, J. Tvarožek, R. Móra*: ECEM 2015, University of Vienna, Austria, August 16-21, 2015
- *J. Ševcech*: IEEE BigDataSE-15, Helsinki, Finland, August 19-29, 2015
- *I. Srba*: ASONAM 2015, Paris, France, August 20-29, 2015
- *V. Vranić, K. Rástočný, M. Bystrický*: ECBS-EERC 2015, Brno University of Technology, Brno, Czech Republic, August 27-28, 2015
- *M. Konôpka*: ESEC/FSE 2015, Bergamo, Italy, August 30 - September 6, 2015
- *O. Kaššák*: ECML PKDD 2015, Porto, Portugal, September 6-12, 2015
- *M. Šajgalík*: 1<sup>st</sup> Int. Keystone Conference, Coimbra, Portugal, September 7-11, 2015
- *D. Chudá, J. Lang, J. Tvarožek*: E-learning 2015, Berlin, Germany, September 9-12, 2015
- *V. Vranić*: WAPL 2015, Politechnika Łódzka, Lodž, Poland, September 12-16, 2015
- *M. Bieliková*: European Commission, Research Executive agency, Brussel, Belgium, September 13-19, 2015
- *M. Kompan*: Recommender Systems 2015, Technische Universität Wien, Austria, September 16-20, 2015
- *V. Rozinajová*: Tagung Big Data 2015, Wien, Austria, September 22, 2015
- *M. Bieliková, M. Barla, M. Lucká, V. Rozinajová, O. Kaššák, M. Šajgalík, M. Lóderer, P. Vrablecová, P. Laurinec*: Data a znalosti 2015, Prague, Czech Republic, September 30 - October 2, 2015
- *M. Bieliková, J. Tvarožek, M. Šimko*: USI, Faculty of Informatics, Lugano, Switzerland, October 8-10, 2015
- *Ľ. Molnár*: UNESCO, France, Oct. 11-14, 2015
- *M. Bieliková, P. Návrat*: ECSS 2015, Technische Universität Wien, Austria, Oct. 12-14, 2015
- *V. Rozinajová, D. Chudá*: GRIFO 2015, Technical University of Ostrava, Czech Republic, October 18-20, 2015
- *V. Vranić*: ICT 2015, Lisabon, Portugal, October 19-22, 2015
- *I. Poláček*: I-Know 2015, Technische Universität Graz, Austria, October 20-22, 2015
- *Ľ. Molnár*: UNESCO, France, Nov. 1-5, 2015
- *M. Bieliková, J. Šimko*: SMAP 2015, University of Trento, Italy, November 4-11, 2015
- *A. Bou Ezzeddine, V. Rozinajová, M. Lucká*: ANALYTICS 2015, Roma, Italy, Nov. 6-12, 2015
- *M. Šajgalík*: ACM ICPC CERC 2015, University of Zagreb, Croatia, November 13-16, 2015

- *M. Bieliková*: 107 JRC Board of Governors Meeting, JRC IET, Amsterdam, Nederland, November 19-20, 2015
- *J. Tvarožek, M. Konôpka*: Eye Movements in Programming 2015, University of Eastern Finland, Joensuu, Finland, November 22-15, 2015
- *P. Návrat, M. Bieliková*: Brno University of Technology, Brno, Czech Republic, November 25, 2015
- *M. Lóderer*: NaBIC 2015, South Africa, November 29 - December 7, 2015
- AOSD-Europe, European Network of Excellence on Aspect-Oriented Software Development (V. Vranić)
- CaSTB, Czech and Slovak Testing Board, a member of ISTQB, International (M. Bieliková)
- Data and Knowledge – Annual Conference, standing Steering Committee (M. Bieliková)
- ECUK, Engineering Council UK (M. Bieliková, P. Návrat)
- ICETA, member of honorary committee (Ľ. Molnár)
- IEEE Computer Intelligence Society (P. Lacko)
- IEEE Computer Society (M. Bieliková, M. Labaj, P. Návrat, V. Vranić)
- IEEE, Institute of Electrical and Electronic Engineers (M. Bieliková, M. Labaj, P. Lacko, Ľ. Molnár, P. Návrat, V. Vranić)
- IET, Institution of Engineering and Technology (M. Bieliková, P. Návrat)
- IFIP, International Federation for Data Processing (M. Bieliková, P. Návrat, V. Rozinajová)
- ISWE, International Society for Web Engineering (M. Bieliková)
- JCKBSE, Joint Conference on Knowledge-Based Software Engineering Series, standing Steering Committee (P. Návrat)
- SMAP – International Workshop on Semantic Media Adaptation and Personalization, standing Steering Committee (M. Bieliková)
- UNESCO (Ľ. Molnár)
- Znalosti Conference Series, standing Steering Committee (P. Návrat)

## XI. Membership

### Slovak Professional Organisations and Societies

- Accreditation Commission of Slovakia (M. Bieliková)
- Gratex IT Institute (I. Polášek)
- Slovak Artificial Intelligence Association (M. Bieliková, P. Návrat)
- Slovak Association of Mathematicians and Physicists (M. Lucká, P. Návrat)
- Slovak Centre of the IET (M. Bieliková)
- Slovak Commission for UNESCO (Ľ. Molnár)
- Slovak Society for Computer Science (M. Barla, M. Bieliková, D. Chudá, M. Kompan, T. Kramár, E. Kuric, M. Labaj, M. Lekavý, M. Lucká, P. Mederly, Ľ. Molnár, P. Návrat, K. Rástočný, V. Rozinajová, J. Šimko, M. Šimko, V. Vranić, D. Zeleník)
- Slovakia Chapter of the Association for Computing Machinery (M. Bieliková, D. Chudá, A. Kovárová, M. Labaj, P. Lacko, M. Lucká, P. Návrat, K. Rástočný, V. Rozinajová, M. Šimko)
- Technical Standardization Committee (Ľ. Molnár)
- Working group of the Accreditation Commission of Slovakia for Information Sciences and Technologies (M. Bieliková, Ľ. Molnár)

### International Professional Organisations and Societies

- ACM SIGHPC, Special Interest Group on High Performance Computing (P. Lacko)
- ACM SIGWEB, Special Interest Group on Hypertext the Web (M. Bieliková)
- ACM, Association for Computing Machinery (M. Bieliková, D. Chudá, A. Kovárová, M. Kompan, M. Konôpka, M. Labaj, P. Lacko, Ľ. Molnár, P. Návrat, K. Rástočný, V. Rozinajová, M. Šimko)
- ADBIS, Advances in Databases and Information Systems Conference Series, standing Steering Committee (P. Návrat)

## XII. Other Activities

- *ACM SPY 2015* – Czech ACM Chapter & Slovak ACM Chapter Student Project of the Year competition, M. Bieliková: member of reviewers board [www.acm-spy.sk](http://www.acm-spy.sk), [www.acm-spy.cz](http://www.acm-spy.cz)
- *ACM International Collegiate Programming Contest 2015* – Slovak University of Technology Contest – A. Považanová: event organiser <http://www.fiit.stuba.sk/acm/>
- *FIITApixel* – photography competition – J. Lang: director, <http://foto.fiit.stuba.sk>
- *GraFIIT Foundation* – book edition support – I. Polášek, P. Návrat: organisers
- *IIT.SRC 2015* – Informatics and Information Technologies Student Research Conference, April 23, 2015 – M. Bieliková: programme committee chair, M. Barla, A. Bou Ezzeddine, D. Chudá, M. Kompan, G. Kosková, A. Kovárová, P. Lacko, M. Laclavík, J. Lang, M. Lekavý, M. Lucká, Ľ. Molnár, P. Návrat, I. Polášek,



- V. Rozinajová, P. Šaloun, M. Šimko, J. Šimko, J. Tvarožek, V. Vranić: members of programme committee, <http://www.fiit.stuba.sk/iit-src/>
- *TP Cup 2015* student competition – M. Bieliková: event organiser <http://www.fiit.stuba.sk/tp-cup/>
  - User Modelling and User Adapted Interaction – M. Bieliková: member of the editorial board
  - Journal of Web Engineering – M. Bieliková: member of the editorial board
  - Information Sciences and Technologies Bulletin of the ACM Slovakia – P. Návrat: Editor-in-Chief, M. Bieliková: Associate Editor-in-Chief
  - Informatica, An International Journal of Computing and Informatics – P. Návrat: member of the editorial board
  - Computing and Informatics – P. Návrat: associate editor
  - Personalized Web (PeWe) Group seminar organization – M. Bieliková: group coordinator; <http://www.fiit.stuba.sk/research/pewe/>
  - *ProFIIT 2015* – secondary school programming competition – A. Považanová: event organiser, <http://www.fiit.stuba.sk/profiit>
  - *RoboCup at FIIT 2015* – Soccer Simulation League, Regional Tournament in Bratislava – I. Kapustík and M. Lekavý: event organisers <http://www.fiit.stuba.sk/robocup/>
  - *ABIS 2015* – 21<sup>st</sup> International Workshop on Adaptivity and User Modeling, September 6-9, 2015, Stuttgart, Germany – M. Bieliková: member of programme committee
  - *ACIIDS 2015* – 7<sup>th</sup> Asian Conference on Intelligent Information and Database Systems, March 23-25, 2015, Bali, Indonesia – M. Bieliková: member of programme committee
  - *ADBIS 2015* – 19<sup>th</sup> East-European Conference on Advances in Databases and Information Systems, September 8-11, 2015, Poitiers, France – P. Návrat: member of steering committee, P. Návrat, V. Rozinajová: member of programme committee
  - *ADVANS D* – Advanced Software Development Research Group seminar organization – V. Vranić, group coordinator
  - *BCI 2015* – 7<sup>th</sup> Balkan Conference in Informatics, September 2-4, 2015, Craiova, Romania – M. Bieliková: member of prog. committee
  - *BIS 2015* – 18<sup>th</sup> International Conference on Business Information Systems, June 24-26, 2015, Poznań, Poland – M. Bieliková: member of programme committee
  - *CompSysTech'15* – International Conference on Computer Systems and Technologies, June 25-26, 2015, Dublin, Ireland – P. Návrat: member of programme committee
  - *DATA a ZNALOSTI 2015* – Annual Conference on Data and Knowledge, September 1-2, 2015, Prague, Czech Republic – M. Bieliková: member of programme committee
  - *DSAA 2015* – International Conference on Data Science and Advanced Analytics, October 19-21, 2015, Paris, France, – M. Bieliková: member of programme committee
  - *ECBS-EERC 2015* – 4<sup>th</sup> Eastern European Regional Conference on the Engineering of Computer Based Systems, August 27-28, 2015, Brno, Czech Republic – V. Vranić: program co-chair, member of steering committee, J. Lang, I. Polášek: members of programme committee
  - *E-LEARNING 2015* – International Conference on e-Learning, September 11-12, 2015, Berlín, D. Chudá, P. Návrat, J. Tvarožek: members of programme committee
  - *ENIC 2015* – The Second European Network Intelligence Conference, September 21-22, 2015, Karlskrona, Sweden – M. Bieliková: member of programme committee
  - *HT 2015* – 26<sup>th</sup> ACM Conference on Hypertext and Social Media, Middle East Technical University Northern Cyprus Campus, September 2-4, 2015, Cyprus – M. Bieliková: member of programme committee
  - *ICALT 2015* – 15<sup>th</sup> IEEE International Conference on Advanced Learning Technologies, Track: Recommender Systems for Learning, July 6-9, 2015, Hualien, Taiwan – M. Bieliková: member of programme committee
  - *ICCCI 2015* – 7<sup>th</sup> International Conference on Collective Intelligence Technologies and Applications, September 21-23, 2015, Madrid, Spain – M. Bieliková: member of programme committee
  - *ICETA 2015* – 13<sup>th</sup> International Conference on Emerging e-learning Technologies and Applications, November 26-27, 2015, Starý Smokovec, Slovakia – M. Bieliková: member of programme committee, Ľ. Molnár: member of honorary committee
  - *ICSLE 2015* – 2<sup>nd</sup> International Conference on Smart Learning Environments, September 23-25, 2015, Sinaia, Romania – M. Bieliková: member of programme committee
  - *ICWE 2015* – 15<sup>th</sup> International Conference on Web Engineering, June 22-26, 2015, Rotterdam, The Netherlands – M. Bieliková: member of programme committee

- *IDA 2015* – 14<sup>th</sup> International Symposium on Intelligent Data Analysis, October 22-24, 2015, Saint-Etienne, France – M. Bieliková: member of programme committee
- *IKC 2015* – 1<sup>st</sup> International KEYSTONE Conference, September 8-9, 2015, Coimbra Portugal – M. Bieliková: member of prog. committee
- *ISMIS 2015* – 22<sup>nd</sup> International Symposium on Methodologies for Intelligent Systems, October 21-23, 2015, Lyon, France – M. Bieliková: member of programme committee
- *ITAT 2015* – 15<sup>th</sup> Workshop on Information Technologies - Applications and Theory, September 17-21, 2015, Čingov, Slovakia – M. Bieliková, D. Chudá: member of programme committee
- *JCDL 2015* – Joint Conference on Digital Libraries, Knoxville, June 21-25, 2015, Tennessee, USA – M. Bieliková: member of programme committee
- *KDWEB 2015* – 1<sup>st</sup> International Workshop on Knowledge Discovery on the Web, September 3-5, 2015, Cagliari, Italy – M. Bieliková: member of programme committee
- *PALE@UMAP 2015* – 5<sup>th</sup> International Workshop on Personalization Approaches in Learning Environments (UMAP 2015), June 30, 2015, Dublin, Ireland – M. Bieliková: co-chair
- *PRASAE@ICSLE 2015* – 2<sup>nd</sup> International Workshop on Peer Review, Peer Assessment, and Self Assessment in Education (ICSLE 2015), September 23-25, 2015, Sinaia, Romania – M. Šimko: member of programme committee
- *RecSys 2015* – 9<sup>th</sup> ACM Conference on Recommender Systems, September 16-20, 2015, Vienna, Austria – M. Bieliková: member of programme committee
- *SCLIT 2015* – 5<sup>th</sup> Symposium on Computer Languages, Implementations and Tools, September 23-29, 2016, Rhodes, Greece – V. Vranić: member of programme committee
- *SQAMIA 2015* – 4<sup>th</sup> Workshop on Software Quality Analysis, Monitoring, Improvement, and Applications, June, 8-10, 2015, Maribor, Slovenia – V. Vranić: member of programme committee
- *SMAP 2015* – 10<sup>th</sup> Int. Workshop on Semantic and Social Media Adaptation and Personalization, November 5-6, 2015, Trento, Italy – M. Bieliková: member of steering committee; M. Šimko, J. Šimko: members of programme committee
- *TPDL 2015* – 19<sup>th</sup> International Conference on Theory and Practice of Digital Libraries, September 14-18, 2015, Poznań, Poland – M. Bieliková: member of programme committee
- *UMAP 2015* – 23<sup>rd</sup> Conference on User Modelling, Adaptation and Personalization, Trinity College Dublin, June 29 - July 3, 2015, Dublin, Ireland – M. Bieliková: member of programme committee
- *WIKT 2015* – 10<sup>th</sup> Workshop on Intelligent and Knowledge oriented Technologies, November 12-13, 2015, Košice, Slovakia – M. Bieliková, D. Chudá, P. Návrat, V. Rozinajová: members of programme committee

# INSTITUTE OF COMPUTER SYSTEMS AND NETWORKS

<http://www.upss.fiit.stuba.sk/>

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## Director of the Institute

**Katarína Jelemenská, PhD.**

e-mail: [katarina.jelemenska@stuba.sk](mailto:katarina.jelemenska@stuba.sk)

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## Deputy Director:

**Elena Gramatová, Assoc. Professor**

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**Tomáš Kováčik, PhD.**

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**Secretary of the Institute:** Tatiana Šípková

Tel: +421 2 210 22 506

## I. General Information

The Institute of Computer Systems and Networks offers undergraduate and graduate study programmes covering a broad range of courses in Computer Engineering. Our courses are built on sound theoretical fundamentals and are oriented towards developing independent creative thinking and ability to design solutions or to solve complex problems in the field of engineering expertise.

These courses cover basics and principles of mathematics, physics, basics of computing and programming, and concentrate mostly on the following domains: computer architecture, distributed systems and computer networks, design of digital systems, embedded systems.

The institute is responsible for education in the accredited degree programmes at two levels of university education:

- Computer and Communication Systems and Networks (bachelor degree),
- Computer and Communication Systems and Networks (master degree).

The institute has been active and successful in research and reflects in research the current development of computer engineering in the world. The dominant research interests of the institute include:

- design of digital systems and embedded systems, computer networks,

- creation of a novel effective formal specification tools, identification and implementation of automated engineering tasks in the area of HW/SW co-design of the mobile computing systems,
- development of new algorithms and methodology for providing reliability and fault tolerance,
- development of new approaches and methods for security enforcement in distributed systems, and
- elaboration of new methodology for VLSI system design and testing at the functional level that is applicable for integrating into ASIC and PLD design.

## II. Staff

### Administrative Department

Tatiana Šípková

### Teaching Staff

Pavel Čičák, Professor

Barbara Drnajová

Elena Gramatová, Assoc. Professor

Ján Hudec, PhD.

Katarína Jelemenská, PhD.

Margaréta Kotočová, Assoc. Professor (part time)

Ivan Kotuliak, Assoc. Professor

Tomáš Kováčik, PhD.

Tibor Krajčovič, Assoc. Professor

Štefan Krištofík, PhD. (part time, since Sept. 2015)

Dominik Macko, PhD.

Peter Pišteň, PhD.

Peter Trúchly, PhD.

#### Researchers

Dušan Bernát

Pavol Helebrandt (since September 2015)

#### External Lecturers

Martin Čechvala

Jakub Obetko

Matúš Turcsány, PhD. (till April 2015)

#### Other Staff

Jana Flochová, PhD. (part time)

#### Full time PhD Students

Ján Balažia, Rastislav Bencel, Andrej Binder, Roman Broniš, Maroš Ďuriček, Tomáš Halagan, Pavol Helebrandt, Ivana Hucková, Štefan Krištofík, František Kudlačák, Ján Lúčanský, Dominik Macko, Ján Murányi, Martin Nagy, Ondrej Perešíni, Richard Roštecký, Miroslav Siebert, Juraj Šubín, Viktor Šulák, Martin Vojtko

### III. TEACHING

#### III.1 Undergraduate Study (Bc.)

Course (Lecturer - semester, credits)

▪ <b>Computer Engineering Principles</b>	Autumn, 6
K. Jelemenská	
▪ <b>Computer Application Design</b>	Spring, 6
P. Čičák	
▪ <b>Computers Architectures</b>	Spring, 6
T. Krajčovič	
▪ <b>Computer and Communication Networks</b>	Autumn, Spring, 6
I. Kotuliak	
▪ <b>Final Bachelor Project I-II</b>	Autumn, Spring, 3-9
P. Čičák	
▪ <b>Introduction to Computer Systems</b>	Spring, 6
T. Kováčik	
▪ <b>Machine Level Programming</b>	Spring, 6
P. Čičák	
▪ <b>Microcomputers</b>	Spring, 7
T. Krajčovič	
▪ <b>Switching and routing in IP networks</b>	Autumn, 6
J. Obetko	
▪ <b>WAN Technologies</b>	Spring, 6
M. Čechvala	
▪ <b>Diagnostics of Digital Systems</b>	Autumn, Spring, 6
E. Gramatová	
▪ <b>English language</b>	Autumn, 2
B. Drnajová	

#### III.2 Master Study (Ing.)

Course (Lecturer - semester, credits)

▪ <b>Architecture of Communication Systems</b>	Autumn, 6
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I. Kotuliak

- **Architectures of Mobile Networks** Spring, 6
- M. Turcsány
- **Digital Systems Design** Autumn, Spring, 6
- K. Jelemenská
- **Diploma Project I-III (Computer and Communication Systems and Networks)** Autumn, Spring, 8-12-20
- P. Čičák
- **NGN Networks, Services and Protocols** Spring, 6
- I. Kotuliak
- **Satellite Systems** Spring, 6
- P. Trúchly
- **Team Project I-II (Computer and Communication Systems and Networks)** Autumn, Spring, 5
- J. Hudec

### IV. Theses

#### IV.1 Bachelor (Bc.) Theses

Study Programme Computer and Communication Systems and Networks

- *Baňas, M.:* Information System for Public Transport. (P. Pišteň)
- *Csaplár, M.:* Hardware Compressor. (M. Ďuriček)
- *Čarnoký, M.:* Reservation System for Coach Transportation. (P. Pišteň)
- *Demko, M.:* Extension of Therapeutic System LeapKin. (M. Nagy)
- *Dobaj, M.:* Test Subsystem of Development Kit EMP386EX. (T. Krajčovič)
- *Doubravský, L.:* Testing Subsystem for Development kit PXA255. (T. Krajčovič)
- *Dubovský, M.:* Information Portal for HbbTV. (R. Broniš)
- *Gono, O.:* Multimedia System for Public Train Transportation. (P. Pišteň)
- *Hermánek, T.:* Virtualization in IP Networks. (T. Halagan)
- *Hudec, M.:* Information System for Public Transport. (P. Pišteň)
- *Chalachán, J.:* Generator fault maps of RAM. (Š. Krištofík)
- *Kaplán, L.:* SDN Topology Virtualization. (T. Halagan)
- *Kleščinec, L.:* Virtualization in IP Networks. (T. Halagan)
- *Klimo, M.:* Automatic Generation of Functional Tests for Processors. (J. Hudec)
- *Kopšo, R.:* Application for Smart TV Platform. (P. Trúchly)

- *Košťál, K.*: Testing Subsystem of Development Kit Based on PXA255. (T. Krajčovič)
- *Krajča, P.*: Hardware Compressor. (M. Ďuríček)
- *Krkoš, T.*: Hardware Task Scheduler. (M. Vojtko)
- *Macho, P.*: Design Special Features of Network Adapter in a PLD. (J. Hudec)
- *Matejka, D.*: Virtualization in IP Networks. (T. Halagan)
- *Matuš, J.*: Human Motion Detection in Video Stream. (P. Malík)
- *Mikuška, T.*: Virtualization in IP Networks. (T. Halagan)
- *Mtier, R.*: Porting Appropriate Operating System on Single Board Computer. (M. Šimlašík)
- *Palatinus, M.*: Extension of SDN Platform Available at FIIT STU. (M. Nagy)
- *Pernecký, P.*: Reduction of Binary Decision Diagrams. (P. Pištek)
- *Radványi, P.*: Application Development for Embedded Systems Using the Platform Qt. (M. Šimlašík)
- *Rusnák, Z.*: Control System of Automatic Mapping Platform. (F. Kudlačák)
- *Rychvalský, T.*: Simulator of Advanced Repair Analysis Algorithm for Embedded Memories. (Š. Krištofík)
- *Szakszová, K.*: Fault Map Generator for RAMs. (Š. Krištofík)
- *Trabelssie, H.*: Security of Domain Name System. (P. Trúchly)
- *Tuleja, M.*: Communication Module for SDN Controller. (P. Helebrandt)
- *Burda, K.*: Port Control Protocol in Software Defined Networks. (M. Nagy)
- *Čerňan, T.*: Visualization of Communication in GPRS / UMTS Networks. (U. Kováč)
- *Danielovič, L.*: Coexistence of IPv4 and IPv6 in a Computer Network. (P. Trúchly)
- *Dukát, M.*: Identification of the Geographical Location of Devices in Mobile Networks. (P. Trúchly)
- *Kohútka, L.*: Hardware Acceleration of Operating Systems. (M. Vojtko)
- *Koren, J.*: Server Application for Collecting and Processing Data from the Wireless System. (V. Stopjaková)
- *Lúčanský, J.*: Optimization of Multiplexer Trees. (P. Pištek)
- *Mikuš, M.*: Interactive Tourist Map. (I. Kotuliak)
- *Močkoř, A.*: Optimizing Multimedia Sessions Using SIP Single Port Approach. (J. Murányi)
- *Onder, J.*: Hybrid Television Application. (T. Kováčik)
- *Pivarník, M.*: SDN Controller Communication Protocol Design. (I. Kotuliak)
- *Polák, M.*: Multimedia Systems for Taxi Services. (P. Pištek)
- *Pôbiš, A.*: Interactive Tourist Map - Mobile Application. (I. Kotuliak)
- *Škriečka, T.*: Multimedia Application for Funtoro Embedded System. (P. Pištek)
- *Tamaškovič, D.*: GPRS Base Transceiver Station Emulator. (M. Nagy)
- *Tkáč, T.*: Survey of Covert Channel via DNS Cache. (D. Bernát)
- *Trávníček, T.*: Mobile Application for Processing and Visualization of Data in Intelligent Home Systems. (V. Stopjaková)
- *Urbán, D.*: Television Content Management. (T. Kováčik)

#### Study Programme Informatics

- *Kucharíková, Z.*: Mobile Application for Monitoring Athletes and Patients. (T. Kováčik)
- *Löffler, M.*: Virtualization Using Yang Modeling Language. (T. Halagan)
- *Marták, L.*: Distributed Simulations of Communication Networks. (D. Bernát)
- *Moravčíková, Z.*: The Extension of the Therapeutic System Leapkin. (M. Nagy)
- *Sanyová, M.*: Social Navigation - New Functions. (T. Kováčik)

#### IV.2 Master (Ing.) Theses

##### Study Programme Computer and Communication Systems and Networks

- *Babják, M.*: GPRS Modem Emulator. (M. Nagy)
- *Baláz, J.*: SDN Controller Extension. (P. Helebrandt)
- *Boros, T.*: Content Delivery Network Design and Implementation over SDN. (I. Kotuliak)

#### IV.3 Doctoral (PhD.) Theses

- *Siebert, M.*: Methods of Critical Paths Delay Faults Testing in Digital Systems. (E. Gramatová, Applied Informatics, August 21, 2015)
- *Krištofík, Š.*: A Contribution towards Architectures and Algorithms for Self Repair of Rams. (E. Gramatová, Applied Informatics, August 21, 2015)
- *Macko, D.*: Contribution to System-level Design and Verification of Low-power Digital Systems. (P. Čičák, Applied Informatics, August 21, 2015)

- *Murány, J.:* Optimization of Multimedia Flows in Multipath Networks. (I. Kotuliak, Applied Informatics, September 24, 2015)
- *Broniš, R.:* Data Delivery in HBB-Next Architecture. (I. Kotuliak, Applied Informatics, September 24, 2015)

## V. IIT.SRC

### Full papers

- *Rusnák, Z.:* Autonomous Mapping Platform. (F. Kudlačák)
- *Baláž, J.:* Host Discovery and Monitoring in SDN. (P. Helebrandt)
- *Burda, K.:* Port Control Protocol in Software-defined Mobile Networks. (M. Nagy)
- *Kohútka, L.:* Hardware Task Scheduling in Real-time Systems. (M. Vojtko)
- *Lúčanský, J.:* Optimization of Decision Diagrams. (P. Pištek)
- *Valiček, M.:* Real-time Performance Comparison of FreeRTOS and User-written Scheduler on Low-end Microcontrollers. (T. Krajčovič)
- *Kudlačák, F.:* Adaptive Tuning Method for PID Controller. (T. Krajčovič)
- *Demko, M.:* Extension of Therapeutic System LeapKin. (M. Nagy)
- *Perešíni, O.:* Experimental Embedded System for Intelligent Actuators Control through the Internet. (T. Krajčovič)

### Extended abstracts

- *Čarnoký, M.:* Reservation System for Coach Transportation. (P. Pištek)
- *Gono, O.:* Multimedia System for Public Train Transportation. (P. Pištek)
- *Hudec, M. – Baňas, M.:* Information System for Public Transportation. (P. Pištek)
- *Kopšo, R.:* Integration of Smart Technologies to Support Fitness Activities. (P. Trúchly)
- *Kucharíková, Z.:* Mobile Application for Monitoring Athletes and Patients. (T. Kováčik)
- *Onder, J. – Trávníček, T.:* Retsys - Realtime Tracking System. (P. Pištek)
- *Polák, M.:* Multimedia Systems for Taxi Services. (P. Pištek)
- *Škriečka, T.:* Multimedia Application for Funto-ro Embedded System. (P. Pištek)
- *Urbán, D.:* Television Content Management. (T. Kováčik)

### TP CUP Competition

- *Dluhý, J. – Ferenczy, L. – Krajčovič, M. – Petřík, T. – Valiček, M.:* Vehicle Tracking System for Cargo Transportation. (P. Pištek)

- *Habovštiak, M. – Matejov, E. – Morvay, T. – Prágai, A. – Protuš, P. – Siro, M. – Trybulová, N.:* DriVR - Vehicle Controlled with Help of Virtual Reality Head-mounted Display. (R. Broniš)

## VI. Research Laboratories

### Networks Technology Laboratory I (P. Trúchly)

The research and teaching laboratory is used in practical lessons within several network courses, as well as for networking courses of Cisco Networking Academy, established at our faculty. The students are involved in design, implementation, and verification of applications for computer networks. They are trained to install, configure and operate local and wide-area networks. The laboratory is also used by the Instructor Training Centre which is a part of Cisco Networking Academy. The available hardware equipment helps students and other staff in their research during practical experiments while working on research projects, bachelor, master, or doctoral thesis. Laboratories are equipped with several network interconnecting devices, like switches and routers. All devices are originated mainly in Cisco company.

### Networks Technology Laboratory II (P. Trúchly)

This research and teaching laboratory is dedicated to teaching WAN technologies to undergraduates, communication services and networks and network security to graduates in the study programme Computer and communication systems and networks. Students gain and prove their practical and theoretical skills. The skills are developed that enable students to design, implement, and troubleshoot scalable local and wide-area networks, create and deploy a global intranet, using routers and switches for multiprotocol client hosts and services. Students are also involved in design, implementation and verification of applications for computer networks and parallel processing. For teaching and testing wireless communication the laboratory is equipped with wire-less access points, wireless network cards are available and necessary software tools.

### Embedded Systems Laboratory (T. Krajčovič)

The laboratory is focused on the embedded system research. It is equipped with all necessary equipment for design, implementation and testing of applications for embedded systems based on modern microprocessors, one-chip microcomputers and softcore processors, including real-time applications. It contains specialized equipment, such as development kits based on monolithic mi-

croprocessors and one-chip microcomputers with RISC and CISC architectures, FPGA and CPLD development kits, logical analyzers, in-circuit and JTAG emulators, digital oscilloscopes and other development tools. The latest specialized equipment has been obtained withing the University Scientific Park project.

#### **Digital Systems Design Laboratory (K. Jelemenská)**

The research and teaching laboratory is predefined for teaching digital system description to undergraduates and digital systems design, testing, diagnostics and reliability and reconfigurable digital systems to graduates in the study programme Computer and Communication systems and networks. Students are to prove their practical and theoretical skills. They are involved in design, description, implementation and verification of small to medium digital systems. Laboratory is equipped with Internet connected computers, RC10 FPGA boards and necessary software tools to gain practical skills in the area of digital systems design – FPGA Advantage.

#### **Communication Technologies Laboratory (I. Kotuliak)**

The research laboratory is intended for perspective research topics in the area of communication networks. These topics cover network routing controlled by software (Software Defined Networking – SDN) that is applied to both fixed and mobile networks, to be more specific. In the area of wireless networks we are engaged in decreasing energy consumption during communications to utilise batteries more effectively. Important research topics are also associated with a delivery of multimedia applications to users. So called Content Delivery Networks (CDN) are raising more and more attention in coming years. The specialized laboratory equipment has been procured in the frame of the University Scientific Park project.

#### **FIIT – Molpir, Ltd. Laboratory (P. Pištek)**

The main purpose of the laboratory is research of multimedia applications oriented towards transport. The research is dedicated to the possibility of applying IT in transport and their usefulness and application in practice. Research is conducted using the specialized equipment specially developed for use in cars, buses, trains etc. The aim is to develop the novel applications aimed at leveraging existing hardware that will bring the user new functionality in the specific domain. Technologies such as GPS, ultrasonic sensor, touch

screens, dedicated servers for transport etc. are currently available in the lab. With these technologies it is possible to work using various operating systems (FreeBSD, Windows 6.0, Windows XP Embedded, Android 1.5, Android 2.3, Android 4.0). The aim is to create useful applications for passengers, drivers, or owners of means of transport. The laboratory was established as a result of cooperation with Molpir, Ltd. It is also opened to students working on research projects, bachelor, master thesis, and team projects.

#### **Forming the Future of Finance with IT (FFF IT) Laboratory (T. Kováčik)**

The laboratory was established as a result of cooperation with CAPCO enterprise. The main vision of the cooperation is to provide students with the possibility to carry out research in a motivating modern environment and to get an experience with the financial sector challenges. However, the research of banking and finance improvement by means of IT is not the only area. The projects related to computer networks, intelligent households, mobile applications and networks are researched here. The provided IT equipment is also available to students working on research projects, bachelor, master thesis, and team projects.

## **VII. Research Projects**

#### **Design Optimization of Low-power Digital and Mixed Integrated Systems (VEGA 1/1008/12)**

(K. Jelemenská), Duration: 2012 –2015

The project is focused on basic research and technologies in low-power digital and mixed system design methods and algorithms optimized for low-power electronic device applications. The power supply consumption is important parameter in nowadays battery-operated mobile electronic devices. This aspect has to be taken into account during the whole design process, in using design for testability and reliability techniques as well. The main project target is to develop methods, techniques and algorithms for top-down design of digital and mixed circuits integrated into a single chip using accessible CMOS technologies while focusing on the low-power parameter.

#### **Methods for the Design and Verification of Digital Systems with Low Power Consumption Using Formal Specification Languages (VEGA 1/0616/14)**

(P. Čičák), Duration: 2014 –2016

The project is focused on the basic research in the field of modeling, design and verification of digital

systems with low power consumption using high-level formal specification languages. At present, digital systems modeling and verification at a higher level of abstraction is still one of the important objects of basic research because of the complexity and difficulty of the design at the structural level. The project aims at developing new methods and algorithms for modeling, design and verification of digital systems at the system level based on specification language (e.g. HSSL), or other means of modeling, taking into account the requirement of low power system. Expected outputs are new approaches, methods and algorithms for digital systems design and verification at higher abstraction levels supporting reductions in system consumption and supplemented by design transformation procedures to established lower-level design platforms (VHDL, Verilog, SystemVerilog etc.).

#### **Verification and Reliability of dDigital System**

**Design (SK-CZ-2013-0173)** (E. Gramatová), Duration: 2014-2015

The project is aimed at basic research in the field of design and verification techniques and algorithms for digital systems on chip, or embedded systems, taking into account system testability and dependability and use of FPGA (Field Programmable Gate Array) technologies. The project objective is to establish a new scientific and technological cooperation and its expected scientific contribution will be dependable architectures of digital systems implemented into FPGA circuits. Consequence of the project outcomes will be logistic and economic benefits of FPGAs for critical applications to guarantee higher operational reliability.

#### **Manufacturable and Dependable Multicore Architectures at Nanoscale (COST Action IC 1103)**

(E. Gramatová), Duration: 2013-2015

The project topics can be divided into the next fields:

- Design: tasks oriented to low-power design techniques for digital circuits and hazard-free asynchronous circuits design.
- Testing: development of new techniques and architectures for built-in self-testing and self-repairing RAMs with redundant memory locations for increasing memory manufacturing yields.
- Verification: analysis of different techniques and approaches, languages for formal verification of digital systems design.

**DriVR (2014et005)** (R. Broniš), Duration: 2015

Project DriVR (Driving in Virtual Reality) is focused on control of vehicle with help of virtual reality head-mounted display. Different solutions and techniques will be analysed to design and implement model of vehicle. Analysis will consist mainly of study of model movement, wireless transfer of control and video data, and video processing on PC to a form suitable for virtual reality head-mounted display.

**Lok-me-IN - Audio Navigation in Shopping Centre (2014et014)** (T. Kováčik), Duration: 2015

The aim of the project is proposal and realization of a system, which consists of transmitter (building speakers system), communication channel and receiver (mobile application of chosen platform). The receiver using sound signals transmitted from speakers of a building shows its location in a map of the building. Thus the user's orientation in a shopping mall is eased and later it can be used e.g. for finding a shop the user is looking for. Proposed solution enables easy localization inside of buildings which is often impossible using other technologies.

## **VIII. Publications**

### **VIII.1 Journals**

- [1] HUDEC, J. - GRAMATOVÁ, E.: An Efficient Functional Test Generation Method for Processors Using Genetic Algorithms. In: *Journal of Electrical Engineering*. Vol. 66, No. 4 (2015), ISSN 1335-3632. pp. 185-193.

### **VIII.2 Conference Proceedings**

- [1] BERNÁT, D. - ČIČÁK, P.: Quantitative Analysis of the Internet Topology Model. In: *ECBS-EERC 2015*. 2015 IEEE Fourth Eastern European Regional Conference on the Engineering of Computer Based Systems. Brno, Czech Republic. Los Alamitos : IEEE, 2015, pp. 51-58.
- [2] BINDER, A. - BOROŠ, T. - KOTULIAK, I.: A SDN Based Method of TCP Connection Handover. In: *Information and Communication Technology*. Third IFIP TC 5/8 Int. Conference, ICT-EurAsia 2015, and 9<sup>th</sup> IFIP WG 8.9 Working Conference, CONFENIS 2015, Held as Part of WCC 2015. Daejeon, Korea, Cham : Springer, 2015, pp. 13-19.
- [3] BRONIŠ, R. - KOTULIAK, I. - KOVÁČIK, T. - TRÚCHLY, P. - BINDER, A.: IP Data Delivery in HBB-next Network Architecture. In: *Information and Communication Technology*. Third



- IFIP TC 5/8 Int. Conference, ICT-EurAsia 2015, and 9<sup>th</sup> IFIP WG 8.9 Working Conf., CONFENIS 2015, Held as Part of WCC 2015. Daejeon, Korea, Cham : Springer, 2015, pp. 20-29.
- [4] BURDA, K. - NAGY, M. - KOTULIAK, I.: Reducing Keepalive Traffic in Software-defined Mobile Networks with Port Control Protocol. In: *Information and Communication Technology*. Third IFIP TC 5/8 Int. Conference, ICT-EurAsia 2015, and 9<sup>th</sup> IFIP WG 8.9 Working Conference, CONFENIS 2015, Held as Part of WCC 2015. Daejeon, Korea, Cham : Springer, 2015, pp. 3-12.
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- [6] HALAGAN, T. - KOVÁČIK, T. - TRÚCHLY, P. - BINDER, A.: Syn Flood Attack Detection and Type Distinguishing Mechanism Based on Counting Bloom Filter. In: *Information and Communication Technology*. Third IFIP TC 5/8 Int. Conference, ICT-EurAsia 2015, and 9<sup>th</sup> IFIP WG 8.9 Working Conference, CONFENIS 2015, Held as Part of WCC 2015. Daejeon, Korea, Cham : Springer, 2015, pp. 30-39.
- [7] HUCKOVÁ, I. - HRUBÝ, M.: QoS-Based Optimization of Data Flow in MPLS Networks. In: *SAMI 2015*. IEEE 13<sup>th</sup> International Symposium on Applied Machine Intelligence and Informatics. Herľany, Slovakia : IEEE, 2015, pp. 83-88.
- [8] HUDEC, J. - GRAMATOVÁ, E.: A New Adaptive System for Software-based Test Generation of Processors. In: *Cost Action IC1103 MEDIAN 2015*, part of design, automation and test in Europe. Workshop proceedings. Grenoble, France. COST, 2015, pp. 9-12.
- [9] HUDEC, J.: An Efficient Adaptive Method of Software-Based Self Test Generation for RISC Processors. In: *ECBS-EERC 2015*. 2015 IEEE Fourth Eastern European Regional Conference on the Engineering of Computer Based Systems. Brno, Czech Republic. Los Alamitos : IEEE, 2015, pp. 119-121.
- [10] JELEMENSKÁ, K. - Kardoš, M. - ČIČÁK, P.: HSSL Specification High-level Synthesis. In: *ICETA 2015*. IEEE 13<sup>th</sup> International Conference on Emerging eLearning Technologies and Applications. Starý Smokovec, Slovakia. Piscataway : IEEE, 2015, pp. 171-176.
- [11] KAPLÁN, L. - HALAGAN, T.: Development Sketch-based Tool for Creation and Scaling of Virtualized SDN Infrastructure. In: *ICETA 2015*. IEEE 13<sup>th</sup> International Conference on Emerging eLearning Technologies and Applications. Starý Smokovec, Slovakia. Piscataway : IEEE, 2015, pp. 189-194.
- [12] KOBZA, L. - VOJTKO, M. - KRAJČOVIČ, T.: Migration of a Modular Operating System to a Intel Atom Processor. In: *ECBS-EERC 2015*. 2015 IEEE Fourth Eastern European Regional Conference on the Engineering of Computer Based Systems. Brno, Czech Republic. Los Alamitos : IEEE, 2015, pp. 144-145.
- [13] KOHÚTKA, L. - VOJTKO, M. - KRAJČOVIČ, T.: Hardware Accelerated Scheduling in Real-time Systems. In: *ECBS-EERC 2015*. 2015 IEEE Fourth Eastern European Regional Conference on the Engineering of Computer Based Systems. Brno, Czech Republic. Los Alamitos : IEEE, 2015, pp. 142-143.
- [14] KOPŠO, R. - TRUCHLY, P.: Smart multimedia system for fitness activities. In: *Redžúr 2015*, 9<sup>th</sup> International Workshop on Multimedia and Signal Processing, Smolenice, Slovakia, 2015.
- [15] MACKO, D. - JELEMENSKÁ, K. - ČIČÁK, P.: Power-management Specification in SystemC. In: *DDECS 2015*. 2015 IEEE 18<sup>th</sup> International Symposium on Design and Diagnostics of Electronic Circuits and Systems. Belgrade, Serbia. Los Alamitos : IEEE, 2015, pp. 259-262.
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- [21] PEREŠÍNI, O. - KRAJČOVIČ, T.: Internet Controlled Embedded System for Intelligent Sensors and Actuators Operation. In: *Applied electronics 2015*. 20<sup>th</sup> International Conference. Pilsen, Czech Republic. Pilsen : University of West Bohemia, 2015, pp. 185-188.
- [22] SEVERÍNOVÁ, H. - ABAFFY, J. - KRAJČOVIČ, T.: Control-flow Checking Using Binary Encoded Software Signatures. In: *Innovations and Advances in Computing*, Informatics, System Sciences, Networking And Engineering. Cham : Springer, 2015, pp. 345-348.
- [23] SIEBERT, M. - GRAMATOVÁ, E.: Parameterized Critical Path Selection for Delay Fault Testing. In: *DDECS 2015*. 2015 IEEE 18<sup>th</sup> International Symposium on Design and Diagnostics of Electronic Circuits and Systems. Belgrade, Serbia. Los Alamitos : IEEE, 2015, pp. 153-156.
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- [25] ŠUBÍN, J. - KRIŠTOFÍK, Š.: A New System for BIST Architecture Generation for Embedded Memories in SoCs. In: *MEDIAN Finale 2015*. Workshop on Manufacturable and Dependable Multicore Architectures at Nanoscale. Tallinn University of Technology, 2015, p. 2.
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- [29] VOJTKO, M.: Adaptability of Embedded Operating Systems. In: *PESW 2015*. 3<sup>rd</sup> Embedded Systems Workshop. Prague : Czech Technical University, 2015, p. 49.

## IX. Cooperation

### Cooperation in Slovakia

- Institute of Informatics, Slovak Academy of Sciences, Bratislava
- Faculty of Electrical Engineering and Information Technology, Slovak University of Technology in Bratislava
- Faculty of Electrical Engineering and Informatics, Technical University of Košice
- Regional Cisco Networking Academy, Faculty of Electrical Engineering and Informatics, Technical University of Košice
- Faculty of Natural Sciences, Matej Bel University in Banská Bystrica
- Faculty of Management Science and Informatics, University of Žilina
- Faculty of Electrical Engineering, University of Žilina
- Regional Cisco Networking Academy, Faculty of Management Science and Informatics, University of Žilina
- Faculty of Informatics, Paneuropean University, Bratislava
- Abonus Ltd.
- Alcatel Lucent
- Asseco Slovakia
- Capco
- CISCO Systems Slovakia Ltd.
- Datalan
- GTEC Ltd.
- Hewlett-Packard Slovakia Ltd.
- IBM Slovakia Ltd.
- Molpir Ltd.
- R-DAS Ltd.
- Siemens Enterprise Communications Ltd.
- Soitron
- Spinet Ltd.
- Telekom
- Tempest
- MAINDATA, spol. s. r.o.

### International Cooperation

- Faculty of Information Technologies,, Czech Technical University in Prague, Czech Republic
- Faculty of Information Technologies, Brno University of Technology, Czech Republic

- Department of Computer Science and Engineering, Faculty of Applied Science, University of West Bohemia in Pilsen, Czech Republic
- Faculty of Computer Systems and Control, Technical University in Sofia, Bulgaria
- Hochschule für Telekommunikation Leipzig, Germany
- INRIA, Grenoble, France
- Institut Supérieur D'Électronique de Paris, France
- University of Maribor, Maribor, Slovenia
- Heinz Nixdorf Institute, University of Paderborn, Germany
- Microelectronic Systems Institute, TU Darmstadt, Germany
- Fraunhofer Institute for Integrated Circuits, Dresden, Germany
- TNO, Netherlands
- Universidad Carlos III de Madrid, Madrid, Spain
- Rundfunk Berlin-Brandenburg, Germany
- Institut für Rundfunktechnik GmbH, Germany
- NEC Europe Ltd.
- Nederlandse Organisatie voor Toegepaste Natuurwetenschappelijk Onderzoek, Netherlands
- Katholieke Universiteit Leuven, Belgium
- Technische Hochschule Mittelhessen, Germany
- TARA Systems Systementwicklung GmbH, Germany
- Š. Křištofik: Training School Median, Prague, Czech Republic, July 13-16, 2015
- F. Kudlačák: Formula student, Győr, Hungary, August 20-23, 2015
- M. Vojtko, M. Ďuríček, J. Hudec, D. Bernát: ECBS-EERC 2015, Brno, Czech Republic, August 26-28, 2015
- O. Perešíni: Conference Applied Electronics 2015, Pilsner, Czech Republic, September 7-10, 2015
- K. Jelemenská, E. Gramatová, O. Perešíni, J. Šubín: PAD 2015, Zlín, Czech Republic, September 2-4, 2015
- I. Hucková: CECIS 2015, Zagreb, Croatia, September 24-25, 2015
- P. Trúchly: ELMAR 2015, University of Zagreb, Croatia, 26 September – 1 October, 2015
- M. Nagy, A. Binder: WCC 2015, Daejeon, Korea, October 2-11, 2015
- D. Macko: VLSI-SOC 2015, Daejeon, Korea, October 4-8, 2015
- T. Krajčovič, P. Čičák: GRIFO 2015, Ostrava, Czech Republic, October 18-20, 2015
- I. Kotuliak: Helsinki, Finland, Oct. 19-22, 2015
- D. Macko, J. Šubín, Š. Křištofik: MC COST Action, Estonia, November 9-12, 2015
- P. Trúchly: IMCL 2015, Aristotle University of Thessaloniki, Greece, November 18-22, 2015
- P. Čičák: Shanghai, China, Nov. 22-27, 2015
- E. Gramatová: Brandenburgische Technische Universität Cottbus, Germany, November 26-27, 2015
- E. Gramatová: Technical University of Ostrava, Czech Republic, December 7, 2015
- E. Gramatová: ČVUT, Prague, Czech Republic December 14, 2015
- Š. Křištofik: ČVUT, Prague, Czech Republic December 14, 2015
- E. Gramatová: Brno University of Technology, Brno, Czech Republic December 14, 2015
- K. Jelemenská: ČVUT, Prague, Czech Republic, December 16-20, 2015

## X. Visits of Staff Members

- E. Gramatová: FIT VUT, Brno, Czech Republic, January 14, 2015
- E. Gramatová: MEDIAN Workshop 2015, Grenoble, France, March 12-13, 2015
- E. Gramatová: Technical University of Ostrava, Czech Republic, March 23, 2015
- K. Jelemenská, M. Siebert, D. Macko: Conference DDECS 2015, IHP - Leibniz-Institut für innovative Mikroelektronik, Belgrade, Serbia, April 21-24, 2015
- P. Čičák: University of Istanbul, Turkey, May 13-15, 2015
- T. Halagan: West Pomeranian Univ. of Technology, Szczecin, Poland, May 13-17, 2015
- M. Siebert: 6<sup>th</sup> International Conference on Nanotechnology: Fundamentals and Applications, Barcelona, Spain, June 14-19, 2015
- E. Gramatová, K. Jelemenská, M. Siebert, D. Macko, M. Vojtko, J. Šubín: PESW 2015, Prague, Czech Republic, July 2-3, 2015
- Ahmed Barnawi: Saudi Arabian, February 25-March 6, 2015
- Guzel Abdrakhmanova: Ufa state aviation technical University: research stay - National Scholarship Programme, April 1-June 29, 2015
- P. Fišer, M. Daňhel: FIT ČVUT, Prague, Czech Republic, May 10-11, 2015
- H. Kubátová: FIT ČVUT, Prague, Czech Republic, June 9-11, 2015

### Visitors to the Institute

- H. Kubátová, M. Daňhel, M. Kohlík: FIT ČVUT, Prague, Czech Republic, June 29 – 30, 2015
- P. Fišer: FIT ČVUT, Prague, Czech Republic, August 20-21, 2015
- R. Hülle: FIT ČVUT, Prague, Czech Republic, October 25-30, 2015
- R. Hülle: FIT ČVUT, Prague, Czech Republic, December 6-11, 2015
- H. Kubátová: FIT ČVUT, Prague, Czech Republic, December 28, 2015
- Working Group of the Accreditation Commission of Slovakia for Information Sciences and Technologies – E. Gramatová, member
- Scientific Board of IT4 Innovation project – E. Gramatová, member
- *DDECS 2015* – 18<sup>th</sup> IEEE Symposium on Design and Diagnostics of Electronic Circuits and Systems, April 2015, Belgrade, Serbia – E. Gramatová, K. Jelemenská: members of programme committee
- *ECBS-EERC 2015* – 4<sup>th</sup> IEEE Fourth Eastern European Regional Conference on the Engineering of Computer Based Systems, August 2015, Brno, Czech Republic - T. Krajčovič: member of programme committee
- *EWDTs 2015* – 13<sup>th</sup> East-West Design & Test Symposium, Sept. 2015, Kharkov, Ukraine – E. Gramatová: member of programme committee
- *ICETA 2015* – 13<sup>th</sup> International Conference on Emerging E-Learning Technologies and Applications, December, 2015, Starý Smokovec, Slovak Republic – P. Čičák, E. Gramatová, K. Jelemenská, I. Kotuliak: members of programme committee
- *IEEE AFRICON 2015* – 12<sup>th</sup> edition, September 2015, Addis Ababa, Ethiopia - K. Jelemenská: member of technical program committee
- *IIT.SRC 2015* – Informatics and Information Technologies Student Research Conference – P. Čičák, E. Gramatová, K. Jelemenská, M. Kotočová, I. Kotuliak, T. Krajčovič, P. Trúchly: members of programme committee
- *PAD 2015* – Czech and Slovak Seminar on Computer Architectures and Diagnostics, September 2-4, 2015, Zlín, Czech Republic – E. Gramatová: member of steering committee, E. Gramatová, K. Jelemenská: members of programme committee
- *WMNC 2015* – 8<sup>th</sup> IFIP Wireless and Mobile Networking Conference – I. Kotuliak: Member of steering committee

## XI. Membership

### Slovak Professional Organisations and Societies

- Slovak Centre of the IEE (P. Čičák)
- Slovak Society of Computer Science (P. Čičák)
- Slovak Information Society (I. Kotuliak)

### International Professional Organisations and Societies

- ECUK, Engineering Council UK (P. Čičák)
- IEEE - Institute of Electrical and Electronic Engineers (E. Gramatová)
- IEEE Computer Society Golden Core (E. Gramatová)
- IEEE, Institute of Electrical and Electronic Engineers (P. Čičák, K. Jelemenská, D. Macko)
- IET, Institute of Engineering and Technology (P. Čičák)
- New York Academy of Sciences, member (J. Hudec)
- Slovak Commission for UNESCO. Informatics, Information and Communication Technologies (T. Krajčovič)
- TTTC, Test Technical Technology Council (E. Gramatová)

## XII. Other Activities

- Newsletter of Cisco Networking academy in Slovakia - P. Čičák: members of editorial board

# NETWORKING ACADEMY

e-mail: [info@cisco.fiit.stuba.sk](mailto:info@cisco.fiit.stuba.sk)

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## I. General Information

In 2011 the former Regional Networking Academy (RCNA FIIT STU) was transformed into the Networking Academy (NA FIIT STU) and the Instructor Training Centre (ITC FIIT STU) was established. This centre consists of three multipurpose research and pedagogical laboratory facilities designated for education in the field of computer networks at two degrees of study programme Computer and Communication Systems and Networks and for education of subjects related to Computer Networking of the study programme Informatics.

Besides filling study programs, Networking Academy provides complete courses and study programs in the field of computer networks as a part of Cisco Networking Academy Program NetAcad. Throughout these courses students gain the necessary knowledge and practical skills to successfully pass Cisco Certified Networking Associate (CCNA) and Cisco Certified Networking Professional (CCNP) certification exams. These exams are well known and highly recognized by the industry. Education that is part of the Academy offers complete spectrum of courses, starting with basic principles of how computer networks work and continuing with modern networking technologies such as IP Telephony and Wireless Communication based on IEEE 802.11 standards (WiFi). Laboratory facilities are equipped with modern communication technology including hardware routers, hardware switches, hardware firewalls, PCs with connection to the Internet and other necessary components for the purpose of practical education in the field of computer networks.

NA FIIT STU offers technological environment for research in the field of modern methods of communication in the computer networks. It creates quality conditions for solving research grants in the field of methods and resources for creating security and management of communication and

mobile computer systems. Pedagogical process is greatly enhanced by providing the necessary support for practical learning during the education of courses related to computer networking throughout the two degrees of study program Computer and Communication Systems and Networks. Within the education process ITC FIIT STU prepares instructor trainings and prepares students for CCNA and CCNP certification exams.

## II. Staff

### Director

Pavel Čičák, Professor, CCNA

### Administrative Department

Marušincová Zuzana

### Instructor Staff

Andrej Binder, CCNA, CCNP, ITQ

Martin Čechvala, CCNP, CCIE

Pavol Helebrandt, CCNA

Martin Hrubý, PhD., CCNA, CCNP, CCIE

Katarína Jelemenská, PhD.

Margaréta Kotočová, Associate Professor, CCNA

Ján Lúčanský

Dominik Macko, PhD., CCNA

Ján Skalný, CCNA, CCNA Security, CCNP, ITQ

Viktor Šulák, CCNA

### Engineering Staff

Dušan Bernát

Roman Stovíček, PhD.

## III. Study programmes

- Study program for preparation for certification exam CCNA (200-120 CCNA)
- Study program for preparation for certification exam CCNP (300-101 ROUTE, 300-115 SWITCH, 300-135 TSHOOT)
- Study program for preparation for certification exam CCNA Security (210-260 IINS)

## **IV. Cooperation**

### **Cooperation in Slovakia**

- Academy Support Centre, Faculty of Electrical Engineering and Information Technology, Technical University in Košice
- Instructor Training Centre, Faculty of Management Science and Informatics, University of Žilina
- CISCO Systems Slovakia, Ltd.
- SOITRON, Ltd.

- DITEC, Ltd.
- Tempest, Ltd.
- Hewlett-Packard Slovakia, Ltd.
- IBM Slovakia, Ltd.
- Microsoft Slovakia, Ltd.

### **International Cooperation**

- Cisco Networking Academy, Czech University of Technology, Prague, Czech Republic
- Cisco Networking Academy, Faculty of Information Technologies, Technical University in Brno, Czech Republic

# PHOTO GALLERY









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