
DEPARTMENT OF ELECTRONICS AND MULTIMEDIA TELECOMMUNICATIONS

Department Of
Electronics
& Multimedia Communications



Annual Report
2007

Technical University of Košice
Faculty of Electrical Engineering and Informatics

TECHNICAL UNIVERSITY OF KOŠICE
Faculty of Electrical Engineering and Informatics
(Slovak Republic)

DEPARTMENT OF ELECTRONICS AND
MULTIMEDIA TELECOMMUNICATIONS

ANNUAL REPORT 2007

Edited by Ľuboš Ovseník

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BRIEF OVERVIEW

The Department of Electronics and Multimedia Communications was founded in 1969. The original name of department was Department of Electronics. The Department offers three types of full-time and part-time degree courses:

Bachelor's Degree course lasts in standard way 3 years and leading to degree Bc. The graduates get more-or-less practical skills in mastering:

- ◆ Automotive electronics;
- ◆ Electronics;
- ◆ Telecommunications.

Master's Degree course lasts in standard way 2 years and leading to degree Ing. The graduates are oriented towards the selected branch of specialization:

- ◆ Electronics and Telecommunication;
- ◆ Measurement Techniques.

Doctoral Degree courses lasts in standard way 3 years and leading to degree PhD.:

- ◆ Infoelectronics;
- ◆ Telecommunications;
- ◆ Measurement Techniques.

The subjects in the degree course are orientated to the linear and non-linear analogue circuits, automotive electronics and diagnostic of cars, digital electronics, microwave technology, optoelectronics, signal and systems, acoustics, digital signal processing, digital filtering, signal processors and microcontrollers, radioelectronic measurements, television systems, signal recording, digital communication and digital transmission systems, optoelectronic communication systems, photonics, sensor systems, multimedia communication systems, mobile and satellite communication systems, digital image communication systems and medical electronics.

The basic research activities of Department are concentrated on digital image and speech processing, multimedia communications, digital filtering, optoelectronics and optical communication, implementation on neural network in digital signal processing and A/D convertors modelling.

DEPARTMENT STAFF AND STRUCTURE

Total number of staff members is 31.

- ◆ Professors: Anton Čižmár, Dušan Kocur, Dušan Levický, Stanislav Marchevský, Ján Mihalík, Linus Michaeli, Ján Turán

- ◆ Associate Professors: Ľubomír Doboš, Miloš Drutarovský, Pavol Galajda, Jozef Juhár, Ľuboš Ovseník, Ján Šaliga

- ◆ Assistant Professors: Mária Gamecová, Ján Gamec, Iveta Gladišová, Zita Klenovičová, Stanislav Ondáš, Radovan Ridzoň, Jozef Zavacký

- ◆ Research Assistant: Ingrid Hroncová, Jozef Krajňák, Ľudmila Maceková, Michal Mirilovič, Ján Papaj, Slavomír Pillár, Matúš Pleva

- ◆ Support staff: Ing Juraj Aksamit, Božena Marchevská, Milan Peška, Viera Šumáková

- ◆ Ph.D. students:
Internal form: Michal Aftanas, Gabriel Bugár, Marián Chovanec, Peter Drotár, Martin Fifik, Juraj Gazda, Miroslav Katrák, Pavol Kocan, Jozef Krahulec, Martin Lojka, Lenka Macková, Ján Mochnáč, Henrieta Palubová, Marek Papco, Peter Patlevič, Marek Pradid, Jozef Ratica, Jana Rovňáková, Michal Sakmár, Ján Šterba, Mária Švecová, Tamás Tokár, Michal Varchola
External form: Miroslav Baboľ, Pavol Cabúk, Ľubomír Čopjan, Sakhia Darjan, Marek Domaracký, Vlastimil Fuňak, Alexander Gilányi, Imrich Harčár, Ľubomír Horniak, Rastislav Kokoška, Rastislav Konkoľ, Martin Lukáč, Pavol Pavelka, Milan Rusko, Péter Serfozo, Lenka Sochová, Péter Szoboszlai, Tomáš Straka, Kamil Šindlery, Anton Štofa, Jozef Študenc, Ján Turán,jr., Peter Varchol, Peter Želinský

DIVISIONS OF THE DEPARTMENT

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COURSES

Bachelor Degree Course (title Bc.) –Automotive electronics

The Bachelor degree course is orientated into the field of Automotive electronics into the basic automotive electronics systems. The students achieve good skills in automotive electrical measurement, automotive electronics components, digital electronics and digital signal processing.

Bachelor Degree Course (title Bc.) –Electronics

The Bachelor degree course is orientated into the field of Electronics into the basic electronics systems. The students achieve good skills in electrical measurement, electronics components, linear and non-linear circuits, digital electronics, microprocessors and signal processors and optoelectronics.

Bachelor Degree Course (title Bc.) –Telecommunications

The Bachelor degree course is orientated into the field Telecommunication mainly into the basic telecommunication systems and networks. The students achieve good skills in telecommunication services, management of telecommunication networks and economics in telecommunications.

Master Degree Course (title Ing.) – Electronics and Telecommunication Engineering

The Master degree course is orientated into the field of Electronics and Telecommunications. In the field of Electronics the students have been achieve good skills in mathematics, physics, electromagnetic field, electrical measurement, electronics components, linear and non-linear circuits, digital electronics, microprocessors and signal processors, optoelectronics and digital signal processing.

In the field Telecommunications the students have been achieve good skills in digital communication and transmission systems, mobile and satellite communications, optoelectronics communication systems and multimedia communication.

Master Degree Course (title Ing.) – Measurement Techniques

The Master degree course is orientated into the field of Measurement techniques. The degree course is the specialisation of the general programme Electronics. In the field of Measurement techniques the students have been achieve good skills in electrical measurement, metrology, electronics components, linear and non-linear circuits, digital electronics, microprocessors and signal processors, digital signal processing targeted on enhancement of the metrological properties, virtual

instrumentation using ICT, measurement in the biomedicine, measurement in the telecommunications, industrial measurement for process control and TQM.

Ph.D. Degree Courses (title Ph.D.) – Infoelectronics

The Ph.D. degree course is orientated into the field of digital image and speech encoding and transmission, optoelectronics systems and digital filtering as well as design of electronic and optoelectronics systems, sensor systems and digital circuit's simulation.

Ph.D. Degree Courses (title Ph.D.) – Telecommunications

The Ph.D. degree course is orientated into the field of multimedia communications, mobile and satellite communications as well as modern telecommunication technologies and networks and digital signal processing in telecommunications.

Ph.D. Degree Courses (title Ph.D.) – Measurement Techniques

The Ph.D. degree course is focused into the methodology of instrumentation in industry, scientific research and monitoring of physical parameters. The related scientific areas are metrology, sensors of different physical qualities, digital signal processing and pre-processing, calibration and self-diagnostic as well as virtual instrumentation.

LIST OF SUBJECTS TAUGHT

Study plan for BSc. degree

Undergraduate Study (Bc.) – Automotive Electronics

Subject	Semester	Lectures/exercises (hours per week)	Name of Lecturer
Basics of electronics	2 nd	3/2	Micheali,
Circuit theory	3 rd	3/2	Kocur
Signals and systems	3 rd	3/2	Mihalík, Zavacký
Digital electronics	3 rd	3/3	Levický
Programming environments for electronics and telecommunications	3 rd	2/2	Drutarovský, Šaliga
Electronic measurement systems	4 th	2/2	Šaliga
Electroacoustics	4 th	3/2	Juhár
FPGA circuits	4 th	2/2	Drutarovský, Galajda
CAD in electronics	4 th	3/2	Galajda
Microelectronic circuits	4 th	3/2	Michaeli
Electromagnetic waves and antennas	4 th	3/2	Ovseník
Intelligent communication systems and networks	5 th	3/2	Marchevský
Semestral projects	5 th	0/3	Marchevský
Automotive electronics	5 th	3/2	Gamec
Microprocessors technology	5 th	3/2	Drutarovský
High frequency and microwave technology	5 th	3/2	Gamec
Videocommunications	5 th	2/2	Mihalík
Bachelor work	6 th	0/4	Marchevský
Embedded systems of cars	6 th	3/2	Marchevský
Digital signal processing for car diagnostics	6 th	3/2	Kocur
Active and passive safety systems	6 th	3/2	Gamec
Optoelectronic systems	6 th	3/2	Turán
Intelligent measurement systems	6 th	2/2	Šaliga
Analogue filters	6 th	3/2	Gamcová
Mobile and satellite communications	6 th	3/2	Doboš, Marchevský

Undergraduate Study (Bc.) – Electronics

Subject	Semester	Lectures/exercises (hours per week)	Name of Lecturer
Basics of electronics	2 nd	3/2	Micheali,
Circuit theory	3 rd	3/2	Kocur
Signals and systems	3 rd	3/2	Mihalík, Zavacký
Digital electronics	3 rd	3/3	Levický
Programming environments for electronics and telecommunications	3 rd	2/2	Drutarovský, Šaliga
Electronic measurement systems	4 th	2/2	Šaliga
Microelectronic circuits	4 th	3/2	Michaeli
Electroacoustics	4 th	3/2	Juhár
Electromagnetic waves and antennas	4 th	3/2	Ovseník
FPGA circuits	4 th	2/2	Drutarovský, Galajda
CAD in electronics	4 th	3/2	Galajda
High frequency and microwave technology	5 th	3/2	Gamec
Semestral projects	5 th	0/2	Turán
Microprocessors technology	5 th	3/2	Drutarovský
Videocommunications	5 th	2/2	Mihalík
Automotive electronics	5 th	3/2	Gamec
Optoelectronic systems	6 th	3/2	Turán

Subject	Semester	Lectures/exercises (hours per week)	Name of Lecturer
Bachelor work	6 th	0/4	Turán
Intelligent measurement systems	6 th	2/2	Šaliga
Mobile and satellite communications	6 th	3/2	Doboš, Marchevský
Digital signal processing for car diagnostics	6 th	3/2	Kocur
Active and passive safety systems	6 th	3/2	Gamec
Analogue filters	6 th	3/2	Gamcová

Undergraduate Study (Bc.) – Telecommunications

Subject	Semester	Lectures/exercises (hours per week)	Name of Lecturer
Basics of electronics	2 nd	3/2	Micheali,
Circuit theory	3 rd	3/2	Kocur
Signals and systems	3 rd	3/2	Mihalík, Zavacký
Digital electronics	3 rd	3/3	Levický
Programming environments for electronics and telecommunications	3 rd	2/2	Drutarovský, Šaliga
Electronic measurement systems	4 th	2/2	Šaliga
Electromagnetic waves and antennas	4 th	3/2	Ovseník
Basis of telecommunication technology	4 th	3/2	Levický
Microelectronic circuits	4 th	3/2	Michaeli
Electroacoustics	4 th	3/2	Juhár
Semestral projects	5 th	0/2	Kocur
Switching systems	5 th	3/2	Marchevský
Networks architecture	5 th	3/2	Čížmár
Access networks	5 th	3/2	Maceková
High frequency and microwave technology	5 th	3/2	Gamec
Microprocessors technology	5 th	3/2	Drutarovský
Videocommunications	5 th	2/2	Mihalík
Telecommunication services	6 th	3/2	Doboš
Bachelor work	6 th	0/4	Kocur
Mobile and satellite communications	6 th	3/2	Doboš, Marchevský
Security of communications networks	6 th	3/2	Levický
Optoelectronic systems	6 th	3/2	Turán
Intelligent measurement systems	6 th	2/2	Šaliga

Study plan for MSc. degree

Graduate Study (Ing.) – Electronics and Telecommunications

Subject	Semester	Lectures/exercises (hours per week)	Name of Lecturer
Digital signal processing	7 th	3/3	Mihalík
Radioelectronic measurement	7 th	3/3	Šaliga
Switching systems	7 th	3/2	Marchevský
Optoelectronics	7 th	3/2	Turán
Electronic systems with microprocessors	7 th	3/2	Drutarovský
Coding and modulation	7 th	3/2	Čížmár
Semestral projects	8 th	0/2	Galajda
Signal processors in telecommunications	8 th	3/2	Drutarovský
Digital filters	8 th	2/2	Kocur, Drutarovský
Digital audio processing and transmission	8 th	3/2	Juhár
TV systems	8 th	3/2	Marchevský
Automotive electronic control systems	8 th	3/2	Gamec
Digital transmission systems	8 th	3/2	Čížmár
Applied cryptography	8 th	3/2	Levický

Subject	Semester	Lectures/exercises (hours per week)	Name of Lecturer
Optoelectronic communications systems	8 th	3/2	Turán
Diploma projects	9 th	0/5	Galajda
Multimedia communications	9 th	3/2	Levický
Digital image communication systems	9 th	3/3	Mihalík
Satellite communications	9 th	3/2	Marchevský
Radioelectronic systems	9 th	3/2	Doboš
Medical electronics	9 th	3/2	Michaeli
Electronic systems of automotive diagnostics	9 th	3/2	Marchevský, Šaliga, Galajda
Photonics	9 th	3/2	Turán
Mobile communications systems	9 th	3/2	Doboš
Spread spectrum communication systems	9 th	3/2	Kocur
Diploma projects	10 th	0/8	Galajda

RESEARCH AND PROJECTS

Title of the Project: *MOBILTEL - Mobile Multimodal Telecommunications Systems and Services*

Funding: APVT-20-029004

Duration: 2005-2007

Co-ordinator: prof. Ing. Anton Čižmár, CSc.

Group members: Ľ. Doboš, J. Juhár, D. Levický, S. Lihan, M. Pleva, J. Papaj, M. Baboľ, S. Ondáš,
M. Mirilovič

Scientific goals/research targets:

The main goal of this project is the research and development in the area of mobile multimodal telecommunication systems, which allows access to information from different areas through mobile multimodal terminal and human - machine interaction with natural speech, with support of another mainly graphical modalities. The solution of the project is furthermore the goal of information exchange and acquisition of new knowledge from the area of the research, development and use of mobile telecommunication systems and services, automatic speech recognition, speech synthesis, automatic speech and multimodal dialog systems, network programming and other subjects according to the solving of the point of this project. The solution should have the following areas:

- ◆ In the area of speech pre-processing, analysis, synthesis and recognition it would be the exploring of new algorithms of extraction the features of the speech signal, which could lead us to more robust automatic speech recognition engines (ASR).
- ◆ In the area of multimodality and multimedia the research will be focused on possibilities of individual modalities implementation in to mobile multimedia devices and telecommunication terminals.
- ◆ In the area of multimodal dialog systems the research will be concentrated on dialog modelling and natural language processing (NLP) techniques, which are necessary for estimation of the natural Slovak language semantics and parsing.
- ◆ In the area of utilization of mobile telecommunication terminals, networks and their services research of possibilities of recent mobile infrastructures and their usability in task will be elaborated. Consideration will be focused to transfer rates and delays for individual solutions.
- ◆ In applications scope our work will be focused to implementation and evaluation of applications. Main goal will be activate mobile multimodal system in demonstrative mode, enabling communication with selected mobile terminal.

Title of the Project: *Cross-Modal Analysis of Audio and Video Signals*

Funding: MVTS COST2102/07 (Cross-Modal Analysis of Verbal and Non-verbal Communication)

Collaboration: 160 partners from universities, research and industrial institutions from 30 European countries and from Canada and Japan.

Duration: 2006-2010

Co-ordinator on TUKE: prof. Ing. A. Čižmár, PhD.

Group members: J. Juhár, Ľ. Doboš, M. Pleva, S. Ondáš, M. Mirilovič, M. Katrák, M. Papco, M. Lojka, L. Macková, J. Papaj

Scientific goals/research targets:

◆ The main objective of the action is:

The main objective of the Action is to develop an advanced acoustical, perceptual and psychological analysis of verbal and non-verbal communication signals originating in spontaneous face-to-face interaction, in order to identify algorithms and automatic procedures capable of identifying human emotional states. Several key aspects will be considered, such as the integration of the developed algorithms and procedures for application in telecommunication, and for the recognition of emotional states, gestures, speech and facial expressions, in anticipation of the implementation of intelligent avatars and interactive dialogue systems that could be exploited to improve user access to future telecommunication services.

◆ This COST Action is organized around three Working Groups as follows.

WG1:

- ◆ Task 1: Cross-modal analysis of audio and video.
- ◆ Task 2: Data analysis and feature correlations.

WG2:

- ◆ Task 3: Cultural differences and individual and socio-cultural variations.
- ◆ Task 4: Emotional states.

WG3:

- ◆ Task 5: Video and audio relationships synthesis and recognition.
- ◆ Task 6: Data encoding and definition of an extended MPEG-7 standard annotation.

Title of the Project: *Pervasive Mobile & Ambient Wireless Communications*

Funding: COST 2100

Collaboration: 56 partners from universities, research and industrial institutions from 26 European countries and from Canada and Japan.

Duration: 2006-2010

Co-ordinator on TUKE: doc. Ing. Lubomír Doboš, PhD.

Group members: A. Čížmár, J. Juhár, J. Papaj, M. Pleva, P. Patlevič, J. Ratica, S. Ondáš

Scientific goals/research targets:

- ◆ The main objective of the action is:

To increase knowledge of mobile and wireless network technologies by exploring and developing new methods, models, techniques, strategies and tools that will facilitate the implementation of next generation mobile radio communication systems and that will foster the development of the paradigms of pervasive and ambient wireless communications.

- ◆ This COST Action is organized around three Working Groups (WGs), dealing respectively with propagation and antenna issues, physical layer (i.e. mainly modulation and signal processing) aspects, and radio network aspects, as follows.
 - ◆ WG1 – Transmission Techniques and Signal Processing
 - ◆ WG2 – Radio Channel
 - ◆ WG3 – Radio Network Aspects

Title of the Project: *Remote Laboratory for Experimental Testing of Complex Reconfigurable Systems/Circuits based on FPGA Circuits*

Funding: KEGA, 3/5238/07

Duration: 2007-2009

Co-ordinator: doc. Ing Miloš Drutarovský, CSc.

Group members: P. Galajda, J. Šaliga, S. Marchevský, D. Kocur, L. Maceková

Scientific goals/research targets:

- ◆ Modern large FPGA devices have capacity equivalent to more than 10 millions equivalent gates and contain large amount of embedded multipliers, DSP blocks, hierarchical memory subsystems, hard cores etc. Designs based on a single FPGA device can currently contain complex soft 32-bit RISC processors (even in the form of small networks), complete signal processing blocks (e.g. for Software Defined Radio) or other Systems on Programmable Chip (SoPC). Development of such complex designs requires access to the target hardware platform for experimental testing.
- ◆ A typical design process is an iterative process that requires compilation of a complete design and testing/detection of errors. The compilation process can take several tenth minutes for complex systems. Testing on real hardware (HW) platform after successful functional simulation of short time segments (timing simulation of complete complex systems is far beyond the capabilities of current simulation tools) is currently the only practical solution. A typical example is testing of HW and software (SW) components of embedded soft processor with

custom HW peripherals/coprocessors. Real HW testing typically requires only a short time for access to the target HW. Typical testing HW contains at least a target FPGA board, JTAG interface to the Host computer and Host computer. More advanced HW can contain Logic Analyzer, Oscilloscope and Generator. All these HW are quite expensive and are required just during a short time.

- ◆ Main research goal of the project is provide access to expensive HW in time multiplex and enable to use it within regular education courses oriented to FPGA technology and Digital Signal Processing related subjects provided at the Faculty of Electrical Engineering and Informatics of Technical University of Kosice.

Title of the Project: *High Altitude Platforms (HAPs) for Communications and Other Services*

Funding: COST 297

Collaboration with: 17 partners from university, research and industrial institutions

Duration: 2006-2009

Co-ordinator: doc. Ing. Pavol Galajda, CSc.

Group members: S. Marchevský, D. Kocur, M. Drutarovský, Ľ. Maceková, Ľ. Čopjan, P. Pavelka, H. Pabubová, J. Krajňák, J. Krahulec

Scientific goals/research targets:

The work is ongoing in Working Groups:

- ◆ WG1 Radio Communication Aspects. This group deals with wireless communication services (including backhaul aspects) based upon HAPs.
- ◆ WG2 Optical Communication Aspects. This group deals with free-space optical communication links and services to and from HAPs.
- ◆ WG3 Aerial Platform Developments. This group deals with development of HAP vehicles themselves, in the context of application for communication services, including control, telecommand, telemetry, critical HAP sub-systems, HAP navigation, and HAP operation.
- ◆ Our research group is focused on the tasks of working group no. 1. (WG1) such as Software Defined Radio, multi-carrier systems, multiple-access techniques, multi-user detection and interference suppression techniques in wireless communication services based on HAPs.
- ◆ Partial Goals:
 - ◆ The analysis of the state of art of channel modelling for communications from High Altitude Platforms.

- ◆ The analysis of the models of high power amplifier nonlinearities in OFDM systems, power amplifier linearization and predistortion schemes for HAP applications.
- ◆ The application of software defined radio for HAP systems.

Title of the Project: *Automatizovaný, hlasom ovládaný telekomunikačný systém a jeho aplikácie*

Funding: AV 4/0006/07

Collaboration with: Institute of Informatics Slovak Academy of Science.

Duration: 2007 – 2009

Project co-ordinator: doc. Ing. Jozef Juhár, CSc.

Group members: A. Čižmár, L. Doboš, M. Pleva, S. Ondáš, M. Mirilovič, M. Katrák, M. Papco, M. Lojka

Scientific goals/research targets:

The main topic of the research project are speech technologies for voice driven telecommunication systems. Technological base of the project is IRKR Communicator, developed in the frame of previous project „Smart speech communication interfaces“. The aim of the project is 1) research, development and experimental evaluation of new, complex a user-friendly automatic spoken language dialogue applications and 2) research and development of new algorithms to improve robustness of the whole system.

Title of the Project: *Spectrum and Power Efficient Broadband Communications*

Funding: COST 289

Collaboration: 15 partners from university, research and industrial institutions from 10 European countries and Turkey.

Duration: 2003-2007

Co-ordinator: prof. Ing. Dušan Kocur, CSc.

Group members: M. Drutarovský, P. Galajda, S. Marchevský, J. Krajňák, L. Čopjan, P. Pavelka

Scientific goals/research targets:

- ◆ General Goal:
 - ◆ Design of new architectures of communication systems with intention to increase the capacity of communication systems within a specified transmission bandwidth with minimum available transmitter power, bearing in mind the cost effectiveness and the practical feasibility of the system.
- ◆ Partial Goals:
 - ◆ Analysis of multiple access principles (e.g. CDMA, MC-CDMA, CC-CDMA, OFDM, etc.) with regard to design the 4G mobile communication systems and heterogeneous networks.

- ◆ Design of sub-systems of the 4G mobile communication systems and heterogeneous networks, especially the multi-user receivers and interference canceller design.
- ◆ Design of software defined radio architectures, mapping selected the software defined radio blocks into the high performance FPGAs.

Results Achieved:

- ◆ Development of new kind of multi-user receiver for MC-CDMA transmission systems based on complex multi-channel microstatistic filter applications referred to as complex microstatistic multi-user receiver.
- ◆ The analysis of the performance properties of complex microstatistic multi-user receiver of MC-CDMA transmission systems under uplink and downlink scenarios.
- ◆ The analysis of the performance properties of complex microstatistic multi-user receiver of MC-CDMA transmission systems under presence of non-linear distortion due to power amplifiers of transmitter (soft limit, hard limit, Saleh and Rapp models).

Title of the Project: *Ultra Wideband Radio application for localisation of hidden people and detection of unauthorised objects*

Acronym: RADIOTECT

Funding: 6FP, Contract N° 032744

Collaboration: Technische Universität Ilmenau (Germany), Meodat Meßtechnik (Germany), Geozondas Ltd. (Lithuania), Ingenieur Büro Ralf Klukas (Germany), Vrije Universiteit Brussel (Belgium), Technische Universiteit Delft (Netherlands), Statens Rådningssverk (Sweden), Crabbe Consulting Ltd. (Germany).

Duration: 2007-2008

Co-ordinator: prof. Ing. Dušan Kocur, CSc.

Group members: M. Drutarovský, J. Rovňáková, M. Švecová, M. Aftanas, P. Galajda, S. Marcheviský, I. Hroncová, S. Pillár.

Scientific goals/research targets:

- ◆ General Goal:
Development of UWB radar systems with enhancing ability to detect and locate: **(1)** criminals incl. terrorists obscured from view e.g. behind walls, **(2)** trapped people after accidents or catastrophes and **(3)** unlawful objects hidden under clothes, including non-metallic.
- ◆ Responsibility of RADIOTECT team from Technical University of Košice :
 - ◆ Development of signal processing methods for through wall detection and localisation of moving persons.

- ◆ Development of signal processing methods for through wall imagining of a room or building interior.

Results Achieved:

- ◆ Elaboration of the state-of-the art in the field of time-invariant and adaptive methods of clutter removal under the condition of through wall measurement scenarios for the purpose of moving targets detection.
- ◆ Elaboration of the state-of-the art in the field of detection methods of moving targets under the condition of through wall measurement scenarios.
- ◆ Elaboration of the state-of-the art in the field of positioning methods and cooperative positioning of targets in 2D and 3D under the condition of over-determined positioning systems.
- ◆ Elaboration of the state-of-the art in the field of imagining based on synthetic aperture radar measurement (SAR) with stress on Kirchhoff and Stolt migration.
- ◆ Implementation of the selected methods of UWB radar signal processing intent on clutter removal, target detection, target positioning, target tracking and imagining in MATLAB software. Evaluation of the proposed methods based on analysis of raw radar data gathered based on through wall measurement scenarios.

Title of the Project: *Digital Signal Processing for Target Detection and Tracking in UWB Radars (DSP-UWB-RAD)*

Funding: Slovak Research and Development Agency under the contract No. LPP-0287-06

Duration: November 2006-November 2009

Co-ordinator: prof. Ing. Dušan Kocur, CSc.

Group members: M. Švecová, J. Rovňaková

Scientific goals/research targets:

Ultra wideband (UWB) radars are of great interest for a vast number of applications such as surface penetrating radar, surveillance and emergency radar, medical instrumentation, non-destructive testing, industrial sensors and many others. UWB radar taken into consideration within *DSP-UWB-RAD* project utilizes a world-patented technique called the Maximum Length Binary Sequence technology and exploits the frequency bandwidth up to 5 GHz.

The main goal of *DSP-UWB-RAD* project is research and development of methods of target detection; localization and tracking by UWB radar based advanced digital signal processing methods. Within project, the research group will be focused on processing of signals obtained from targets represented by people in a room or building under rubble (so-called through-wall target detection and tracking) or snow.

Results Achieved:

- ◆ Static/dynamic background (clutter) removal for through wall moving targets detection by UWB radar: Investigation and evaluation of different methods for the improvement of signal to clutter ratio of weak signals scattered back by the moving persons (human bodies).
- ◆ Through wall moving targets detection by UWB radar: Investigation and evaluation of different methods for detection of moving persons (e.g. threshold detectors, (N,k) detectors, CFAR detectors, IPCP detectors, binary detectors).
- ◆ Cooperative positioning: The elaboration of the state-of-the-art in the field of target localisation based on combination of the time of arrivals and time differences of arrivals in 3D and 2D. Here, the following methods have been studied: (1) analytical calculation, (2) least-square methods and (3) approximate maximum likelihood algorithm.
- ◆ Gathering of real data according to through wall moving target detection by measurement with UWB radar systems. The raw radar data processing by the methods of clutter removal, target detection and target tracking.

Title of the Project: *Digital Processing of UWB Radar Signals***Acronym:** DSP-UWB-RAD**Funding:** MVTS**Duration:** 2007-2008**Co-ordinator:** prof. Ing. Dušan Kocur, CSc.**Group members:** M. Drutarovský, J. Rovňáková, M. Švecová, M. Aftanas, P. Galajda, S. Marcheviský, I. Hroncová, S. Pillár.**Scientific goals/research targets:**

Development of digital signal processing methods of UWB radar signals for the purpose of through wall detection and localisation of moving persons and room or building interior imagining.

Results Achieved:

- ◆ Elaboration of the state-of-the-art in the field of clutter removal and detection methods under the condition of through wall measurement scenarios for the purpose of moving targets detection.
- ◆ Elaboration of the state-of-the-art in the field of positioning methods and cooperative positioning of targets in 2D and 3D under the condition of over-determined positioning systems.
- ◆ Elaboration of the state-of-the-art in the field of imagining based on synthetic aperture radar measurement (SAR) with stress on Kirchhoff and Stolt migration.
- ◆ MATLAB implementation of the selected methods of UWB radar signal processing intent on clutter removal, target detection, target positioning, target tracking and imagining. Evaluation of

the proposed methods based on analysis of raw radar data gathered based on through wall measurement scenarios.

Title of the Project: *Psycho-acoustic Toolbox Development*

Funding: Medav GmbH

Duration: May 1, 2007- August 31, 2008

Co-ordinator: prof. Ing. Dušan Kocur, CSc.

Group members: M. Drutarovský, I. Hroncová

Scientific goals/research targets:

Development of MATLAB toolbox for the evaluation of basic psychoacoustic quantities of sound signals.

Results Achieved:

MATLAB toolbox for the evaluation of basic psychoacoustic quantities of sound signals such as:

- ◆ 1/3 octave spectrum,
- ◆ loudness according to Zwicker,
- ◆ sharpness according to Fastl, Bismarck and Aures,
- ◆ tonal analysis of sound signal according to Terhard (spectral-pitch and virtual-pitch pattern),
- ◆ tonality according to Aures,
- ◆ roughness according to Aures and later extended by Daniel and Weber,
- ◆ fluctuation strength according to Höldrich.

The developed software has been applied in the research and development of sound signal analysis methods for the purpose of car engine diagnostics.

Title of the Project: *Engintest*

Funding: Medav GmbH

Duration: September 1, 2007- August 31, 2008

Co-ordinator: prof. Ing. Dušan Kocur, CSc.

Group members: M. Drutarovský, I. Hroncová

Scientific goals/research targets:

Development of advanced signal analysis methods for the purpose of quality testing systems introduced into manufacturing lines for end-of-line testing with stress on car engine testing.

Results Achieved:

Analysis of the sets of car engines produced by leading European engine producers based on psychoacoustic quantities analyses of sound signals produced by car engines at so-called cold-tests.

The obtained results outlined that psychoacoustics analysis could be a relevant tool for car engine diagnostics.

Title of the Project: *Multimedia communication security*

Funding: VEGA 1/4054/07

Duration: 2007-2009

Co-ordinator: prof. Ing. Dušan Levický, CSc.

Group members: A. Čižmár, S. Drutarovský, J. Juhár, Ľ. Doboš, Z. Klenovičová, M. Gamcová, R. Ridzoň, M. Pleva, P. Varchol, J. Papaj, M. Mirilovič, P. Patlevič, T. Tokár, S. Ondáš, J. Ratica, M. Katrák

Scientific goals/research targets:

- ◆ Design of new methods for multimedia content security of grey-scale and color image by using digital watermarking as well as design of steganography techniques mainly for digital image steganography by using DCT, DWT and CDMA. Analysis of transmission parameters invisibility and security proposed method for application in NGN networks.
- ◆ Design of new multimodal methods for people recognition and verification by using human body characteristics (voice, palms) with reliable features extraction and better discriminability. Design of methods based on text-independent speaker verification and new method of biometrics feature fusion for multimodal systems.
- ◆ Design of new method for increasing of mobile networks security and QoS, mainly ad-hoc mobile networks security by using new routing and CAC protocols and algorithms for mobile terminals with limited computational capacity, such as PDA.

Results Achieved:

- ◆ Design of new methods of digital watermarking by using HVS models in still pictures
- ◆ Design of new methods of digital watermarking by using robust watermarks in still grey scale and color pictures
- ◆ Design of new methods for digital image steganography by using DCT and CDMA
- ◆ Analysis of mobile ad-hoc networks CAC protocols
- ◆ Analysis of mobile multimodal telecommunications systems and services
- ◆ Design of new method for GMM implementation in biometric security systems

Title of the Project: *Reconfigurable platforms for broadband wireless telecommunication networks*

Funding: VEGA, 1/4088/07

Duration: 2007-2009

Co-ordinator: prof. Ing Stanislav Marchevský, CSc.

Group members: D. Kocur, M. Drutarovský, P. Galajda, J. Gamec, S. Benčo, Ľ. Maceková, Ľ. Čopjan, J. Krajňák, H. Palubová

Scientific goals/research targets:

Scientific project will be oriented to the elaborating and verifying of methods of design of reconfigurable platforms for broadband wireless telecommunication networks. Special emphasis is imposed on design of algorithms, protocols and design methods of reconfigurable hardware for packet oriented processing of video signals as well as on elaboration of new dynamic reconfigurable architectures of multiuser detectors for processing CDMA signals. Increasing of spectral efficiency, receiver sensitivity and number users are intended. The remark will be devoted to elaborating and verifying of design methods of reconfigurable software defined radio as well. The radio can be reconfigured via the wireless channel during the operation. Beside this, special remark will be focused to study authentication and security of terminals, operating in broadband wireless networks, design of authentication algorithms, methods and protocols, with regard to design of secure terminals based on reconfigurable hardware.

Title of the Project: *Metrological Quality Enhancement of the Analog to Digital Interfaces by the Digital Signal Processing Methods*

Funding: VEGA, 1/2180/05

Duration: 2005-2007

Co-ordinator: prof. Ing Linus Michaeli, DrSc.

Group members: J. Šaliga, V. Pirč, P. Galajda, Ľ. Horniak, Sz. Csernok, P. Cabúk, V. Frolek, P. Mikulík, M. Sakmár, L. Sochová

Scientific goals/research targets:

- ◆ The project objective is the improvement of the metrological properties of the measuring system converting analogue signal to its digital representation. The research will be focused on the following represent ants of the analog-to-digital converters.
- ◆ Low passes analog-to digital converters.
- ◆ Sigma-delta converters of the selected parameters modulated in the high frequency signal or converters of measured physical quantity to the number.
- ◆ The common effort is the study of the testing methods in the end-user laboratories and methods enhancing their accuracy. The main research effort is splitted into three research areas:
 - ◆ Fast ADC testing methods based on the known error model convenient for the testing of the DAQ boards and their traceability to the standardised approaches.

- ◆ Digital signal processing methods for ADC error reduction. The proposed algorithm will be utilised time redundancy in the data flux and implementation of the appropriate filters for dynamic resolution enhancement.
- ◆ Design of the methods for the band-pass sigma-delta ADC testing for demodulation of software radio signals and sigma delta structures for physical quantity sensors.

Title of the Project: *Summer school on "Data Acquisition systems"*

Funding: SOCRATES (EUR 15000)

Collaboration with: Italy, Hungary, Czech Republic.

Duration: 2006-2007

Project subcoordinator: prof. Ing Linus Michaeli, DrSc.

Group members: J. Šaliga,

Scientific goals/research targets:

The IP course is aimed on the preparation graduates in the hardware and software design of the Data Acquisition Systems integrated with the computerized information environment. It allows achieving the requirements of industrial partners for graduates skilled in the relevant field for the organisation according to TQM. The project meets needs of highly qualified graduates, able to work in multinational teams.

Results Achieved:

- ◆ Student's skills how to design Data Acquisition Systems using modern approaches from the area of information and communication technologies.
- ◆ Knowledge about metrological parameters of DAQ according to actual International standards and inform than about abigouity of the interpretation among various producers.
- ◆ Student's skills in the simple testing methods for metrological parameter assessment coherent with ISO standards
- ◆ Production teaching materials for students and teacher related with Data Acquisition Systems.

Title of the Project: *Metrological characterisation of the ADConverters "ADCWAN"*

Funding: MIUR Italy (EUR 75000) call:(D. M. 5.8.2004, n. 262 – Programmazione del sistema universitario)

Collaboration with: Italy

Duration: 2005-2007

Project subcoordinator: prof. Ing Linus Michaeli, DrSc.

Group members: J. Šaliga,

Scientific goals/research targets:

Research of the hardware and software tools of the Data Acquisition Systems integrated with the computerized information environment. The project meets needs of highly qualified graduates, experienced in the quality assessment of the virtual instruments utilised in the industry and their permanent monitoring.

Results Achieved:

- ◆ New testing methods for Data Acquisition Systems using modern approaches from the area of information and communication technologies.
- ◆ Knowledge about metrological parameters of DAQ according to actual International standards and contribution to their permanent up-dating.
- ◆ Production teaching materials for students and teacher related with Data Acquisition Systems.

Title of the Project: *Coding of the human head in the standard videocodec MPEG-4 SNHC*

Funding: VEGA -1/3133/06

Duration: 2006 – 2008

Project subcoordinator: prof. Ing Ján Mihalík, CSc.

Group members: J. Zavacký, I. Gladišová, V. Michalčín, R. Štefanišin, M. Kasár

Scientific goals/research targets:

The research of algorithms of coding of the human head in the standard videocodec MPEG-4 SNHC for purpose of implementation of intelligent interfaces for communication of a human to machine, virtual studios and shops, virtual multimedia services (education, shopping, working, entertainment, etc.), virtual film and video production, but also the advanced videocommunications by cloned and virtual human heads. There are supposed new algorithms of modeling and animation of the human head on the basis of calibration, deformation, estimation of three dimensional motion and animation parameters, also generation and projection of the texture on the wireframe 3D model. Further algorithms of calculation of the triangular spline functions and their application on calculation of DMS approximation of the surface of human head. Going on derivation of eigenfaces by using principal component analysis and optical flow equation, consequently their employing for tracking of the complex 3D movement of the human head. Finally the new modifications of coding of the texture on the basis DWT with lifting structure, optimal quantization and entropy coding also FAP by using difference arithmetic coding or vector quantization in DCT domain.

Title of the Project: *Digital Image Processing Using Class of Projecting Transforms***Funding:** VEGA 1/3143/06**Duration:** 2006-2008**Co-ordinator:** prof. RNDr. Ing Ján Turán, DrSc.**Group members:** J. Gamec, L. Ovseník, D. Šišková, J. Študenc P. Serfőző, J. Turán, Jr., P. Szoboszlai, T. Straka. J. Futó**Collaboration with:**

- ◆ prof. Dr. K. Fazekas, BUTE, Budapest, Hungary
- ◆ prof. Dr. A. Figueras and Prof. Dr. J. Cid-Sueiro, University Carlos III, Madrid, Spain
- ◆ prof. Dr. J. Tasic, TU Ljubljana, Slovenia
- ◆ prof. Dr. T. Adam, Technical University, Miskolc, Hungary
- ◆ prof. Dr. K. Skala, University Zagreb, Croatia
- ◆ prof. Dr. W. Stechele, TU Munich, Germany
- ◆ prof. Dr. A. Samcovic, University Belgrade, Serbia and Monte Negro
- ◆ prof. Dr. Tran Mihn Son, Université d'Evry, Paris, France

Project summary:

The project will solve new methods for digital image and image sequence processing using class of projecting transforms (Radon, Hough, Trace and Mojette transforms). Developed new methods will be used in the field of selecting non-traditional features, of images and image sequences which may be invariant, sensitive or which correlate well with some property we wish to identify in a sequence of images. This features will be used in invariant image recognition systems (associative image memory), for comparison images for fault or fraud detection or change detection, site monitoring and surveillance.

Scientific goals/research targets:

- ◆ Development new methods for image processing using class of projecting transform (Radon, Hough, Trace and Mojette).
- ◆ Study properties of the class of projecting transforms and its applications in distributed digital systems for image transmission and memories.
- ◆ Development new methods for sensitive feature selection based on class of projecting transforms and their use for comparison images for fault or fraud detection or change detection, site monitoring and surveillance.
- ◆ Study new applications of Hough Transform (robust system identification, metrology problems and signal processing).
- ◆ Development new methods for image processing using nonlinear invertible rapid transform

Results Achieved:

- ◆ Development new methods for invariant feature extraction based on CT, RT, NT, Radon and Hough Transform.
- ◆ New Continuous Kernel Hough Transform (CKHT) and its application to feature extraction and system parameters estimation.
- ◆ System parameters estimation tool based on CKHT.
- ◆ Motion estimation based on inverse rapid transforms.
- ◆ Invariant associative memory based on STIR transforms.
- ◆ 3D-object recognition system based on using RT for reflected acoustic wave analysis.
- ◆ Invariant image recognition systems based on hybridisation of RT, NT with Hough, Radon and Trace transform.

Title of the Project: *Semantic Multimedia Analysis of Digital Media***Funding:** COST 292

Collaboration with: Hungary, United Kingdom (Project coordinator: prof. Dr. E. Izquierdo, Queen Mary College, University of London), Portugal, Spain, Italy, Serbia and Montenegro, Finland, Greece, Turkey, France, Germany, Belgium, Ireland, Norway, Austria, Croatia, Netherlands.

Duration: 2004-2008Co-ordinator: prof. RNDr. Ing Ján Turán, DrSc.

Group members: J. Gamec, I. Gladišová, P. Filo, J. Futó, Ľ. Maceková, S. Marchevský, Ľ. Ovseník, T. Straka, J. Študenc

Results Achieved:

The work is ongoing in Working Groups:

- ◆ WG.1: Common Testing Data and Framework.
- ◆ WG.2: Image and Video Segmentation, Shot Analysis and Key Frame Extraction, Efficient Extraction of Standardized Features.
- ◆ WG.3: Reduction of the Dimension of the Feature Space and Multimodal Feature Fusion.
- ◆ WG.4: Automatic Paradigms for Semantic Annotation.
- ◆ WG.5: Semi-automatic Paradigms for Semantic Annotation.
- ◆ WG.6: Applications.
- ◆ WG.7: JPSearch.

- ◆ Our research group will focus on the development of advanced methods for digital image and video signal processing based of extraction of Low-level invariant transform and colour features; applications: coding of enriched and smart content and visualization.

EQUIPMENTS

Teaching and Research Laboratories and Special Measuring Instruments and Equipment.

<i>Laboratory</i>	<i>Equipment</i>
Laboratory of Network Security	12 PCs with software for teaching, programming and experiments, CISCO switches and routers.
Laboratory of Signal Processors and Embedded Microcontrollers (http://www.kemt.fei.tuke.sk/fpga)	<ul style="list-style-type: none"> - Hardware and software development tools (floating licenses) for Analog Devices fixed-point digital signal processors ADSP218x, ADSP219x and ADSP2153x, ADSP2156x Blackfin DSPs development boards, JTAG emulators, video extenders. The laboratory is supported by the Analog Devices University program. - Hardware and software development tools (floating licenses) for Altera FPGAs, UP-1, UP-3, NIOS II, Stratix DSP development boards and DSP development kit with video input daughtercard, Cyclone II edition. The laboratory is supported by the Altera and Mentor Graphics University programs. - Hardware and software development tools for 32-bit ColdFire microcontrollers and ZigBee compliant RF hardware. The laboratory is supported by the Freescale University program. - Hardware and software development tools for 8-bit single chip Analog Devices ADuC83x MicroConverters. - 64-channel/4-GHz timing Agilent 16822A logic analyzer with integrated 40-channel pattern generator. - UWB radar systems.
Laboratory of Measurement	Special accurate measurement system for static and dynamic ADC testing (calibrating generator Stanford Research DS 360, precise multimeter and DC source, software tools based on LabWindows/CVI and LabVIEW for ADC parameter estimation according to IEEE 1057, IEEE 1241 Std). Department licence for all software by National Instruments, various high quality multifunction DAQ boards, PXI system, measurements system controlled over the Internet, spectrum and network analysers up to 3GHz, and other various instrumentations.
Laboratory of Optoelectronics	Development tools for optical fibre communications training systems and optical desk with He-Ne laser.
Laboratory of Microwave Technology	Development tools for microwave training systems (waveguides – 3cm, 6cm; attenuators, coupling components).
Laboratory of Speech Technology for Telecommunications	Development tools for automatic speech recognition systems and automatic voice services in telecommunications and Internet.
Laboratory of Mobile Communication Technology	CISCO Aironet 1310 Wireless Bridges, CISCO Aironet 1200 Access Points, CISCO Aironet 350 Wireless LAN Adapters.

CO-OPERATION

Co-operation in Slovakia

<i>Institution</i>	<i>Type of activity</i>
Slovak Telecom Bratislava	Research, Leonardo
Alcatel SEL Liptovský Hrádok	Leonardo
Siemens Software House Bratislava	Leonardo
Ericsson Slovakia	Leonardo
Telenor Slovakia	Leonardo
Alcatel Bussiness System Bratislava	Leonardo
VSE, Košice	Research
Volkswagen Slovakia a.s.	Development and education
Slovak Academy of Science	Research and development
Ingmetal, Prešov	Research and development
TTC Telecom, Košice	Education

International Co-operation

<i>Institution</i>	<i>Type of activity</i>
Alcatel SEL Stuttgart	Leonardo
Siemens Viena	Leonardo
UPC Barcelona	Leonardo
Politecnico di Torino	Leonardo
Loracom France Nancy	INCO/COPERNICUS
University of Catania Italy	INCO/COPERNICUS
University of Mining and Metallurgy Krakow	INCO/COPERNICUS, JOINT
MEDAV GmbH, Germany	Bilateral Contracts
Technische Universität Ilmenau, Germany	6FP, Socrates, DAAD
Meodat Meßtechnik, Germany	6FP
Geozondas Ltd., Lithuania	6FP
Ingenieur Büro Ralf Klukas, Germany	6FP
Vrije Universiteit Brussel, Belgium	6FP
Techische Universiteit Delft, Netherlands	6FP, COST, Socrates
Statens Rådningsverk, Sweden	6FP
Crabbe Consulting Ltd, Germany	6FP
Universitat Ramon Llull, Barcelona, Spain	COST
Technical University Budapest	COST
Technical University of Ljubljana	COST
Technical University of Clju-Napoca	COST
University of Firenze Italy	COST
University of Gent	COST

University of Maribor	COST
INESC Lisabon	COST
University of Sannio Italy	Leonardo / SOCRATES
University of Reggio Di Calabria Italy	Leonardo / SOCRATES
University of Mediteranea Italy	SOCRATES
Universite Jean Monnet-Saint-Etienne France	SOCRATES
ŠkodaAuto Mladá Boleslav, Czech Republic	Bilateral Contract

FACULTY ESSAYS

Čižmár Anton

Full professor

His research interests include speech processing, data compression, digital communications, project management, telecommunication technologies and services.

Doboš Lubomír

Associated professor

His current research interests include mobile and wireless communication systems with focus on Call Admission Control algorithms for next generation mobile systems, Routing protocols for Mobile Ad-Hoc systems, MIMO systems and Multimodal mobile systems and services (focus on Speech processing).

Drutarovský Miloš

Associated professor

His research interests include applied cryptography, digital signal processing, algorithms and architectures for embedded cryptographic architectures and sensor networks, digital signal processors, FPGAs, microcontrollers and soft microcontrollers embedded into the FPGAs.

Galajda Pavol

Associated professor

His research interests include nonlinear circuit's theory, nonlinearities in digital transmission systems, Chaos in spread spectrum communication systems, High Altitude Platforms (HAPs) and programmable logic devices- ALTERA and FPGA circuits.

Gamec Ján

Assistant professor

His general research interests include digital signal processing, block - matching algorithm and motion estimation.

Gamcová Mária

Assistant professor

Her general research interests include one and two-dimensional processing based on the method of digital filtering.

Glaďšová Iveta

Assistant professor

Her research interests are in the digital signal processing, geometric source coding and vector quantization, an algorithm for lattice and pyramid quantizers and codes.

Juhár Jozef

Associated professor

His research interests are in digital speech/audio processing and transmission, automatic speech/speaker recognition, speech synthesis, dialogue modelling and application of speech technologies in developing and deploying automatic voice services in telecommunications and Internet.

Klenovičová Zita*Assistant professor*

Her research interests include digital circuits and digital picture processing.

Kocur Dušan*Full professor*

His research interest is in spread spectrum communication systems; CDMA, MC-CDMA and UWB transmission systems; UWB radar signal processing and digital signal processing.

Levický Dušan*Full professor*

His research interests include UWB radar signal processing, spread spectrum communication systems (CDMA, MC-CDMA and UWB transmission systems), psychoacoustics.

Maceková Ludmila*Research assistant*

Her main interests and activities are focused on both areas of channel modelling for HAP communications and access networks.

Marchevský Stanislav*Full professor*

His main research interests are multidimensional digital filters, linear and non-linear digital filters for image processing, and design of multi-user detectors for CDMA signals from satellites.

Michaeli Linus*Full professor*

His research interests are the pre-processing systems in the instrumentation, modelling of AD and DA converters and methods for correction of their uncertainties, industrial measurement and virtual instrumentation.

Mihalík Ján*Full professor*

His current research interest includes signal and information theory, image and video coding, digital image and video processing, application the techniques of coding and processing in the standard image and video codecs, finally multimedia videocommunications in PSTN, mobile, ISDN, ATM telecommunication networks and Internet on the basis of the standards.

Ovseník Luboš*Associated professor*

His general research interests include fiber optics, fiber optical sensors and the fiber optical application in the microwave domain.

Šaliga Ján*Associated professor*

His general research interests include ADC testing, distributed measurement systems, measurement instruments, systems and methods.

Špány Viktor*Professor Emeritus*

His main interests and activities are in the non-linear circuits theory, smart sensors, flip-flop sensors, integrated functional blocks and statistical sensors.

Turán Ján*Full professor*

His main interests and activities are in the digital signal processing, Hough transform, rapid transform, fiber optics and its applications in communications, sensing and signal processing.

Zavacký Jozef*Assistant professor*

His current interest includes signal and information theory, sampling of the one-dimensional and multidimensional signals.

Ph.D. STUDENTS

<i>Name</i>	<i>Supervisor</i>	<i>Degree Course</i>
First year of study		
<u>Internal form:</u>		
Ing. Gabriel Bugár	prof. Levický	Telecommunications
Ing. Marián Chovanec	prof. Michaeli	Measurement technique
Ing. Peter Drotár	doc. Galajda	Infoelectronics
Ing. Martin Fifik	prof. Turán	Infoelectronics
Ing. Juraj Gazda	prof. Kocur	Infoelectronics
Ing. Pavol Kocan	prof. Marchevský	Telecommunications
Ing. Martin Lojka	doc. Juhár	Infoelectronics
Ing. Lenka Macková	prof. Čižmár	Telecommunications
Ing. Ján Mochnáč	prof. Marchevský	Infoelectronics
Ing. Marek Papco	doc. Juhár	Telecommunications
Ing. Marek Pradid	prof. Levický	Telecommunications
Ing. Ján Šterba	prof. Kocur	Telecommunications
Ing. Michal Varchola	doc. Drutarovský	Infoelectronics
<u>External form:</u>		
Ing. Vlastimil Fuňak	prof. Turán	Infoelectronics
Ing. Alexander Gilányi	prof. Turán	Infoelectronics
Ing. Rastislav Konkol'	doc. Šaliga	Measurement technique
Ing. Kamil Šindlery	prof. Marchevský	Infoelectronics
Second year of study		
<u>Internal form:</u>		
Ing. Michal Aftanas	doc. Drutarovský	Infoelectronics
Ing. Jozef Krahulec	prof. Marchevský	Telecommunications
Ing. Jozef Ratica	doc. Doboš	Telecommunications
Mgr. Jana Rovňáková	prof. Kocur	Infoelectronics
Ing. Michal Sakmár	doc. Šaliga	Measurement technique
Mgr. Mária Švecová	prof. Kocur	Infoelectronics
Ing. Tamás Tokár	prof. Levický	Telecommunications
<u>External form:</u>		
Ing. Rastislav Kokoška	prof. Marchevský	Telecommunications
Ing. Péter Szoboszlai	prof. Turán	Infoelectronics
Ing. Ján Turán jr.	prof. Marchevský	Infoelectronics
Third year of study		
<u>Internal form:</u>		
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- Juhár Jozef**, Member of ISCA International Affairs Sub-committee on Eastern Europe
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PUBLICATION ACTIVITY OF THE DEPARTMENT

Books:

1. KOCUR,D.-KOŠČ,P.: Institutional implementation of e-learning technologies at the Technical University of Košice. (Chapter in book). In: e-learning? e-learning!: Network Cultural Diversity and New Media, Berlin: Trafo verlag, 2007, pp.167-175.
2. LEVICKÝ,D.-RIDZOŇ,R.: Informačná bezpečnosť: Projekt NGN - Multimédiá, multimedialne ICT technológie, sieťové platformy. Bratislava, STU, 2007, 89pp.
3. LEVICKÝ,D.-RIDZOŇ,R.: Multimédia a multimedialne technológie. Bratislava, STU v spolupráci Agrogenofond Nitra, 2007, 93pp.
4. MIHALÍK,J.-ZAVACKÝ,J.: Diskrétné signály a sústavy. Košice, LČSOV, FEI TU, 2007, 189pp.
5. TURÁN,J.-OVSENÍK,Ľ.-TURÁN,J.Jr.: Projektovanie optických vláknových komunikačných a senzorových systémov. Harlequin, Košice, 2007, 287pp.

Journal Papers:

1. DRUTAROVSKÝ,M.-GALAJDA,P.: A robust chaos-based true random number generator embedded in reconfigurable switched-capacitor hardware. Radioengineering, Vol. 16, No. 3 (2007), pp.120-127.
2. ČOPJAN,Ľ.-KRAHULEC,J.-MARCHEVSKÝ,S.-BENČO,S.: 3-State channel model for land mobile satellite communication. Acta Electrotechnica et Informatica, Vol. 7, No. 2 (2007), pp.9-12.
3. FORIŠ,P.-LEVICKÝ,D.: Implementations of HVS models in digital image watermarking. Radioengineering, Vol. 16, No. 1 (2007), pp.45-50.
4. KRAJŇÁK,J.-DEUMAL,M.-PAVELKA,P.-KOCUR,D.-PIJOAN,J. L.-GALAJDA,P.: Multi-user detection of nonlinearly distorted MC-CDMA symbols by microstatistic filtering. In: Wireless Personal Communications, Springer Netherlands, DOI: 10.1007/s11277-007-9398-5, October 11 (2007), p.12.
5. MACEKOVÁ,Ľ.-GALAJDA,P.: High altitude platforms for communications and other wireless services. Acta Electrotechnica et Informatica, Vol. 7, No. 2 (2007), pp.13-17.
6. MACEKOVÁ,Ľ.-GALAJDA,P.-PALUBOVÁ,H.: Bezdrôtové komunikácie prostredníctvom HAP, platformiem plávajúcich v stratosfére. Slaboproudý Obzor, Vol. 61, No. 4 (2005), pp.1-6. (printed in 2007)
7. MICHAELI,L.-ŠALIGA,J.-KOLLÁR,M.: Parameters of band pass sigma delta ADC and the comparison with the standard ones. In: Measurement, Vol. 40, No. 5 (2007), pp.473-478.
8. MICHAELI,L.-ŠALIGA,J.- MICHALKO,P.: Triangular testing signal for identification of unified error model parameters. In: Measurement, Vol. 40, No. 5 (2007), pp.491-499.
9. MIHALÍK,J.-MICHALČIN,V.: Animation of 3D model of human head. Radioengineering, Vol. 16, No. 1 (2007), pp.58-66.
10. MIHALÍK,J.-KASÁR,M.: Basis of eigenfaces for tracking of human head. Journal of Electrical Engineering, Vol. 58, No. 3 (2007), pp.134-139.
11. OVSENÍK,Ľ.-TURÁN,J.: Opticky napájané senzorové systémy. Časopis pre elektrotechniku a energetiku, Vol. 13, október (2007), pp.134-139.
12. OVSENÍK,Ľ.-TURÁN,J.-TURÁN,J.Jr.: Multimedialny kurz: vzdelávanie nielen cez Internet. Časopis pre elektrotechniku a energetiku, Vol. 13, október (2007), pp.13-18.

13. PAVELKA,P.-KRAJŇÁK,J.-GALAJDA,P.-KOCUR,D.: Analysis of non-linear distortions in MC-CDMA systems. *Acta Electrotechnica et Informatica*, Vol. 7, (2007).
14. RIDZOŇ,R.-LEVICKÝ,D.: Robust digital watermarking based on the Log-polar mapping. *Radioengineering*, Vol. 16, No. 4 (2007), pp.76-81.
15. VARCHOL,P.-LEVICKÝ,D.: Using of hand geometry in biometric security systems. *Radioengineering*, Vol. 16, No. 4 (2007), pp.82-87.
16. TURÁN,J.-OVSENÍK,L.-TURÁN,J.Jr.: Multimedia teleeducation courseware: Adafox - modelling digital and analogue fiber optical networks. *Journal of Electrical Engineering*, Vol. 58, No. 5 (2007), pp.294-300.

Conference papers:

1. AFTANAS,M.-ROVNÁKOVÁ,J.-RIŠKOVÁ,M.-KOCUR,D.-DRUTAROVSKÝ,M.: An analysis of 2D target positioning accuracy for M-sequence UWB radar system under ideal conditions. In: *Radioelektronika 2007: Proceedings of 17th international conference*, Brno, Czech Republic, April 24-25, 2007, pp.189-194.
2. ČOPJAN,L.-KRAHULEC,J.-MARCHEVSKÝ,S.-BENČO,S.: Image transmission over the 3-states channel using MOE blind algorithm. In: *Radioelektronika 2007: Proceedings of 17th international conference*, Brno, Czech Republic, April 24-25, 2007, pp.233-236.
3. ČOPJAN,L.-KRAHULEC,J.-MARCHEVSKÝ,S.-BENČO,S.: 2-stage blind receiver based on the CM algorithm for MC-CDMA signals detection over the 3-states channel model. In: *2007 IWSSIP & EC-SIPMCS: Proceedings of 2007 14th International Workshop on Systems, Signals & Image Processing (IWSSIP) & EURASIP Conference Focused on Speech & Image Processing, Multimedia Communications & Services (EC-SIPMCS)*, University of Maribor, Slovenia, 2007, pp.265-268.
4. ČOPJAN,L.: Performance of the blind 2-stage receiver over AWGN chann. In: *7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition*, Košice, Slovakia, 2007, pp.23-24.
5. DOBOŠ,L.-PATLEVIČ,P.: Implementation of Fuzzy Logic in CAC. In: *RTT 2007: Research in Telecommunication Technology 2007*, Žilina, Slovakia, 2007, 5pp.
6. DRUTAROVSKÝ,M.-GALAJDA,P.: A robust chaos-based True Random number generator embedded in reconfigurable Switched-capacitor hardware. In: *Radioelektronika 2007: Proceedings of 17th international conference*, Brno, Czech Republic, April 24-25, 2007, pp.63-68.
7. ENYEDI,B.-KONYHA,L.-FAZEKAS,K.-TURÁN,J.: License plate localization and storage method. In: *2007 IWSSIP & EC-SIPMCS: Proceedings of 2007 14th International Workshop on Systems, Signals & Image Processing (IWSSIP) & EURASIP Conference Focused on Speech & Image Processing, Multimedia Communications & Services (EC-SIPMCS)*, University of Maribor, Slovenia, 2007, pp.441-444.
8. ENYEDI,B.-KONYHA,L.-FAZEKAS,K.-TURÁN,J.: Small tricks to enhance the accuracy of license plate character recognition. In: *SIGMAP 2007: Proceedings of the Second International Conference on Signal Processing and Multimedia Applications*, Setúbal: INSTICC, 2007, pp.125-128.
9. HAZE,J.-VRBA,R.-FUJČIK,L.-FOREJTEK,J.-ZAVORAL,P.-PAVLIK,M.-MICHAELI,L.: Bandpass Sigma-Delta modulator for capacitive pressure sensor. In: *IMTC/2007: 2007 IEEE Instrumentation and Measurement Technology*, 2007, 6pp.

10. JUHÁR,J.-ONDÁŠ,S.-LUKČO,J.-ZOMBEK,J.: Speech interface to the bus and city buses timetable information. In: RTT 2007: Research in Telecommunication Technology 2007, Žilina, Slovakia, 2007, 4pp.
11. KASÁR,M.: Estimation of animation parameter of human eyes. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.15-16.
12. KATRÁK,M.: Speech recognition using neural network. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.35-36.
13. KATRÁK,M.: Speech recognition using neural network. In: RTT 2007: Research in Telecommunication Technology 2007, Žilina, Slovakia, 2007, 5pp.
14. KLENOVIČOVÁ,Z.-RIDZOŇ,R.-LEVICKÝ,D.: Digital watermarks and their applications. In: RTT 2007: Research in Telecommunication Technology 2007, Žilina, Slovakia, 2007, 5pp.
15. KOCUR,D.-KOŠČ,P.: Recommendations for Institutional Implementation of e-Learning Technologies. The 5th Int. Conference on Emerging e-learning Technologies and Applications (ICETA'2007). September 6-8, 2007, The High Tatras, Slovakia, pp. 451-456.
16. KRAHULEC,J.: The extended Suzuki proces of type I. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.37-38.
17. KRAHULEC,J.-ČOPJAN,E.-GALAJDA,P.-MARCHEVSKÝ,S.: Performance of blind CM receiver for multiple fading channels for HAP systems, COST 297 Workshop, Wroclaw, Poland, October 2007.
18. KRAJŇÁK,J.-DEUMAL,M.-PAVELKA,P.-KOCUR,D.-PIJOAN,L.-GALAJDA,P.: Multi-user detection of nonlinearly distorted MC-CDMA symbols by microstatistic filtering. In: Proceedings of 4th and Final Workshop, Contributions to Spectrum and Power Efficient Broadband Communications, Gothenburg, Sweden, April 11-12 (2007), 5pp.
19. MICHAELI,L.-SAKMÁR,M.-ŠALIGA,J.: Some errors of analogue signal sources for ADC exponential stimulus histogram test. In: ADC Modelling and Testing: 12th TC-4 International Workshop, Iasi: CERMI, 2007, pp.51-56.
20. MICHAELI,L.-ŠALIGA,J.-SOCHOVÁ,L.: Integral nonlinearity correction algorithm based on error table optimizing and noise filtering. In: Measurement 2007: 6th International Conference on Measurement, Bratislava, Slovakia, 2007, pp.30-33.
21. MIHALÍK,J.-KASÁR,M.: Shaping of geometry of 3D human head model. In: Radioelektronika 2007: Proceedings of 17th international conference, Brno, Czech Republic, April 24-25, 2007, pp.483-486.
22. MIKULÍK,P.-MICHAELI,L.-ŠALIGA,J.: Non-linear Volterra model identification of industrial Glue-application system. In: IMTC/2007: 2007 IEEE Instrumentation and Measurement Technology, 2007, 4pp.
23. MIRILOVIČ,M.: On the way to language modeling for automatic speech recognition in Slovak. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.39-40.
24. MIRILOVIČ,M.-ČIŽMÁR,A.-PAPCO,M.: Automatic speech recognition in Slovak based on SONIC Toolkit. In: RTT 2007: Research in Telecommunication Technology 2007, Žilina, Slovakia, 2007, 5pp.

25. MIRILOVIČ,M.-ČIŽMÁR,A.-JUHÁR,J.: Automatic segmentation of Slovak words into morphemes. In: RTT 2007: Research in Telecommunication Technology 2007, Žilina, Slovakia, 2007, 5pp.
26. ONDÁŠ,S.: Principles of voice services design for IRKR communicator. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.17-18.
27. ONDÁŠ,S.-JUHÁR,J.-VALO,L.: Evaluation tool for spoken dialogue system and its services. In: RTT 2007: Research in Telecommunication Technology 2007, Žilina, Slovakia, 2007, 4pp.
28. ONDÁŠ,S.-JUHÁR,J.-LOJKA,M.: Speech interface for controlling of Windows applications in Slovak. In: RTT 2007: Research in Telecommunication Technology 2007, Žilina, Slovakia, 2007, 4pp.
29. PALUBOVÁ,H.: Frequency and time synchronization for OFDM systems. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.41-42.
30. PAPA,J.-PLEVA,M.-ČIŽMÁR,A.-DOBOŠ,L.-JUHÁR,J.-ONDÁŠ,S.: MOBILTEL - mobile multimodal telecommunications systems and services. In: Radioelektronika 2007: Proceedings of 17th international conference, Brno, Czech Republic, April 24-25, 2007, pp.517-520.
31. PAPA,J.-PLEVA,M.: Introduction to project Mobiltel. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.19-20.
32. PAPA,J.-DOBOŠ,L.-ČIŽMÁR,A.: Security as a QoS parameters in MANET networks. In: RTT 2007: Research in Telecommunication Technology 2007, Žilina, Slovakia, 2007, 5pp.
33. PATLEVIČ,P.: Fuzzy-based CAC scheme. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.25-26.
34. PAVELKA,P.-KRAJŇÁK,J.-GALAJDA,P.-KOCUR,D.: Efficient design procedure of microstatistic multi-user detector for nonlinearly distorted MC-CDMA. In: Radioelektronika 2007: Proceedings of 17th international conference, Brno, Czech Republic, April 24-25, 2007, pp.147-152.
35. PAVELKA,P.-GALAJDA,P.-KRAJŇÁK,J.-KOCUR,D.: Methods for Decreasing the Sensitivity of Multicarrier Systems to Nonlinear Amplification, Fourth Management Committee meeting of COST Action 297, Prague, Czech Republic, March 2007.
36. PAVELKA,P.: An efficient implementation of predistortion technique for nonlinearly distorted OFDM. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.27-28.
37. PLEVA,M.-PAPA,J.-ČIŽMÁR,A.-DOBOŠ,L.-JUHÁR,J.-ONDÁŠ,S.-MIRILOVIČ,M.: Towards to mobile multimodal telecommunications systems and services. In: Verbal and Nonverbal Communication Behaviours: COST Action 2102 International Workshop, Berlin: Springer-Verlag, 2007, pp.286-293.
38. PLEVA,M.-JUHÁR,J.-ČIŽMÁR,A.: Slovak broadcast news speech corpus for automatic speech recognition. In: RTT 2007: Research in Telecommunication Technology 2007, Žilina, Slovakia, 2007, 4pp.

39. RATICA,J.-DOBOŠ,L.: Mobile Ad-Hoc networks connection admission control protocols overview. In: Radioelektronika 2007: Proceedings of 17th international conference, Brno, Czech Republic, April 24-25, 2007, pp.181-184.
40. RATICA,J.: Connection admission control protocols in mobile ad-hoc networks. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.43-44.
41. RIDZOŇ,R.-LEVICKÝ,D.: Log-polar mapping in robust digital image watermarking. In: Radioelektronika 2007: Proceedings of 17th international conference, Brno, Czech Republic, April 24-25, 2007, pp. 525-528.
42. RIDZOŇ,R.-KLENOVIČOVÁ,Z.-LEVICKÝ,D.: Digital watermarking in multimedia. In: RTT 2007: Research in Telecommunication Technology 2007, Žilina, Slovakia, 2007, 4pp.
43. RIDZOŇ,R.-LEVICKÝ,D.: DRM based on the robust digital watermarking. In: Komunikačné a informačné technológie: 4. vedecká konferencia s medzinárodnou účasťou, Tatranské Zruby, Slovakia, October 3-5, 2007, 6pp.
44. RIŠKOVÁ,M.-ROVNÁKOVÁ,J.-AFTANAS,M.: M-sequence UWB radar architecture for throughwall detection and localisation. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.29-30.
45. SAMCOVIC,A.-TURÁN,J.: Digital image watermarking by spread spectrum. In: Advances in communications : Proceedings of the 11th WSEAS International Conference on Communications (part of the 2007 CSCC Multiconference), S.l.: WSEAS Press, 2007, www.wseas.org, pp.29-32.
46. SERFOZO,P.-TURÁN,J.-VÁSÁRHELYI,J.-VARGA,A.: Mojette transform and hardware development work for applications. In: MicroCAD 2007: International Scientific Conference, Miskolc: UM ITTC, 2007, pp.29-36.
47. SOCHOVÁ,L.: Correction of ADCs integral nonlinearity. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.21-22.
48. TOKÁR,T.-LEVICKÝ,D.: Robust watermarking of gray scale images by using synchronization templates. In: Radioelektronika 2007: Proceedings of 17th international conference, Brno, Czech Republic, April 24-25, 2007, pp.551-554.
49. TOKÁR,T.: Synchronization templates in digital watermarking. In: 7th PhD Student Conference and Scientific and Technical Competition of Students of Faculty of Electrical Engineering and Informatics Technical University of Košice: Proceeding from conference and competition, Košice, Slovakia, 2007, pp.45-46.
50. TOKÁR,T.-LEVICKÝ,D.: Robustná digitálna vodotlač na báze synchronizačnej šablóny. In: Komunikačné a informačné technológie: 4. vedecká konferencia s medzinárodnou účasťou, Tatranské Zruby, Slovakia, October 3-5, 2007, 5pp.
51. TURÁN,J.-TURÁN,J.Jr.-OVSENÍK,L.-MARCHEVSKÝ,S.: Image processing with invertible Rapid transform. In: Radioelektronika 2007: Proceedings of 17th international conference, Brno, Czech Republic, April 24-25, 2007, pp.555-558.
52. TURÁN,J.-TURÁN,J.Jr.-OVSENÍK,L.: Invariant associative image memory based on trace transform and KLT. In: MIPRO 2007: 30th Jubilee International Convention, Rijeka, Croatia, May 2007, pp.246-248.

53. TURÁN,J.-OVSENÍK,L.-TURÁN,J.Jr.: Architecture of transform based invariant feature memory. In: 2007 IWSSIP & EC-SIPMCS: Proceedings of 2007 14th International Workshop on Systems, Signals & Image Processing (IWSSIP) & EURASIP Conference Focused on Speech & Image Processing, Multimedia Communications & Services (EC-SIPMCS), University of Maribor, Slovenia, 2007, pp.281-284.
54. VARCHOL,P.-RIDZOŇ,R.-LEVICKÝ,D.: Modern authentication methods. In: RTT 2007: Research in Telecommunication Technology 2007, Žilina, Slovakia, 2007, 6pp.
55. VARCHOL,P.-LEVICKÝ,D.: Implementation of Gaussian mixture models for biometric security. In: Komunikačné a informačné technológie: 4. vedecká konferencia s medzinárodnou účasťou, Tatranské Zruby, Slovakia, October 3-5, 2007, 6pp.

Thesis

1. FILO,P.: Transformačné metódy estimácie parametrov systémov obrazov. PhD. diz. práca FEI TU Košice, Slovakia, December 2007, 113pp. (in Slovak).
2. FUTÓ,J.: Identifikácia invariantov sebedobnosti v sieťových prenosoch generovaných činnosťou dištančne pracujúceho pracovníka. PhD. diz. práca FEI TU Košice, Slovakia, June 2007. (in Slovak).
3. KASÁR,M.: Klonovanie ľudskej hlavy pomocou geometrických a textúrových modelov. PhD. diz. práca FEI TU Košice, Slovakia, December 2007. (in Slovak).
4. ŠVAČ,P.: Two-Shift Complementary Code Elements and Their Application to Mobile Communications. Dissertatation Thesis for Ph.D. degree. FEI TU of Košice, Slovakia, December 2007, 119 pp.

Other

1. DÚHA,J.-MARCHEVSKÝ,S.-RÓKA,R.-TRÚCHLY,P.-WIESER,V.: Technológie v prístupových sieťach a procesy ich integrácie do NGN. Vydavateľstvo STU v Bratislave v spolupráci s AGROGENOFOND Nitra, Bratislava, 2007.
2. GALAJDA,P.: Lomnický štít- the peak in the High Tatras- reaching 2632m (SAP- Small Altitude Platform), Fourth Management Committee meeting of COST Action 297, Prague, Czech Republic, March 2007.
3. KOCUR,D.-DRUTAROVSKÝ,M.-HRONCOVÁ,I.: Psychoacoustic Toolbox. Algorithms and Matlab Source Codes for Basic Psychoacoustic Parameters Evaluation. Technical Report of the project Psycho-acoustic Toolbox Development. Technical University of Košice, September 2007, 130 pp.
4. MARCHEVSKÝ,S.-PAPAJ,J.-PLEVA,M., a.kol.: Uživatelská príručka a inštalačná príručka s metodikou merania a spracovania dát z meraní ADSL2+ liniek. Technická univerzita v Košiciach, Fakulta elektrotechniky a informatiky, Košice, 2007.
5. MARCHEVSKÝ,S.-GALAJDA,P.-GAMEC, J. a kol.: Návrh koncepcie, meranie a overenie schopnosti jednotlivých častí prístupovej siete prenášať signály pre DSL a 3PP služby. Technická univerzita v Košiciach, Fakulta elektrotechniky a informatiky, Košice, 2007.
6. MIRILOVIČ,M.-JUHÁR,J.-ČIŽMÁR,A.: Steps towards the stochastic language modelling in Slovak. In: ECMS 2007: 8th International Workshop on Electronics, Control, Modelling, Measurement and Signals, Technical University of Liberec, Czech Republic, 2007, pp.19.
7. ONDÁŠ,S.-JUHÁR,J.: Automatic evaluation of Slovak spoken language dialogue system. In: ECMS 2007: 8th International Workshop on Electronics, Control, Modelling, Measurement and Signals, Technical University of Liberec, Czech Republic, 2007, pp.20.

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