
DEPARTMENT OF ELECTRONICS AND MULTIMEDIA TELECOMMUNICATIONS

Department Of
Electronics
& Multimedia Communications



Annual Report
2006

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 2006

Edited by Ľuboš Ovseník

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BRIEF OVERVIEW

Profile of the Department

The Department specializes in three main areas:

Electronics

- research within this area is concentrated on electronics systems and methods for digital signal processing.

The Department organizes an international conference on Digital Signal Processing every three years, the only one conference about DSP in Slovakia.

Measurement Technique

Research in the area of data acquisition and primary data processing is orientated towards the sensors with direct digital output and simulation of A/D convertors which includes elements of artificial intelligence. We cooperate in this area with universities in USA and Italy.

Telecommunications

- research within this area is concentrated on transmission of multimedia information (e.g. images, text, graphics, video and speech signals).

History of the Department

September 1969 - Foundation of the Department. It has been separated from the Department of Electrotechnics of the Faculty of Mechanical Engineering in Košice, arising at the same time as the Faculty of Electrotechnics of TU. The first head of the Department was Doc. Ing. Viktor Špány, CSc., who until then was working at the Department of Electrotechnics of the Faculty of Mechanical Engineering. Taught subjects: Electronic Circuits I., II., Applied Electronics I., II. and Signals and Systems . The research was aimed at a modernization and digitalization of studio equipments of the fifth generation for Tesla Electroacoustics. From 1974, Ing. Jozef Felix, CSc. began working at the Department as an external teacher.

1974 - Specialization of the Department narrowed. It became a guarant of a new direction named Electronic Systems opened within a study branch Technical Cybernetics. The same year the name of the Department has been changed to the Department of the Electronic Circuits and Systems.

1975 - The Department takes part in a development of special measurement instruments for cosmic radiation registration in the radiation belts of the Earth within the international research project Intercosmos. Developed equipments were placed on balloons and satellites. Prof. Ing. Ján Chmúrny, CSc. began working externally at the Department.

1979 - Breakpoint in the history of the Department. The Department became a guarant of a new study branch Radioelectronics. At the same time the name of the Department has been changed to

the Department of Radioelectronics. New subjects were added according to the new direction of the Department. The research became orientated beside to the program Intercosmos also to the digital processing of image and speech signals.

1985 - Department is involved in a state research program Sensors and Sensor Systems. The program was aimed at the special types of sensors and sensor signal processing.

1986 - Doc. Ing. Dušan Levický, CSc. became the head of the Department. During the years 1985 - 1989 the Department closely cooperated with industrial background (VSŽ Košice, VSE Košice, Tesla Piešťany, VÚ 060 Liptovský Mikuláš etc.).

1990 - Department organisation is reconstructed. Research is aimed at institutional, grant and international projects. R&D is oriented toward two main streams:

electronics

- acquisition and primary signal processing obtained from sensors with direct digital output
- A/D convertors simulation using artificial intelligence elements

telecommunications

- processing and transmitting of multimedia information
- digital signal processing in multimedia telecommunications
- processing of visual signals in intelligent telecommunication terminals
- digital image processing and image transmitting at low bit rates

1996 - Name of the Department changes for the third time - Department of Electronics and Multimedia Communications. It mirrors the new trends in research and education at the Department.

1998 - Study course Radioelectronics is modified and renamed to the Electronics and Telecommunication Technics so as to be equivalent with study courses abroad.

DEPARTMENT STAFF AND STRUCTURE

Total number of staff members is 25.

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

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

- ◆ Assistant Professors: Mária Gamcová, Ján Gamec, Iveta Gladišová, Zita Klenovičová, Jozef Zavacký

- ◆ Research Assistant: Ľudmila Maceková, Ján Papaj, Matúš Pleva

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

- ◆ Ph.D. students:
Internal form: Michal Aftanas, Ľubomír Čopjan, Miroslav Kasár, Miroslav Katrák, Jozef Krahulec, Jozef Krajňák, Michal Mirilovič, Stanislav Ondáš, Henrieta Palubová, Peter Patlevič, Pavol Pavelka, Jozef Ratica, Radovan Ridzoň, Mária Rišková, Jana Rovňáková, Michal Sakmár, Lenka Sochová, Anton Štofa, Tamás Tokár, Peter Varchol
External form: Miroslav Baboľ, Pavol Cabúk, Szabolcz Csernok, Sakhia Darja, Marek Domaracký, Vladimír Frolek, Juraj Futó, Imrich Harčár, Viktor Homolya, Ľubomír Horniak, Rastislav Kokoška, Miloš Kováč, Marián Krivda, Štefan Lipovský, Martin Lukáč, Renáta Nováková, Ján Papaj, Slavomír Pilár, Milan Rusko, Péter Serfozo, Péter Szoboszlai, Tomáš Straka, Jozef Študenc, Pavol Švač, Ján Turán, Marián Zlacky, Peter Želinský

DIVISIONS OF THE DEPARTMENT

Laboratory of Multimedia Communications

Head: prof. prof. Ing. Dušan Levický, CSc., Member of the IEEE

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Laboratory of Digital Image Processing and Videocommunication

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COURSES

Bachelor Degree Course (title Bc.) – Telecommunications Engineering

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.) – Electronics

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

Subject	Semester	Lectures/exercises (hours per week)	Name of Lecturer
Basics of Electronics	1 st year	3/2	Micheali,
Digital Electronics	2 nd year	3/2	Klenovičová
Electronic Measurement systems	2 nd year	3/2	Šaliga
Circuit theory	2 nd year	3/2	Kocur
Electromagnetic Waves and Antennas	4 th	3/2	Ovseník
Programming Tools for Electronics and Telecommunications	2 nd year	2/2	Drutarovský, Šaliga
Signals and Systems	4 th	3/2	Mihalík, Gladišová
Basis of telecom. Technology	2 nd year	3/2	Levický
Electroacoustics	2 nd year	3/2	Juhár
Microelectronic Circuits	2 nd year	3/2	Michaeli
Telecommunication Networks	3 rd year	3/2	Čižmár
Transmission Systems	3 rd year	3/2	Čižmár
Switching Systems	3 rd year	3/2	Marchevský
Semestral Projects	3 rd year	0/2	Galajda
Measurement in Telecommunications	3 rd year	3/2	Šaliga
Optoelectronic Communication Systems	3 rd year	3/2	Turán
Videocommunications	5 th	3/2	Mihalík
Telecommunication Services	3 rd year	3/2	Čižmár
Management of Telecommunication Networks	3 rd year	3/2	Čižmár
Security of Communications Networks	3 rd year	3/2	Levický
Multimedia Communications	3 rd year	3/2	Levický
Satellite Communications	3 rd year	3/2	Marchevský
Mobile Communication Systems	3 rd year	3/2	Doboš

Study plan for MSc. degree

Subject	Semester	Lectures/exercises (hours per week)	Name of Lecturer
Transmission of Information in Electroenergetics	3 rd year	2/2	Čižmár
Analog Electronic Systems	5 th	2/2	Zavacký
Electronic Systems	3 rd year	3/2	Galajda
Linear Analog Circuits	3 rd year	4/3	Kocur
Microwave Technology	3 rd year	3/2	Gamec
Digital Electronics	3 rd year	3/2	Levický
Electronic Devices	3 rd year	3/3	Gamec
Digital Communication Systems	3 rd year	3/3	Levický
Non-Linear Analog Circuits	3 rd year	4/3	Michaeli
Signals and Systems	6 th	3/3	Zavacký
Design of Electronic Equipment	3 rd year	3/2	Doboš
Acoustics	3 rd year	3/2	Juhár
Electronic Systems with FPGA Circuits	3 rd year	2/3	Drutarovský, Galajda
Metrology and Industry Measurements	3 rd year	2/2	Michaeli
Radioelectronic Measurement	4 th year	3/3	Šaliga
Electronic Systems with Microprocessors	4 th year	3/2	Drutarovský
Digital Signal Processing	7 th	3/3	Mihalík
Optoelectronics	7 th	3/2	Turán
Switching Systems	4 th year	3/2	Marchevský

Subject	Semester	Lectures/exercises (hours per week)	Name of Lecturer
Coding and Modulation	4 th year	2/2	Čižmár
Semestral Projects	4 th year	0/2	Marchevský
Digital Transmission Systems	4 th year	3/2	Čižmár
Signal Processors in Telecommunications	4 th year	3/2	Drutarovský
TV Systems	4 th year	3/2	Marchevský
Analog & Digital Interfaces	4 th year	3/2	Michaeli, Šaliga
Optoelectronic Communications Systems	8 th	3/2	Turán
Digital Filters	4 th year	2/2	Kocur, Drutarovský
Applied Cryptography	4 th year	2/2	Levický
Digital Audio Processing and Transmission	4 th year	3/2	Juhár
Photonics	9 th	3/2	Turán
Medical Electronics	5 th year	3/2	Michaeli
Sensor Systems	5 th year	3/2	Michaeli
Radioelectronic Systems	5 th year	3/2	Doboš
Multimedia Communications	5 th year	3/2	Levický
Satellite Communications	5 th year	3/2	Marchevský
Digital Image Communication Systems	9 th	3/3	Mihalík
Mobile Communications Systems	5 th year	3/2	Doboš
Spread Spectrum Communication Systems	5 th year	3/2	Kocur
Diploma Projects	5 th year	0/8	Galajda
Choice Chapters from Electronics and Telecommunication Techniques	5 th year	4/0	Marchevský

RESEARCH AND PROJECTS

Title of the Project: *Digital Signal Processing, Transmission, Recognition and Protection in Multimedia Communications*

Funding: VEGA 1/1057/04

Duration: 2004-2006

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

Group members: A. Čížmár, S. Marchevský, D. Kocur, M. Drutarovský, J. Juhár, Ľ. Doboš, Z. Klenovičová, M. Gamcová, Ľ. Maceková, R. Hovančák, R. Ridzoň, S. Lihan, P. Foriš, J. Krajňák, M. Pleva, M. Šimka, S. Šurin, P. Varchol

Scientific goals/research targets:

- ◆ Design of the new methods for image coding and digital image watermarking in information technologies for multimedia communications as well as new methods for message transmission by using steganography
- ◆ Verification of robustness watermarks in proposed methods
- ◆ Design of the new method of speech recognition in voice interactive dialog systems.
- ◆ Design of new methods of digital signal transmission by using CDMA and multi-user detection.
- ◆ Design of the new methods for digital image filtration from point of view digital image processing and image quality enhancement.

Results Achieved:

- ◆ Design of new method for digital watermarking of color image by using DWT and DCT and methods for multiembedding watermarks.
- ◆ Analysis selected types of attacks on digital watermarks and robustness of watermark techniques.
- ◆ Design of new methods for building up subliminal channels in steganography.
- ◆ Design of new embedded cryptographic architectures based on FPGA.
- ◆ Design of new method of speech recognition and its implementation in interactive information system.
- ◆ Design new modifications of adaptive LMS filters for image filtering.
- ◆ Development of a new structure and design procedure of complex multichannel microstatistic filters with application for non-linear multi-user receivers of MC-CDMA transmission systems.

Title of the Project: *ICT networks and services convergency in communication infrastructure of SR*

Funding: S000095 / National programme for R&D “Building of information society”

Collaboration with: STU Bratislava, ŽU Žilina, VUS B. Bystrica

Duration: 2004-2006

Co-ordinator: doc. Ing. Ľubomír Doboš, CSc. (WP6)

prof. Ing. Dušan Levický, CSc. (WP4, WP13)

Group members: M. Drutarovský, P. Foriš, R. Hovančák, R. Ridzoň, M. Šimka, S. Šurin

Scientific goals/research targets:

- ◆ The main objective of the project is research and development of telecommunication network and services for NGN in public and private telecommunication networks of SR.
 - ◆ WP4 : Data security analysis in NGN
 - ◆ WP6: R&D of NGN conception for SR infrastructure from point of view data security
 - ◆ WP13: Implementation of data security in NGN environment

Results Achieved:

- ◆ Design of new methods for data security in NGN based on enciphering.
- ◆ Design of new method for ownerships protection by using digital watermarking in NGN.

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: *Smart spoken language communication system*

Funding: S00034 / National programme for R&D “Building of information society”

Collaboration with: STU Bratislava, SAV Bratislava, ŽU Žilina

Duration: 2003-2006

Co-ordinator: doc. Ing. Jozef Juhár, PhD.

Group members: L. Doboš, A. Čížmár, D. Levický, S. Lihan, M. Pleva, M. Kováč, J. Papaj, M. Baboľ, M. Lukáč, S. Ondáš, M. Mirilovič, P. Varchol, J. Gamec, I. Gladišová

Scientific goals/research targets:

- ◆ The main objective of the project is research and development of a smart automated voice-interactive dialogue system, enabling the access to distributed information via conversational human-machine dialogue. The solution should have the the following main properties:
 - ◆ The dialogue system will enable spoken language interaction in Slovak.
 - ◆ Communication through PSTN, GSM and VoIP telecommunication network
 - ◆ The system will consists of I/O telephone unit, speech recognition unit, natural language understanding unit, dialogue management unit, natural language generation unit, speech synthesis module and module for communication with external database.
 - ◆ Open and modular architecture allowing further extensibility to other languages, modalities, and ability to modify them for different purposes.

- ◆ The functionality of the system will be proved with minimal two pilot applications from two specific domains (e.g. telecommunications, traveling, ...).

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

Funding: COST 289

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

Duration: 2003-2007

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

Group members: M. Drutarovský, P. Galajda, S. Marchevský, J. Krajňák, Ľ. 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 a new structure of complex multichannel microstatistic filters.
- ◆ Development of a design procedure of complex multichannel microstatistic filters.
- ◆ Development of new kind of multi-user receiver for MC-CDMA transmission systems based on complex multi-channel microstatistic filter application referred to complex microstatistic multi-user receiver.
- ◆ The analysis of the performance properties of complex microstatistic multi-user receiver of MC-CDMA transmission systems under different scenarios.

- ◆ The analysis of the performance properties of complex microstatistic multi-user receiver of MC-CDMA transmission systems under presence of a high level of peak-to-average power ratio of transmitter (so-called PAPR effect).
- ◆ Design of new methods for performance improvement of MC-CDMA and OFDM transmission systems under presence of a high level of peak-to-average power ratio of transmitter (so-called PAPR effect).
- ◆ Analysis and comparison of performance properties of blind minimum output energy algorithm and conventional detection for CDMA receivers.

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. Rišková, 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.

Project will be strongly harmonization with the project Ultra Wideband Radio application for localisation of hidden people and detection of unauthorised objects (project of the 6th frame program of EU, acronym: RADIOTECT, Contract Number: COOP-CT-2006-032744, project duration: January 1, 2007- December 31, 2008).

Results Achieved:

- ◆ Introduction into UWR radar - fundamentals of UWB radar technology.

Title of the Project: Using *ICT technologies and new generation network platforms in education*

Funding: 2003 SP 20/028 01 04 / National programme for R&D “Building of information society”

Collaboration with: ŽU Žilina, STU Bratislava, SPU Nitra, UKF Nitra, ZCV Bratislava, SANET Bratislava, Asociácia projektu INFOVEK Bratislava, ELFA, s.r.o., Košice

Duration: 2003-2006

Co-ordinator: prof.Ing.Stanislav Marchevský, CSc. (WG3, WG7, WG10)

prof. Ing. Dušan Levický, CSc. (WG12)

Group members: V. Baláž, S. Benčo, L. Čopjan, M. Drutarovský, P Foriš, P Galajda, A. Galajdová, M. Gamcová, J. Gamec, I. Gladišová, M. Grega, R. Hovančák, K. Harčarufková, P. Horovčák, Z. Klenovičová, D. Kocur, P. Košč, A. Lavrín, L. Michaeli, L. Ovseník, R. Ridzoň, J. Šaliga, J. Turán

Scientific goals/research targets:

- ◆ Proposal of new pedagogical approaches and proposal of innovation methodology for e-learning, e-consulting and cooperative work based on effective and optimal using new generation ICT and converged telecommunication and IP networks (included proposal of necessary changes of Ministry of education, SR regulations).
- ◆ Proposal of conception of integrated virtual hardware platform for e-learning, e-consulting and cooperative work based on new generation ICT and converged telecommunication and IP networks and its pilot implementation.
- ◆ Proposal and development of software tools (environs) for management, administration and implementation of courses and application of e-learning, e-consulting and cooperative work in environment of designed integrated virtual platform.
- ◆ Proposal of security techniques for e-learning

Results Achieved:

- ◆ Design of new conceptions and structures of possible type architectures of hardware platforms and software platforms (configurations) for e-learning, e-consulting and e-cooperative work implemented in converged technologies and NGN environment with taking account and using:
 - Properties and capabilities of new generation technology and network platforms
 - Variability from point of view of different type of technologies: fixed, mobile, and satellite
 - ◆ Methods for network security in LMS in e-learning
 - ◆ Development of methodology for authentization and autorification of education material based on digital watermarking
 - ◆ Development and implementation of pilot platform for e-learning, e-consulting and cooperative work (HW, SW configuration, ICT infrastructure)
-

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 upon 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 and power amplifier linearization for HAP applications.
 - ◆ The analysis of the state of art in the field of software defined radio for HAP applications.

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 spitted 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 informe 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, Ľ. Ovseník, D. Šiškovíčová, 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 Monet Negro, 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>
ATM Laboratory	ATM Laboratory Network, ATM Switch.
DSP Laboratory	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 (www.kemt.fei.tuke.sk/adsp).
Laboratory of Measurement	Hardware and software development tools for Altera FPGAs, UP-1, UP-3, NIOS II and Stratix DSP development boards. The laboratory is supported by the Altera University program (www.kemt.fei.tuke.sk/fpga).
Laboratory of Embedded Microcontrollers	Laboratory of Measurement (Special precise measurement system for dynamic ADC testing. Testing stand is equipped by calibrated Stanford Research DS 360, Data acquisition system with software tools based on LabWindows/CVI for ADC parameter estimation according to IEEE 1057, IEEE 1241 Std). Data Acquisition Systems controlled by LabVIEW for laboratory and industrial virtual measurement based on Allan Bardley HW components.
Laboratory of Optoelectronics	Development tools for single chip Analog Devices ADuC 83x MicroConverters (Intel 8052 compatible), Freescale ZigBee compliant HCS08 microcontrollers, Cypress PSOC mixed-signal array microcontrollers, embedded Altera RISC soft processor NIOS II.
Laboratory of TV System	Development tools for optical fibre communications training systems and optical desk with He-Ne laser.
Laboratory of Microwave Technology	Special TV system for teaching.
Laboratory of Speech Technology for Telecommunications	Development tools for microwave training systems.
Laboratory of Mobile Communication Technology	Development tools for automatic speech recognition systems and automatic voice services in telecommunications and Internet.
	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

International Co-operation

<i>Institution</i>	<i>Type of activity</i>
Alcatel SEL Stuttgart	Leonardo
Siemens Viena	Leonardo
UPC Barcelona	Leonardo
Politechnico 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 Contract
Technical University Ilmenau Germany	SOCRATES
Technical University Budapest	COST
Technical University of Ljubljana	COST
Technical University of Delft	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 (digital filters and order spectral analysis), algorithms and architectures for embedded cryptographic architectures, digital signal processors, FPGAs and soft microcontrollers embedded into the FPGAs.

Galajda Pavol

Associated professor

His research interest is in nonlinear circuit's theory, CHAOS in spread spectrum communication systems, High Altitude Platforms (HAPs), Software Defined Radio (SDR) 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 main interests and activities are in the multimedia communications, cryptography and watermarking.

Maceková Ludmila*Research assistant*

Her main interest includes design and implementation algorithms for two and three-dimensional filters for image processing, and also broadband communications for HAPS.

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. Michal Aftanas	doc. Drutarovský	Infoelectronics
Ing. Jozef Krahulec	prof. Marcheviský	Telecommunications
Ing. Jozef Ratica	doc. Doboš	Telecommunications
Mgr. Mária Rišková	prof. Kocur	Infoelectronics
Mgr. Jana Rovňáková	prof. Kocur	Infoelectronics
Ing. Michal Sakmár	doc. Šaliga	Measurement technique
Ing. Tamás Tokár	prof. Levický	Telecommunications
<u>External form:</u>		
Ing. Rastislav Kokoška	prof. Marcheviský	Telecommunications
Ing Péter Szoboszlai	prof. Turán	Infoelectronics
Ing. Ján Turán	prof. Marcheviský	Infoelectronics
Second year of study		
<u>Internal form:</u>		
Ing. Miroslav Katrák	doc. Juhár	Telecommunications
Ing. Henrieta Palubová	doc. Galajda	Infoelectronics
Ing. Peter Patlevič	doc. Doboš	Telecommunications
<u>External form:</u>		
Ing. Sakhia Darja	prof. Čižmár	Telecommunications
Ing. Juraj Futó	prof. Turán	Infoelectronics
Ing. Ľubomír Horniak	prof. Michaeli	Measurement technique
Ing. Renáta Nováková	prof. Levický	Telecommunications
Ing. Milan Rusko	doc. Juhár	Telecommunications
Ing. Tomáš Straka	prof. Turán	Infoelectronics
Ing. Peter Želinský	doc. Galajda	Infoelectronics
Third year of study		
<u>Internal form:</u>		
Ing. Ľubomír Čopjan	prof. Marcheviský	Telecommunications
Ing. Miroslav Kasár	prof. Mihalík	Telecommunications
Ing. Jozef Krajňák	prof. Kocur	Electronics
Ing. Michel Mirilovič	prof. Čižmár	Telecommunications
Ing. Stanislav Ondáš	doc. Juhár	Telecommunications
Ing. Pavol Pavelka	doc. Galajda	Electronics
Ing. Radovan Ridzoň	prof. Levický	Telecommunications
Ing. Lenka Sochová	prof. Michaeli	Measurement technique
Ing. Anton Štofa	doc. Doboš	Telecommunications
Ing. Peter Varchol	prof. Levický	Telecommunications
<u>External form:</u>		
Ing. Pavol Cabúk	prof. Michaeli	Measurement technique
Ing. Marek Domaracký	prof. Levický	Telecommunications
Ing. Imrich Harčár	doc. Šaliga	Measurement technique
Ing. Štefan Lipovský	doc. Doboš	Telecommunications

Fourth year of studyExternal form:

Ing. Miroslav Baboľ	prof. Čižmár	Telecommunications
Ing. Martin Lukáč	doc. Juhár	Telecommunications
Ing. Péter Serfozo	prof. Turán	Electronics
Ing. Jozef Študenc	prof. Turán	Electronics

Fifth year of studyExternal form:

Ing. Szabolcz Csernok	doc. Šaliga	Measurement technique
Ing. Vladimír Frolek	doc. Šaliga	Measurement technique
Ing. Viktor Homolya	doc. Juhár	Telecommunications
Ing. Miloš Kováč	doc. Juhár	Telecommunications
Ing. Marián Krivda	prof. Levický	Telecommunications
Ing. Ján Papaj	prof. Čižmár	Telecommunications
Ing. Slavomír Pilár	prof. Marcheviský	Telecommunications
Ing. Pavol Švač	prof. Kocur	Telecommunications
Ing. Marián Zlacký	doc. Doboš	Telecommunications

MEMBERS

- Čižmár Anton**, Member of Technical Standardization Commission No.41 for Telecommunications in Slovakia.
- Čižmár Anton**, Member IEEE Affiliate Computer Society, No. 41237162
- Čižmár Anton**, Member of AES (Audio Engineering Society), New York, I.D. 44 154.
- Doboš Eubomír**, Member of Technical Standardization Commission No.80 for Radiocommunications in Slovakia.
- Juhár Jozef**, Member of ISCA (International Speech Communication Association)
- Juhár Jozef**, Member of ISCA International Affairs Sub-committee on Eastern Europe
- Juhár Jozef**, Member of the editorial board "International Journal of Signal and Imaging Systems Engineering", Issued by Inderscience Publishers, Geneva, Switzerland
- Juhár Jozef**, Member of Technical Standardization Commission No.55 for Electroacoustics and ultrasound in Slovakia.
- Kocur Dušan**, Chairman of the editorial board of the journal "Acta Electrotechnica et Informatica".
- Kocur Dušan**, Member of the editorial board of the journal "Acta Polytechnica Hungarica".
- Levický Dušan**, Member of the editorial board "Radioengineering".
- Levický Dušan**, Member of the IEEE.
- Levický Dušan**, Member of Czech and Slovak Radioelectronics Society.
- Marchevský Stanislav**, Member of the Scientific Board Military Academy, Liptovský Mikuláš.
- Marchevský Stanislav**, Member of Technical Standardization Commission No. 60, Sound, Image and Audiovideo Equipment and Systems in Slovakia.
- Marchevský Stanislav**, Member of Scientific Board of Faculty of Environmental and Manufacturing Technology, Technical University of Zvolen.
- Michaeli Linus**, Head of Slovak IMEKO National Committee and head of the Technical Committee TC-4 "Measurement of Electrical Quantities"
- Michaeli Linus**, Slovak Metrological Institute, Member of the Scientific Board.
- Michaeli Linus**, Member of the editorial board „Computer Standard & Interfaces“, Issued by Elsevier, Amsterdam, New York.
- Michaeli Linus**, Member of the reviewer board "Measurement". Journal IMEKO, Issued by Elsevier, Amsterdam, New York.
- Michaeli Linus**, Member of the Scientific Board University of Transport and Communication, Žilina, Slovakia.
- Michaeli Linus**, Member of the editorial board „Measurement Science Review“, Issued by SAV, Bratislava
- Michaeli Linus**, Co-ordinator of IMEKO Working Group "AD and DA metrology".
- Michaeli Linus**, Member of the IEEE, Instrumentation & Measurement Society.
- Michaeli Linus**, Scientific Grant Agency of Slovak Republic.
- Šaliga Ján**, Member of Slovak IMEKO Technical Committee TC-4 "Measurement of Electrical Quantities".
- Turán Ján**, Member of the Slovak Technical Standardization Committee No.53 for Cables, Conductors and Isolating Materials.
- Turán Ján**, Member of the Slovak Technical Standardization Committee No.43 for Terminology.
- Turán Ján**, Senior Member of the IEEE.
- Turán Ján**, Member of Czech and Slovak Radioelectronics Society.

PUBLICATION ACTIVITY OF THE DEPARTMENT

Books:

Journal Papers:

1. Daponte,P.-Michaeli,L.: Introduction to Special Issue on ADC Modelling and Testing - 9th Workshop on ADC Modelling and Testing. Measurement Vol.39, No.3, April 2006, pp.238-244.
2. Drutarovský,M.-Šimka,M.-Fischer,V.: Comparison of Scalable Montgomery Modular Multiplication Implementations Embedded in Reconfigurable Hardware. Acta Electrotechnica et Informatica, Vol.6, No.2, 2006, pp.37-45.
3. Drutarovský,M.-Galajda,P.: Chaos-based True Random Number Generator Embedded in a Reconfigurable Hardware. Journal of Electrical Engineering, Vol. 57, No.4, 2006, pp.218-225.
4. Giertl,J.-Jakab,F.-Bača,J.-Andoga,R.-Mirilovič,M.: Contribution to Adaptive Sampling of QoS Parameters in Computer Networks. Acta Electrotechnica et Informatica, Vol.6, No.1 2006, pp.52-59.
5. Gladišová,I.-Mihalík,J.-Zavacký,J.: Bezstratová kompresia obrazu pomocou stavového binárneho aritmetického kódovania jeho bitových rovín. Slaboproudý obzor, Vol.63, No.2, 2006.
6. Lukáč,R.-Galajda,P.-Galajdová,A.: LUM Processor with Neural Decision. International journal of pattern recognition and artificial intelligence, Vol. 20, No.5, 2006, pp.747-762.
7. Michaeli,L.: Trendy v číslicových meracích prístrojoch, Journal of EE, Vol.12, No.1, 2006, p.17-19.
8. Mihalík,J.-Michalčín,V.: 3D Motion Estimation of Human Head by Using Optical Flow. Radioengineering, Vol.15, No.2, 2006, pp.37-44.
9. Ovseník,L.-Turán,J.: Modelovanie a e-learning (The Modelling and e-learning). Journal of EE, Vol.12, October 2006, pp.162-167.
10. Šaliga,J.-Michaeli,L.-Holcer,R.: Noise Sensitivity of the Exponential Histogram ADC Test. Measurement Vol.39, No .3, April 2006, pp.238-244.
11. Turán,J.-Šiškovíčová,D.-Turán,jr.J.-Filo,J.-Ovseník,L.: Trace Transform and KLT Based Invariant Features and Image Recognition System. Acta Electrotechnica et Informatica, Vol.6, No.3, 2006, pp.5-15.

Conference papers:

1. Benčo,S.-Čopjan,L.-Kocur,D.-Marchevský,S.: Blind Minimum Output Energy Algorithm Versus Conventional Detection for CDMA Signal Receiving. 13th International conference IWSSIP 2006 and Cost 292, Budapest, Hungary, September 21-23, 2006, pp.337 – 340.
2. Čižmár,A.-Pleva,M.: Prenos dát po NN rozvodnej sieti v testovacej aplikácii na TU v Košiciach. International conference “Komunikace po silnoproudých vedeních NN a VN ((Perspektiva využití technologií PLC/BPL))”, Prague, Czech Republic, October 5-6, 2006.

3. Čopjan, Ľ.-Marchevský, S.: Effective Transmission Over AWGN Channel Using Turbo Codes. Proceedings of the Junior Scientific Conference 2006, Vienna, Austria, April 19-21, 2006, pp.5-6.
4. Čopjan, Ľ.: MOE Algorithm for CDMA Interference Rejection. 6th PhD Student Conference of FEI TU Košice, Slovak republic, 17.5.2006, pp.29-30.
5. Doboš, J.-Čižmár, A.-Juhár, J.: Mobile Broadband Multimedia Networks COST 273. Faculty of Electrical Engineering and Informatics Research and Development Projects, September 2006, Košice, Slovak republic, pp. 69–70.
6. Foriš, P.-Hovančák, R.-Levický, D.: Color Digital Image Watermarking Based on HVS Model in DCT Domain. Radioelektronika 2006, STU Bratislava, 25.-26.4.2006, Slovak republic, pp.234-237.
7. Futó, J.: Multifractal Properties of Teleworker Generated Traffic Traces. 6th PhD Student Conference of FEI TU Košice, Slovak republic, 17.5.2006, pp.39-40.
8. Galajda, P.-Marchevský, S.-Benčo, S.: Mobilné služby poskytované v modernej informačnej spoločnosti (Mobile Services Offer by Modern Information Society). Medzinárodná vedecká konferencia k 10. výročiu vzniku FEVT, Zvolen, Slovak republic, September 5-7, 2006, pp.50-56.
9. Galajda, P.-Marchevský, S.: Mobile Learning (M-Learning) Architecture at the Technical University of Kosice. International scientific-educational conference. Modern problems of mathematical and informatical education. Moscow, Russia, May 4–8, 2005, pp.147-149.
10. Gamec, J.-Gamcová, M.: The Localization of Errors of Fast Search Motion Estimation Algorithm. 13th International conference IWSSIP 2006 and Cost 292, Budapest, Hungary, September 21-23, 2006, pp.341-344.
11. Gladišová, I.: Simple Image Indexing and Retrieval Technique Based on Dominant Colours. 13th International conference IWSSIP 2006 and Cost 292, Budapest, Hungary, September 21-23, 2006, pp.345-347.
12. Gladišová, I.-Turán, J.: Dominant Colour-Based Image Descriptors and they Application. Radioelektronika 2006, STU Bratislava, Slovak republic, 25-26.4.2006, pp.238-241.
13. Juhár, J.-Ondáš, S.-Doboš, Ľ.-Čižmár, A.-Rusko, M.-Trnka, M.-Rozinaj, G.-Jarina, R.: Speech Interface for Information Extraction from the Internet through Telephone Network. In: Acoustics High Tatras 06 - 33rd International Acoustical Conference - EAA Symposium, Štrbské Pleso, Slovakia, October 4-6, 2006, pp.96-99.
14. Juhár, J.-Čižmár, A.: Acoustic Modeling In Speech Communication Interfaces. In: Acoustics High Tatras 06 - 33rd International Acoustical Conference - EAA Symposium, Štrbské Pleso, Slovakia, October 4-6, 2006, pp.29-29.
15. Juhár, J.-Ondáš, S.-Čižmár, A.-Rusko, M.-Rozinaj, G.-Jarina, R.: Galaxy/VoiceXML Based Spoken Slovak Dialogue System to Access the Internet. In: ECAI 2006 Workshop on Language-Enabled Educational Technology and Development and Evaluation of Robust Spoken Dialogue Systems, Riva del Garda, Italy, August 29, 2006, pp.34-37.
16. Juhár, J.-Ondáš, S.: Hlasom ovládané informačné portály v slovenčine: Vízia, alebo možná realita?. In: INFOSEM 2006, October 24-26, 2006, pp.106-113.
17. Juhár, J.-Ondáš, S.-Čižmár, A.-Rusko, M.-Rozinaj, G.-Jarina, R.: Development of Slovak GALAXY/VoiceXML Based Spoken Language Dialogue System to Retrieve Information from the Internet. In: Interspeech 2006 – ICSLP, Pittsburgh, USA, September 17-21, 2006, pp.485-488.

18. Hovančák,R.-Fóriš,P.-Levický,D.: Steganography Based on DWT Transform. Radioelektronika 2006, STU Bratislava, Slovak republic, 25.-26.4.2006, pp.149-152.
19. Kasár,M.-Mihalík,J.-Zavacký,J.: Design of Basis of Eigenfaces. Proc. "Nové smery v spracovaní signálov VIII", Tatranské Zruby, Slovakia, 2006, pp.182-186.
20. Kasár,M.: An Algorithm of Tracking of Human Head. Proc. 6th PhD Student Conference and Scientific and Technical Competition of Students of FEI TU Košice, Košice, Slovakia, 2006, pp.63-64.
21. Kocur,D.-Čížová,J.-Krajňák,J.-Galajda,P.-Marchevský,S.-Drutarovský,M.: Cost action 289: Spectrum and power efficient broadband communications. (Cost akcia 289: Spektrálna a výkonová efektívnosť v širokopásmových komunikáciach). FEI Research and Development Projects, Košice, Slovak republic, 2006, pp.71-72.
22. Kocur,D.-Krajňák,J.-Marchevský,S.: Piece-Wise Linear Multi-Channel Complex Microstatistic Filters (Mnohokanálový po častiach lineárny komplexný mikroštatistický filter). Proceedings Intelligent engineering systems INES 2006, Metropolitan University of London, United Kingdom, June 26-28, 2006, pp.53-56.
23. Kollár,M.-Michaeli,L.: Determination of the Power Spectral Density in Capacitive Digital Accelerometers Using Theory of Limit Cycles. Faculty of Electrical Engineering and Informatics Research and Development Projects, September 2006, Košice, Slovak republic, pp.97-98.
24. Kollár,M.-Michaeli,L.: Noise Consideration for Micromachined Digital Accelerometers. Proceedings of the 23rd IEEE Instrumentation and Measurement Technology Conference IMTC 2006, Sorrento, Italy, April 24-27, 2006, pp.507-512.
25. Kollár,M.-Michaeli,L.: Consideration for a New Micromachined Accelerometer Capacitive Interface Based on Switched Flip-Flop Circuit. Proceedings of the 23rd IEEE Instrumentation and Measurement Technology Conference IMTC 2006, Sorrento, Italy, April 24-27, 2006, pp.513-518.
26. Kollár,M.-Michaeli,L.: Determination of the power spectral density in capacitive digital accelerometer using theory of the limite cycles, Proceedings of XVIII IMEKO World Congress, Rio de Janeiro, Brasil, September 17-22, 2006.
27. Krajňák,J.: People Detection by UWB Radar. 6th PhD Student Conference and Scientific and Technical Competition of Students of FEI TU Košice, Košice, Slovakia, 2006, pp.75-76.
28. Levický,D.-Čížmár,A.-Juhár,J.-Kocur,D.-Marchevský,S.: Digital Signal Processing, Transmission, Recognition and Protection in Multimedia Communications, Faculty of Electrical Engineering and Informatics Research and Development Projects, September 2006, Košice, Slovak republic, pp.73-74.
29. Levický,D.-Klenovičová,Z.-Ridzoň,R.: Next Generation Network Security. Research in Telecommunication Technology - RTT 2006, Nové Mesto na Morave, Czech republic, September 11-13, 2006, pp.279-282.
30. Lihan,S.-Mirilovič,M.-Čížmár,A.-Juhár,J.: Annotation of Noisy Speech Database Recorded in Car Environment. In: Acoustics High Tatras 06 - 33rd International Acoustical Conference - EAA Symposium, Štrbské Pleso, Slovakia, October 4-6, 2006, pp.126-129.
31. Lihan,S.-Juhár,J.: Comparison of Two Slovak Speech Databases in Speech Recognition Tests. In: Acoustics High Tatras 06 - 33rd International Acoustical Conference - EAA Symposium, Štrbské Pleso, Slovakia, October 4-6, 2006, pp.130-133.

32. Lihan,S.-Juhár,J.-Čížmár,A.: Comparison of Slovak and Czech Speech Recognition Based on Grapheme and Phoneme Acoustic Models. In: Interspeech 2006 – ICSLP, Pittsburgh, USA, September 17-21, 2006, pp.149-152.
33. Marcheuský,S.-Kocur,D.-Čížová,J.-Čopjan,L.-Drutarovský,M.-Galajda,P.Grega,M.-Longauer,L.: Paketovo orientované služby dodávané prostredníctvom satelitov - COST 272. Faculty of Electrical Engineering and Informatics Research and Development Projects, September 2006, Košice, Slovak republic, pp.75–76.
34. Marcheuský,S.-Galajda,P.-Benčo,S.-Pillár,S.-Ratica,J.: Infraštruktúra pre príjem paketovo-orientovaných e-learningových služieb poskytovaných cez satelit (Infrastructure for receiving packet-oriented e-learning services delivered via satellite). Medzinárodná vedecká konferencia k 10. výročiu, Zvolen, Slovak republic, 5.-7.9.2006, pp. 81–87.
35. Michaeli,L.-Sochová,L.-Šaliga,J.: ADC Look-up table based post correction combined with dithering, Proceedings of XVIII IMEKO World Congress, Rio de Janeiro, Brasil, September 17-22, 2006.
36. Mihalík,J.: Algorithms of Standard Videocoders H.263 and MPEG 4. Faculty of Electrical Engineering and Informatics Research and Development Projects, September 2006, Košice, Slovak republic, pp.77-78.
37. Mirilovič,M.: Slovak Text Data Collection for in Stochastic Language Modeling. 6th PhD Student Conference and Scientific and Technical Competition of Students of FEI TU Košice, Košice, Slovakia, 2006, pp.91-92.
38. Ondáš,S.: VOICEXML - Based Spoken Language Interactive System. 6th PhD Student Conference and Scientific and Technical Competition of Students of FEI TU Košice, Košice, Slovakia, 2006, pp. 97-98.
39. Palubová,H.: OFDM System for Broadband Communication. 6th PhD Student Conference and Scientific and Technical Competition of Students of FEI TU Košice, Košice, Slovakia, 2006, pp.101-102.
40. Pavelka,P.: Reducing The Peak-to-Average Power Ratio (PAPR) in OFDM. . 6th PhD Student Conference and Scientific and Technical Competition of Students of FEI TU Košice, Košice, Slovakia, 2006, pp.103-104.
41. Ridzoň,R.: Exploitation of the Log-polar Mapping in Digital Watermarking. 6th PhD Student Conference and Scientific and Technical Competition of Students of FEI TU Košice, Košice, Slovakia, 2006, pp.113-114.
42. Ridzoň,R.-Klenovičová,Z.-Levický,D.: Multimedia Content Security Architecture. Research in Telecommunication Technology - RTT 2006, Nové Mesto na Morave, Czech republic, September 11-13, 2006, pp. 253-258.
43. Serfözö,P.-Vásárhelyi,J.-Turán,J.: Analysis of Mojette Transform Implementation on Reconfigurable Hardware. 7th International conference of energetics and electrical engineering ENELKO 2006, Cluj, Romania, October 20-22, 2006, pp.105-111.
44. Serfözö,P.-Vásárhelyi,J.-Turán,J.: Analysis of Mojette Transform on Field Programmable Gate Array. HUCI 2006, Budapest, Hungary, November 24-25, 2006, pp.255-266.
45. Serra,A,C.-Alegria,F.-Michaeli,L.-Michalko,P.-Šaliga,J.: Fast ADC Testing by Repetitive Histogram. Proceedings of the 23rd IEEE Instrumentation and Measurement Technology Conference IMTC 2006, Sorrento, Italy, April 24-27, 2006, pp.1633-1638.

46. Sochová,L.: ADC Look-UP Table Based Post Correction Method Combined With Averaging Filter and Dithering. 6th PhD Student Conference and Scientific and Technical Competition of Students of FEI TU Košice, Košice, Slovakia, 2006, pp.125-126.
47. Šaliga,J.-Michaeli,L.-Holcer,R.-Michalko,P.-Sochová,L.-Kollár,M.: Methods Of Analogue-To-Digital Interfaces Uncertainty Testing And Correction (Metódy testovania a korekcie neurčitostí analógovo číslicových rozhraní). Faculty of Electrical Engineering and Informatics Research and Development Projects, September 2006, Košice, Slovak republic, pp.79–80.
48. Šimka,M.: Active Non-Invasive Attack on True Random Number Generator. 6th PhD Student Conference and Scientific and Technical Competition of Students of FEI TU Košice, Košice, Slovakia, 2006, pp.129-130.
49. Šimka,M.-Fischer,V.-Drutarovský,M.-Fayolle,J.: Model of a True Random Number Generator Aimed at Cryptographic Applications. Proceedings of the IEEE International Symposium on Circuits and Systems – ISCAS 2006, Island of Kos, Greece, pp.5619-5622.
50. Štefanišin,R.: Differential Coding of Hierarchical Field of Motion Vectors. 6th PhD Student Conference and Scientific and Technical Competition of Students of FEI TU Košice, Košice, Slovakia, 2006, pp.131-132.
51. Turán,J.-Ovseník,L.-Turán,J,jr.: Invariant Feature Extraction Method Based on KLT and Trace Transform. Radioelektronika 2006, STU Bratislava, Slovak republic, 25.-26.4.2006, pp.197-201.
52. Turán,J.-Ovseník,L.-Gamec,J.-Študenc,J.-Futó,J.-Filo,P.-Šiškovičová,D.-Farkaš,P.-Benča,M.: Final Report COST 276. Faculty of Electrical Engineering and Informatics Research and Development Projects, September 2006, Košice, Slovak republic, pp.83–84.
53. Turán,J.-Ovseník,L.-Gamec,J.-Študenc,J.-Futó,J.-Filo,P.-Šiškovičová,D.-Farkaš,P.-Benča,M.: Final Report Vega 1/0381/03. Faculty of Electrical Engineering and Informatics Research and Development Projects, September 2006, Košice, Slovak republic, pp.81–82.
54. Turán,J.-Ovseník,L.-Turán,J,jr.: Transform Based Invariant Feature Extraction. 13th International conference IWSSIP 2006 and Cost 292, Budapest, Hungary, September 21-23, 2006, pp. 79-82.
55. Varchol,P.-Levický,D.: Access Security Based on Biometric. Research in Telecommunication Technology - RTT 2006, Nové Mesto na Morave, Czech republic, September 11-13, 2006, pp.4-8.

Thesis

1. Foriš,P.: Perceptívne metódy digitálnej vodotlače v statických obrazoch. PhD. diz. práca FEI TU Košice, Slovakia, October 2006, 138p. (in Slovak).

Other

1. Šimka,M.-Drutarovský,M.-Fischer,V.: Random Numbers in Cryptography. Invited presentation, Securing Cyberspace: Applications and Foundations of Cryptography and Computer Security - Workshop IV: Special purpose hardware for cryptography: Attacks and Applications, Institute for Pure and Applied Mathematics, University of California, Los Angeles, USA, December 4-8, 2006.
2. Drutarovský,M.: Cryptographic Intellectual Property (IP) Blocks based on Reconfigurable FPGA Hardware. Invited presentation, International conference Cooperation Potential of Slovak Research and Development - Electrical Engineering and ICT, Bratislava, Slovakia, October 24, 2006.

3. Dado, M.-Podhradský, P.-Levický, D.-Marchevský, S.-Drutarovský, M.-Galajda, P.-Gladišová, I.-Gamcová, M.-Gamec, J.-Kocur, D.-Michaeli, L.-Ovseník, L.-Šaliga, J.-Turán, J. a kol.: Využitie IKT technológií a sieťových platforiem novej generácie vo vzdelávaní v rámci štátneho programu výskumu a vývoja Budovanie informačnej spoločnosti, Číslo správy 2003 SP 20 028 01 04-4, Signatúra: 2003 SP 20 028 01 04, Objednávateľ Ministerstvo školstva SR (MŠ SR), Gestor štátneho programu MŠ SR, I.-IV. Časť, Žilinská univerzita, jún 2006.

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