FACULTY OF ELECTRONICS AND TELECOMMUNICATIONS ENGINEERING

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INTELLIGENT INDUSTRIAL ELECTRONIC SYSTEMS RESEARCH CENTER – *I. I. E. S.*

GENERAL PRESENTATION

Intelligent Industrial Electronic Systems (I.I.E.S.) is a **research center**, type C, that has been evaluated and accredited by CNCSIS. The Center was created in 11.05.2001, in accordance with the CNCSIS certificate, nr. 106/CC-C. The director of the Center is **prof. dr. eng. Mircea CIUGUDEAN**.

MAIN ACTIVITIES

The Center performs research and design activities in domains such as:

- Robotics (production systems, drive control, mobile robots, sensors)
- Integrated circuits design
- Power electronics (dc-dc converters, power factor correction, neuro-fuzzy control, fuzzy controllers, power active filters)
- Neural networks and intelligent sensors.

CONTACT

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RESEARCH FIELDS

Integrated Circuits Design

- Keywords: ASIC, VLSI, DA, arithmetic coprocessor

Robotics

- Keywords: sensor, robot, transducers, industrial robot driving

Neural Computing and Intelligent Sensors

- Keywords: intelligent sensors, artificial neural network, sensor data processing

Power Electronics

- Keywords: power converters, power quality, harmonic pollution, power factor correction, soft switching, chaos

Electronic Packaging and Testing Field

- Keywords: CAE, CAD, CAM, test sequence-generation, self-testing design, test points, EMC, logic analysis, spectral analysis

Researches in *INTEGRATED CIRCUITS DESIGN*

FIELD DESCRIPTION

The research group in this domain is lead by prof. dr. eng. Mircea CIUGUDEAN and also includes an associate professor, one lecturer, three assistants, and three graduate students. The group will grow further by four graduate students and three PhD students per year.

Researches in *ROBOTICS*

FIELD DESCRIPTION

The Research Team in Robotics (RTR) is lead by prof. dr. eng. Tiberiu MURESAN and prof. dr. eng. Ivan BOGDANOV. The team includes one more professor, associate professors, three lecturers and one assistant professor.

The members of the RTR are members of the Robotics Association from Romania which is part of the International Federation of Robotics with the headquarters in Stockholm, Sweden.

In the last years the main research subjects were:

- Pilot intelligent production systems
- Research on passive systems and active intelligent systems interaction
- Microcontroller based control of electrical drives
- Interpolation in robot control
- Mobile robots control
- Sensors for robotics
- Equipment for leading the welding heads.

The Robotics Research Team uses six PC computers and simulation software.

Researches in *NEURAL COMPUTING AND INTELLIGENT SENSORS*

The research group is coordinated by prof.dr.eng. Virgil TIPONUT and includes three assistant professors from the Department of Applied Electronics, 8 post-graduates from other universities in Romania and industrial companies (Romania, Canada, USA), who are developing their PhD thesis.

FIELD DESCRIPTION

- VLSI Implementation of Cellular Neural Networks (CNN)
- Applications of CNN in Intelligent Sensors
- Applications of CNN in Robotics (Mobile Robots and Colony of Interacting Robots)

The research activities are also focused in the field

of Computational Intelligence (CI) applications. Using CI paradigms problems like biometrics - face detection and recognition, time series prediction or autonomous mobile robot navigation are tackle. For coding purpose, mainly MATLAB and C are employed.

Hardware/Software resources:
- General purpose PC compatible computers
- DSP boards from Texas Instruments
- Microconverter boards from Analog Devices
- Software development tools
- Prototyping facilities

RESEARCH PROJECTS

1. Numar identificare: 599/19.01.2009

Titlu: Noi metode de analiză şi recunoaştere a expresiei faciale (New Methods for Facial Expression Analisys and Recognition)

Value: Total: 277416,15 RON (157500 RON on 2011)
Director: Cătălin-Daniel Căleanu, Assoc. Prof.
Members: V. Tiponut, V. Gui, R. Mirsu, D. Ianchis, Z. Haraszy

FIELD AND GRANT DESCRIPTION

The aim of the project is the investigation and development of facial expression recognition methods and principles. The research will be focused on finding robust solutions for the following subsystems: face representation, face detection, face synthesis, feature selection and extraction, classification.

ACTIVITIES AND RESULTS

Within the framework of the current project, several major face imagery processing topics have been addressed, e.g.:
- an overview of the current state of the art systems/algorithms/methodology was performed;
- data acquisition: some of the experiments were performed using Beihang University facial expression database and with images acquired from real environments with complex backgrounds, large variety of emotional states, occlusions;
- preprocessing: we have employed robust techniques for mean shift segmentation, background estimation, tracking;
- feature extraction: a novel method for facial expression recognition which is robust to facial occlusion has been proposed. The face to be recognized is reconstructed using robust principal component analysis (RPCA), and saliency detection is used on the difference image of reconstructed face and the face to be recognized to obtain the facial occlusion region. For improving the nonlinear alignment performance of Active Appearance Models (AAM), we apply a nonlinear manifold learning algorithm, Local Linear Embedded, to model shape-texture manifold. Experiments show that our method maintains a lower alignment residual to some small scale movements compared with traditional AAM based on Principal Component Analysis (PCA) and makes a success alignment to large scale motions;
- classification: some possibilities regarding the use of novel neural architectures (e.g. Liquid State Machine) for processing the facial expression have been analyzed. Also a reweighted AdaBoost classifier has shown good results with respect some public databases of faces, e.g. JAFFE;
- optimization: we have been proposed the application of the Pattern Search Optimization for feature extraction and classification parameters and show that when the process simulation is very complex and it is not designed in a vectorised manner, Pattern Search represents an attractive alternative to the other optimization methods, e.g. genetic algorithm, as it is often computationally less expensive and can minimize the same types of functions and yields better results in terms of classification acuracy and processing speed;
- face expression synthesis: novel model of layered fuzzy facial expression generation has been proposed. A novel layered fuzzy facial expression generation language is also developed for conveniently controlling facial expression generation of virtual agent.

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RESEARCH TEAM

Prof.dr.eng. Virgil TIPONUŢ
Prof.dr.eng. Alexandru GACSADY
Assoc.prof.dr.eng. Catalin CALEANU
Lect.eng. Aurel FILIP
Lect.eng. Calin LAR
Lect.eng. Ioan GAVRILUT
Assist.eng. Laviniu TEPELEA

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Researches in *POWER ELECTRONICS*

The main research themes investigated are:

- Improvement and development of new high-frequency PWM and resonant dc/dc converter topologies
- Elaboration of new power factor correction circuits
- New control techniques for power factor correction circuits using classical solutions or neuro-fuzzy controllers

- Research on ac-ac matrix converters and the corresponding control methods
- Improvement of the electrical drives using active power filters and fuzzy regulators
- Research regarding topologies and operation improvement of active power filters
- Development of experimental prototypes for the different circuits as resulted from the theoretical research

The research team uses as technical support six PCs, design and simulation software for power electronics, two power analyzers and many other power electronics devices.

For the present, the research team efforts are focused on creating a power quality test center, according to European regulations.

RESEARCH TEAM

Prof.dr.eng. Viorel POPESCU – head of the group
Prof.dr.eng. Tiberiu MURESAN
Assoc.prof.dr.eng. Dan LASCU
Lect.dr.eng. Adrian POPOVICI
Lect.dr.eng. Dan NEGOITESCU
Lect.eng. Mircea BABAITA

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Researches in *ELECTRONIC PACKAGING AND TESTING*

The research group in this domain is coordinated by prof. dr. eng. Aurel GONTEAN, and includes two assistants and three graduated-students. The group established relationships with several regional powerful companies in the electronic packaging field, like SOLECTRON, ABB, TELCO and NOVAR. Also, the group has preferential relations with ALCATEL Network System, Romania in the field of testing electronic equipment.

PhD RESEARCH ACTIVITIES

1. Scientific supervisor *Prof.dr.eng. Virgil TIPONUŢ*

PhD students

- Alin BRÎNDUŞESCU: *Contributions to the biological signals simulation using artificial neural networks*
- Ionuţ MIREL: *Methods for Digital Video Images Processing*
- Sorin POPESCU: *Optimization of the electrical welding process by means of artificial neural networks*
- Laviniu ŢEPELEA: *Human-Machine Interface.*
- Daniel IANCHIŞ: *Cercetari privind sistemele de detectie a obstacolelor pentru nevazatori*
- Sebastian MICUŢ: *Reserch on e-Nose devices*
- Mihai-Emanuel BASCH*: Neuromorf circuits for obstacle detection*
- Teodor-Valentin SANDU*: Research on auditive implants optimization*
- Kristian MOZIK*: Biometric methods for person identification*
- *Mihai POMARLAN: Dinamic programming for robots moving planning*

2. Scientific supervisor: *Prof.dr.eng. Tiberiu MUREŞAN*

PhD students:

- Petru PAPAZIAN: *Intelligent Subsystems for Optimal Control of Technological Processes*
- Dan Mircea ANDREICIUC: *Analysis and Correction Methods for Positioning and Orientation of Mobile Industrial Robots*

3. Scientific supervisor: *Prof.dr.eng. Mircea CIUGUDEAN*

PhD students:

- Aurel FILIP: *Researches on CMOS Frequency References*
- Andrei PASCA: *Clock signal distribution network*
- George ROSU: *Analogue circuits for fuzzy systems*

4. Scientific supervisor: *Prof.dr.eng. Viorel POPESCU*

PhD students:

- Florin PRUTIANU*: Contributions to theoretical and experimental study regarding optimization of energy converters from wind power station*
- Cristian VRÂNCILĂ*: Contributions regarding improved performance of active power filters*
- Ioana-Monica POP*: Contributions to theoretical and experimental study regarding optimization of energy converters from solar power station*

5. Scientific supervisor: *Prof.dr.eng. Aurel GONTEAN*

PhD students:

- Oana-Silvana POPESCU: *Digital modulation with FPGA*
- Paul HARFAS: *Wind turbine diagnostics using signal processing*
- Mihail-Octavian CERNAIANU: *Intelligent control for wind turbin motors*
- Cosmin CIRSTEA: *Wireless sensors networks*
- Ruxandra-Ioana RUSNAC: *Algorithms for mobile target detection*
- Liviu CRISAN: *Group coportament for mobile robots*

- Adrian-Constantin BERINDE*: Neural networks applications in robotics.*
- Emilian-Silviou GAVRILA: *Solutions for automotive testing*

6. Scientific supervisor: *Prof.dr.eng. Dan LASCU*

PhD students:

- Mircea GURBINA: *Contributions to nonlinear phenomena study in power converters*
- Aurel CIRESAN: *Soft-switching converters with applications in green power processing*
- Vasile-Daniel DRAGHICI: *Contributions regarding intelligent driven for power converters*
- Radu-Gabriel FOLEA*, Nonlinear phenomens and haotic comportament modeling in power converters*

PHD THESES SUSTAINED

- Bogdan MARINCA: *Contributions on new integrated temperature sensors design in CMOS technology,* scientific supervisor Prof.dr.eng. Mircea CIUGUDEAN
- Radu MIRSU, *Information processing using liquid state machines based on spiking neuroans,* scientific supervisor Prof.dr.eng. Virgil TIPONUT
- Zoltan HARASZY, *Contributions regarding human-machine interface with applications in person with visual disabilities help with sounds,* scientific supervisor Prof.dr.eng. Virgil TIPONUT
- David George CRISTEA, *Universal signal conditioning system for electrochemical and bioluminescent sensor arrays,* scientific supervisor Prof.dr.eng. Virgil TIPONUT
- Robert Istvan LORINCZ, *Contributions to the optimization of permanent magnet dc motor control systems,* scientific supervisor Prof.dr.eng. Virgil TIPONUT

PUBLICATIONS

BOOKS

1. Ricardo de Asmundis (editor), Aurel-Stefan GONTEAN, Roland SZABO, *Labview Powered Remote Lab in Modeling, Programming and Simulations Using LabVIEW™ Software,* 2011, 32 pages, ISBN 978-953-307-521-1
2. O. Sergiyenko (editor), Sabin IONEL, Ioana IONEL, *Statistical Tools and Optoelectronic Measuring Instruments in Optoelectronic Devices and Propoerties*, 2011, 22 pages, Croatia, ISBN 978-953-307-204-3
3. Sabin IONEL, *Electronics and optoelectronics devices* (in Romanian), Politehnica Publishing House, 2011, 324 pages, ISBN 978-606-554-057-6
4. Sabin IONEL, *Electronics Enigineering* (in Romanian), Politehnica Publishing House, 2011, 386 pages, ISBN 978-606-554-257-0
5. Sabin IONEL, *Pspice and MATLAB for Electronics (in* Romanian), Politehnica Publishing House, 2011, 280 pages, ISBN 978-606-554-402-4
6. Cristian RAVARIU, Sabin IONEL, *Programul SPICE de simulare a circuitelor electronice*, Editura Academiei Oamenilor de Stiinta, 2011, 84 pages, ISBN 978-606-8371-03-0
7. Mircea BABAITA, *Sisteme electronice de acţionare*, Vest Publishing House, 2011, 279 pages, ISBN 978-973-36-0531-7

PUBLISHED PAPERS

1. Caleanu Catalin, X. Mao, G. Pradel, S. Moga, Y. Xue, *Combined pattern search optimization of feature extraction and classification parameters in facial recognition*, Pattern Recognition Letters, Elsevier - ScienceDirect, DOI: http://dx.doi.org/10.1016/j.patrec. 2011. 03.019; Vol. 32(9), p.1250-1255, 6; ISSN 0167-8655
2. Firoiu Ioana, Nafornita Corina, Isar Dorina, Isar Alexandru; *Bayesian Hyperanalytic Denoising of SONAR Images*; IEEE GEOSCIENCE AND REMOTE SENSING LETTERS; 8, 1065-1069, 5; ISSN 1545-598X
3. Maranescu B., Visa A., Mracec M., Ilia G., Maranescu V., Simon Z., Mracec M.; *Lamellar Co2+ vinylphosphonate metal organic framework.PM3 semi-empirical analysis of structural properties*; Rev. Roum. Chim.; 56, p.473-482, ISSN:0035-3930
4. Maranescu B., Vişa A., Mracec M., Iliescu S.,.Popa A,.Ilia G, Maranescu V., Simon Z.; *Structural Proprieties of Ni2+ Vinilphosphonate Using PM3 Semiempirical Analysis*; Rev. Roum. Chim.; 56, p.1133-1141, ISSN:0035-3930
5. R. Mîrşu, Caleanu Catalin, V. Tiponuţ; *GPU Accelerated Model for Liquid State Machine Based on spiking Neurons*; MENDEL 2011, 17th International Conference on Soft Computing, Brno, Czech Republic; p.275-283, ISSN 1803-3814
6. P Cevei, M Cevei, I Jivet, *Experiments in Electrotherapy for Pain Relief using a Novel Modality Concept*; International Conference on Advencements of Medicine and Health Care through Technology; p.164-167, ISBN 978-3-642-22585-7
7. Popescu S., Gontean Aurel-Stefan, Budura G.; *Simulation and implementation of a BPSK modulator on FPGA,* 6th IEEE International

Symposium on Applied Computational Intelligence and Informatics, SACI 2011; p.459-463; ISBN 978-1-4244-9109-4

8. Popescu S., Gontean Aurel-Stefan, Alexa F.; *Improved FPGA-based detector*; 6th IEEE International Symposium on Applied Computational Intelligence and Informatics, SACI 2011; p.455-458; ISBN 978-1-4244-9109-4
9. Rusnac R., Gontean Aurel-Stefan; *Evaluation of Some Node Localization Algorithms*; IEEE 17th International Symposium for Design and Technology in Elecetronics Packaging, SIITME 2011, Timişoara, România; p.287-290; ISBN 978-1-4244-9109-4
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11. Lie Ioan, Beschiu Carmen, Nanu Sorin; *FPGA based signal processing structures*; Proceedings of the 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI), Timisoara; p.439 - 444; ISBN 978-1-4244-9108-7
12. Lie Ioan, Lazarescu Anita, Gontean Aurel; *Digital thermometer-thermostat implemented in a programmable circuitry*; Proceedings of the 34th International Spring Seminar on Electronics Technology: "New Trends in Micro/Nanotechnology", ISSE 2011; Tratanska Lomnica; p.466 - 469; ISSN: 2161-2528, ISBN: 978-145772112-0
13. Lie Ioan, Gontean Aurel, Hegy Szilard; *LabVIEW Implemented Boundary Scan Tester*; Proceedings of the 34th International Spring Seminar on Electronics Technology: "New Trends in Micro/Nanotechnology", ISSE 2011; Tratanska Lomnica; p.282-287; ISSN: 2161-2528, ISBN: 978-145772112-0
14. Szabo Robert, Gontean Aurel, Lie Ioan; *Mobile LCD clock*; Proceedings of the 15th International Conference on Intelligent Engineering Systems, INES 2011; Poprad; p.375-380; ISBN 978-142448956-5
15. Szabo Robert, Gontean Aurel, Lie Ioan; *Cheap live color recognition with webcam*; Proceedings of the XXIII International Symposium on Information, Communication and Automation Technologies (ICAT); p.001 - 007; ISBN 978-1-4577-0744-5
16. Szabo Robert, Gontean Aurel, Lie Ioan; *Temperature and climate chamber automated control*; Proceedings of the 12th International Symposium on, Computational Intelligence and Informatics (CINTI), Budapest; p.155 - 159; ISBN 978-1-4577-0044-6
17. Nafornita Corina, Isar Dorina, Isar Alexandru; *Searching the Most Appropriate Mother Wavelets for Bayesian Denoising of Sonar Images in the Hyperanalytic Wavelet Domain*; Proceedings of the IEEE Workshop on Statistical Signal Processing SSP 2011, 28-30 June, 2011, Nice, France, p.169-172, ISBN 978-1-4577-0568-7
18. Ruxandra-Ioana Rusnac, Aurel Gontean; *Evaluation of Wireless Sensor Networks Node Localization Algorithms*; Intelligent Data Acquisition and Advanced Computing Systems (IDAACS), 2011 IEEE 6th International Conference on ; p.857-862, ISBN 978-1-4577-1426-9
19. Ruxandra-Ioana Rusnac, Aurel Gontean; *Performance analysis of wireless sensor network node localization algorithm*; Communications and Vehicular Technology in the Benelux (SCVT), 2011 18th IEEE Symposium on ; p.1-5, ISBN 978-1-4577-1288-3
20. Isar Dorina, Isar Alexandru, Nafornita Corina; *Building Riesz Bases with the Aid of Low-pass Filters*; SPAMEC 2011, Cluj-Napoca, Romania, August 25-28, 2011; Proceedings of SPAMEC 2011
21. Costache Beatrice, Nafornita Corina, Isar Dorina, Isar Alexandru ; *Signal Processing Methods for Wireless Real Time Patient Monitoring System for Cardiac Illness*; First International Conference on Wireless and Mobile Networks, Paris, October, 23-24, 2011; Proceedings of the First International Conference on Wireless and Mobile Networks; 3 pages;
22. Balta Horia, Isar Dorina, Isar Alexandru, Balta Maria; *Mirror Equivalent Turbocodes-part 1*; 2011 International Conference on Communication Engineering and Networks (ICCEN 2011), Hong Kong, November 25 - 26, 2011; Proceedings of 2011 International Conference on Communication Engineering and Networks (ICCEN 2011); 25-31, 7; ISSN: 2010-460X
23. Balta Horia, Isar Dorina, Isar Alexandru, Balta Maria; *Mirror Equivalent Turbocodes-part 2*; 2011 International Conference on Communication Engineering and Networks (ICCEN 2011), Hong Kong, November 25 - 26, 2011; Proceedings of 2011 International Conference on Communication Engineering and Networks (ICCEN 2011; p.32-38, ISSN: 2010-460X
24. Balta Horia, Isar Dorina, Isar Alexandru, Balta Maria; *Simulation of Operation of Turbocodes trough the Monte Carlo Method, Comparison between Matlab, C and C#*; 3rd International

Symposium on Computer, Communication, Control and Automation 3CA 2011, Nov 19-20, 2011, Zuhai, China; Proceedings of 3rd International Symposium on Computer, Communication, Control and Automation 3CA 2011; 5; ISSN: 1876-1100

RESEARCH INTERESTS

- Prof.dr.eng. Mircea CIUGUDEAN: Conception of Analog Integrated Circuits and their Applications
- Prof.dr.eng. Tiberiu MUREȘAN: Digital Circuits, Industrial Robot Driving, Switched Mode Power Supplies
- Prof.dr.eng. Viorel POPESCU: Switched-Mode Power Supplies, *Industrial Electronics*
- Prof.dr.eng. Virgil TIPONUȚ: Analog Electronic Circuits, Logic Programmed Systems, Sensors and Transducers, Neural Networks
- Prof.dr.eng. Mihail Eugen TĂNASE: Doppler Telemetry
- Prof.dr.eng. Ivan BOGDANOV: *Industrial Robots, Computer control of electrical drives*
- Prof.dr.eng. Sabin IONEL: DSP applications, Statistical signal processing. Failure diagnosis
- Assoc.prof.dr.eng. Ioan JIVEȚ: Designing ASIC (VLSI) Circuits, Design of Digital Systems with Micro-Controllers and Micro-Processors, Clinical Applications of Electrical Bio-impedance Tomography
- Prof.dr.eng. Aurel GONTEAN: Programmed Logic Systems, Digital Circuits
- Prof.dr.eng. Dan LASCU: High Frequency Power Processors, Power Factor Correction Circuits, Switched-Mode Power Supplies, CAD Design in Power Electronics
- Assoc.prof.dr.eng. Dan ANDREICIUC: Industrial Robots, Mobile Robots
- Prof.dr.eng. Dorina ISAR: Industrial Process Control Equipment, Signal Processing for Signal / Noise Ratio Enhancement
- Lect.dr.eng. Lucian JURCA: Analog Electronic Circuits
- Assoc. prof. dr.eng. Adrian POPOVICI: Industrial Electronics, Materials for Electronics
- Assoc. prof. dr.eng Cătălin CĂLEANU: Electronic Devices and Circuits
- Assist.eng. Aurel FILIP: Analog Electronic Circuits
- Assist.eng. Sorin POPESCU: Analog Electronic Circuits, Logic Programmed Systems
- Assoc. prof. dr. eng. Ioan LIE: Electronics, Doppler Telemetry
- Assoc. prof. dr. eng. Dan NEGOIȚESCU: Industrial Electronics, Power Factor Correction
- Assist.eng. MIRCEA BĂBĂIȚĂ: Digital Circuits
- S.l.dr.eng. Valentin MARANESCU: Conception of Analog Integrated Circuits
- Assist.eng. Beniamin DRĂGOI: Conception of Analog Integrated Circuits
- Assist.dr.eng. Marlene DĂNEȚI: DSP applications, Statistical signal processing, Failure diagnosis
- Assist.eng. Petru PAPAZIAN: Digital Circuits
- Assist.eng. Bogdan MARINCA: Doppler Telemetry

DEPARTMENT OF COMMUNICATIONS
RESEARCH GROUP IN SIGNAL PROCESSING

RESEARCH FIELDS

- Adaptive signal processing
- Image processing
- Digital watermarking
- Time-frequency representations
- Wavelets theory applications
- Multiresolution analysis
- Nonlinear signal processing
- Neural networks
- Coding
- Compression
- Communication networks

KEYWORDS

Signals Circuits and Systems, Adaptive Signal Processing, Time-Frequency Representations, Wavelets Theory and Applications, Nonlinear Signal Processing, Neural Networks, Image Processing, Microwave Technique, Theory of Information and Coding, Data Transmission, Modern Communication Networks, Telecommunication Circuits, Digital Signal Processing, Digital Watermarking, Data Transmission on Radio Channels, Mobile Radio Communications

RESEARCH PROJECTS

1. No. ID-930: ***The Use of Wavelets Theory for Decision Making***

Value: Total 464.783,85 RON (174.998,85 RON on 2010) (202.337 RON on 2011)
Director: Prof. Alexandru Isar
Members: Prof. Ioan Nafornita, As. Prof. Moga Sorin (Telecom Bretagne) Lecturer Corina Nafornita, doctor Ioana Firoiu (until January 2011-replaced by Ph D. Student Jamal Mountassir) and doctor Cristina Stolojescu.

FIELD AND GRANT DESCRIPTION

Making decisions is a branch of artificial intelligence that is more and more used in complex applications like medicine (using a diagnostic, a treatment decision is made), geology (using images of a region, some hypotheses regarding the underground composition and some decision about extraction are made) or communications (using information about the functioning of each element of a communication network, some decisions about the resources allocation are made, for example of the frequency bandwidth). According to Bob Colwell, any machine can have artificial intelligence. This must be developed on the basis of understanding and imitation of the human brain. The intelligence results from the action of a large group of specialized neurons that use a world model based on memory to make a continuous series of predictions of future events. The neural networks of the cortex must be interpreted like a distributed memory of pattern sequences stoked in an invariant form, hierarchically arranged, accessed in an associative fashion. Between the neural network applications already known we can find applications in decision making for medicine, geology and communications. To make a correct decision, the decider must have the information in an appropriate form. This is the reason why, alternative representations of information are frequently used. A very interesting representation is in this respect the wavelet decomposition. In this project we want to associate the wavelets theory with the neural network theory to solve problems of decisions making in medicine, in geology and in communications.

ACTIVITIES AND RESULTS

2010-Three articles were published in magazines indexed in ISI Web of Knowledge. Six articles were published in the proceedings of conferences which were included in 2011 in ISI Web of Knowledge. The Ioana Firoiu's Ph.D. Thesis was defended.
2011-Six articles were submitted to magazines indexed in ISI Web of Knowledge, one of them was already published and the publication of another one was accepted. Twelve articles presented at conferences were included in international data bases. The Cristina Stolojescu's Ph.D. Thesis was defended.

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INTERNATIONAL PROJECTS

1. **No. 510/31.03.2011 :** ***Classification de textures fondée sur la theorie des ondelettes hyper-analytiques et les copules***

Program de cooperare bilaterală PAI Brancusi Romania-Franta, ANCS/EGIDE
Value: 29.400 RON Total (13.230 RON on 2011)
Director: Corina Nafornita (UPT), Yannick Berthoumieu (ENSEIRB)
Members: UPT: Ioan Nafornita, Alexandru Isar, ENSEIRB: Flavius Turcu, Ioana Turcu

FIELD AND GRANT DESCRIPTION

Stochastic modeling of natural images is the subject of many applications: denoising, filtering, classification, compression, synthesis. The purpose is to have a statistical model of the image information. There is a large variability for natural images so a transform domain can be more appropriate. This is a multi-orientation multi-level decomposition hence there is a need to study inter/intra dependence between components. Recent research in texture analysis and synthesis shows the importance of a statistical model in an "augmented" domain like a multi-orientation multi-level decomposition. A stochastic model with a minimum numbers of descriptors (parameters) is searched. The majority of methods are based of marginal pdf's, and their parameters are the descriptors. These methods have very good results in classification and filtering but in synthesis they lack performance. Two major drawbacks appear: they are based on the independence hypothesis between subbands and no mutual statistics are used. We search compact models for texture analysis and synthesis. We propose to use a new transform with enhanced selectivity and quasi shift invariance, the hyperanalytic wavelet transform (HWT) proposed by the Romanian team and a new family of multivariate models based on copula theory proposed by the French team.

ACTIVITIES AND RESULTS

For the Romanian team: 1 research article published in an ISI journal, 1 research article submitted to an ISI journal, 2 conference papers indexed by IEEE Xplore. 3 book chapers written by members of the Romanian team. One PhD student is enrolled and working on the theme of the project. The members of the Romanian team were invited in Bordeaux in November, and the director also in the period April-June.

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PUBLICATIONS

BOOKS

1. Editor: Nikolai Kolev; Isar Alexandru, Firoiu Ioana, Nafornita Corina, Moga Sorin, *SONAR Images Denoising in SONAR Systems*;InTech; 2011, 15 pages; ISBN 978-953-307-345-3

2. Editor: Hannu Olkkonen; Nafornita Corina, Isar Alexandru; *Application of Discrete Wavelet Transform in Watermarking in Discrete Wavelet Transforms. Algorithms and Applications*; InTech; 2011; 5 pages; ISBN 978-953-307-482-5

3. Ed. Didem Gökçay, Gülsen Yildirim; Ioan Buciu, Ioan Nafornita, Cornelia Gordan; *Facial Expression Synthesis and Animation in Affective Computing and Interaction: Psychological, Cognitive and Neuroscientific Perspectives*; IGI global; 23 pages; ISBN13: 9781616928926, ISBN10: 1616928921, EISBN13: 9781616928940

4. Isar Alexandru, Kovaci Maria; *Network Computer Security (in Romanian);* Politehnica Publishing House, 2011, 286 pages; ISBN 978-606-554-414-7

PAPERS

1. Firoiu Ioana, Nafornita Corina, Isar Dorina, Isar Alexandru; *Bayesian Hyperanalytic Denoising of SONAR Images*; IEEE GEOSCIENCE AND REMOTE SENSING LETTERS; vol.8, 2011, p.1065-1069, ISSN 1545-598X

2. Nafornita Corina, Isar Dorina, Isar Alexandru; *Searching the Most Appropriate Mother Wavelets for Bayesian Denoising of Sonar Images in the Hyperanalytic Wavelet Domain*; Proceedings of the IEEE Workshop on Statistical Signal Processing SSP 2011, 28-30 June, 2011, Nice, France, ; p.169-172, ISBN 978-1-4577-0568-7

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4. Mountassir Jamal, Balta Horia, Oltean Marius, Kovaci Maria, Isar Alexandru; *A physical layer simulator for WiMAX in Rayleigh fading channel*; Proceedings of the international symposium on Applied Computational Intelligence and Informatics (SACI) 2011, 19-21 May, Timisoara, p.281-284, ISBN: 978-1-4244-9107-0

5. Balta Horia, Kovaci Maria, Isar Alexandru, Nafornita Miranda, Balta Maria; *ARP and QPP interleaves selection based on the convergence of iterative decoding process for the construction of 16-state Duo Binary Turbo Codes*; proceedings of 34th International Conference on Telecommunications and Signal Processing (TSP) 2011; p.116-120, ISBN: CFP1188P-CDR / ISBN 978-1-4577-1409-2

6. Balta Horia, Kovaci Maria, Isar Alexandru, Nafornita Miranda, Balta Maria; *Double-binary RSC convolutional codes selection based on convergence of iterative turbo-decoding process*; Proceedings of 10th International Symposium on Signals Circuits and Systems (ISSCS) 2011; p.1-4, Print ISBN: 978-1-61284-944-7

7. Arvinti-Costache Beatrice, Costache Marius, Stolz R, Nafornita Corina, Isar Alexandru, Toepfer H.; *A wavelet based baseline drift correction method for fetal magnetocardiograms;* Proceedings of IEEE 9th International Conference on New Circuits and Systems (NEWCAS) 2011; p.109-112, ISBN: 978-1-61284-135-9

8. Arvinti Beatrice, Isar Alexandru, Costache Marius; *An adaptive compression algorithm for ECG signals*; Proceedings of the 12th IEEE International Symposium on Computational Intelligence and Informatics (CINTI) 2011; p.91-95, ISBN: 978-1-4577-0044-6

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10. Bojneagu Daniel, Mountassir Jamal, Oltean Marius, Isar Alexandru; *A New Blind Estimation Technique for Orthogonal Modulation Communication Systems Based on Denoising. Preliminary Results*; Proceedings of 10th International Symposium on Signals Circuits and Systems (ISSCS) 2011; p.149-152, ISBN: 978-1-61284-944-7

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clipping-companding scheme with sigmoid functions; Proceedings of International Conference Applied Electronics (AE) 2011; p.1-4, ISBN: 978-1-4577-0315-7

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14. Stolojescu Cristina, Moga Sorin, Lenca Philippe, Isar Alexandru; *WiMAX traffic analysis and Base stations classification in terms of LRD;* Proceedings of 15th Portuguese Conference on Artificial Intelligence, EPIA 2011, Lisbon.; p.478-490, ISBN: 978-989-95618-4-7
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19. Ionescu Daniela, Bogdan Ion, Kovaci Maria; *Simulation determination of the negative permeability for the metamaterials based on Sr(ZnTi)Fe10O19 hexaferrite*; IEEE 17th International Symposium for Design and Technology in Electronic Packaging (SIITME), Timisoara, Romania; p.201-206, ISBN 978-1-4577-1275-3
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23. Costache Beatrice, Nafornita Corina, Isar Dorina, Isar Alexandru; *Signal Processing Methods for Wireless Real Time Patient Monitoring System for Cardiac Illness;* First International Conference on Wireless and Mobile Networks, Paris, October, 23-24, 2011; Proceedings of the First International Conference on Wireless and Mobile Networks; 3 pages;
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34. Andrei Campeanu, Gal Janos, Ioan Nafornita; *64-QAM Carrier Synchronization by an Extended Kalman Filtering;* Proceedings of the First International Conference on Wireless and Mobile Networks, Paris, October, 23-24, 2011; 2 pages;
35. Balta Horia, Kovaci Maria, Maria Balta, Alexandru Isar; *A Comparison of Methods Convolutional Codes of Trellis Termination of the COMPONENTS OF Turbo-Codes;* Proceedings of the First International Conference on Wireless and Mobile Networks (ICWMCN), Paris, France, 24-25, October, 2011; 3 pages;
36. Budura G., Balint C.; *Traffic models for performance evaluation in VAMOS networks;* Applied Electronics, 2011 International Conference, Pilsen; Conference proceedings; p.63-66, ISBN 978-1-4577-0315-7
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39. Vesa Andy, Alexa Florin; *Radiation Pattern Characteristics for 2D and 3D Uniform Array Antennas;* Proceedings of The 2011 International Conference on Wireless and Optical Communications (ICWOC 2011), 21-22 Mai; p.275-278;

PhD RESEARCH ACTIVITIES

1. *Scientific Supervisor: Prof. dr. eng. Ioan NAFORNIŢĂ*

PhD students

- Romulus REIS, *Non-Stationary Signal Description by Non-Parametrical Method*
- Florin VANCEA, *Data Protection in Communication Networks*
- Andy VESA, *Improvement of Digital Radio Systems Detection*,
- Arpad IOZSA, *Beamforming techniques*.
- Cristian-Alin MOS, *Security systems in road traffic*.

2. *Scientific Supervisor: Prof. dr. eng. Miranda NAFORNIŢĂ*

PhD students:

- Sorin POPA, *Synchronization techniques improvement for radio channel transmission systems*
- Florin Lucian MORGOS, *Radio channels equalization techniques improvement*
- Ioan CARLIA, *Collaborative adhoc wireless mobile networks*
- Marin MANGRI, *Optimizarea tracing-ului la protocoalele de timp real din IMS (IP Multimedia Subsystems)*
- Daniela-Ecaterina CRISTEA; *Texture Classification Using Transforms*
- Adrian MACAVEIU, *The Use of RADAR in Improving Road Traffic Safety*

3. *Scientific Supervisor: Prof. dr. eng. Alexandru ISAR*

PhD students:

- Cristina Stolojescu, *Traffic predictions in wireless networks*.
- Victor CUTEANU, *Contributions in satellite receiver design*.
- Petru LAZAR, *Protocols in wireless communications networks*.

- Ioan ANDOR, *Security techniques used in wireless communications networks*.
- Beatrice, ARVINTI, *Tele monitoring for patients suffering from heart desease.*
- Lucian, ARDELEAN, *Interference reduction techniques in WiMAX technology*.
- Daniel BOJNEAGU, second year student.
- Jamal MOUNTASIR, *Study on LTE wireless networks*.

PHD THESES SUSTAINED

- Marius SALAGEAN, *Non-Stationary Signal Description by Non-Parametrical Method,* Scientific supervisor Prof.dr.eng. Ioan NAFORNITA

RESEARCH TEAM

- Prof.dr.eng. Ioan NAFORNIȚĂ: *Signals, Circuits and Systems, Adaptive Signal Processing, Time-frequency Representations, Wavelets Theory's Applications, Microwave Techniques, Image processing, Digital watermarking*
- Prof.dr.eng. Miranda NAFORNIȚĂ: *Theory of Information and Coding, Data Transmission, Signals, Circuits and Systems, Modern Communication Networks*
- Prof.dr.eng. Alexandru ISAR: *Signals, Circuits and Systems, Wavelets Theory's Applications, Time-frequency Representations, Compression, Coding*
- Prof.dr.eng. Andrei CÂMPEANU: *Telecommunication Equipment Technology, Telecommunication Circuits*
- Assoc. Prof. dr. eng. Corina BOTOCA: *Microwave Techniques, Signals, Circuits and Systems, Neural networks*
- Assoc. Prof. dr. eng. Georgeta BUDURA: *Signals, Circuits and Systems, Nonlinear Signal Processing, Telecommunication Circuits*
- Lect. dr. eng. Cornel BALINT: *Speach coding, Telecommunications network, Digital Switching*
- Lect. dr. eng. Horia BALTĂ: *Optical Transmission and Processing of Information, Statistical Theory of Information Transmission, Theory of Information and Coding*
- Assist. dr. eng. Maria KOVACI: *Statistical Theory of Information Transmission, Theory of Information and Coding, Signals Circuits and Systems*
- Assist. dr. eng. Janos GAL: *Signals, Circuits and Systems, Telecommunication Circuits*
- Assist. dr. eng. Radu LUCACIU: *Optical Transmission and Processing of Information*
- Lect. dr. eng. Nicolae MICLĂU: *Optical Transmission and Processing of Information, Theory of Information and Coding*
- Lect.dr.eng. Corina NAFORNIȚĂ: *Digital Signal Processing, Digital Watermarking*
- Assist. dr. eng. Marius OLTEAN: *Data Transmission on Radio Channels*
- Assist.dr.eng. Marius SĂLĂGEAN: *Signals, Circuits and Systems*
- *Assist.eng. Andy VESA: Radio communication, Wireless communications*

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RESEARCH GROUP IN IMAGE PROCESSING AND MULTIMEDIA TECHNOLOGIES

RESEARCH FIELDS

- Television and Digital Television
- Image Compression
- Digital Image Processing
- Motion Analysis
- Pattern Recognition
- Interactive Multimedia Techniques
- Media Streaming
- Multimedia Databases
- Internet Security Techniques
- E-learning
- Advanced learning technologies
- WWW, Hypermedia and Internet

KEYWORDS

Image Processing, Sound Processing, Multimedia, Image Compression, Interactive Applications, Web Services, E-learning

INTERNATIONAL PROJECTS

1. LLP project "SKILL2E - Sustainable Know-How in Intercultural Learning in Student Placements and the Knowledge Transfer to Enterprises", Agreement **510416-LLP-1-2010-1-AT-ERASMUS-ECUE**

Director: Assoc.lect.eng. Diana ANDONE
UPT Value: 35.708 EURO (10.207 EURO for 2011)
Members: Prof.dr.eng. Radu VASIU
Lect.dr.eng. Marian BUCOS
Assist.dr.eng. Mihai ONITA
Dr.eng. Andrei TERNAUCIUC
Tatiana TERNAUCIUC
Assist.dr. Delia ROBESCU-TANASE
Partners: University of Applied Sciences Salzburg, Austria (coord);
University of Alicante, Spain;
Arcada University of Applied Sciences, Helsinki, Finland;
Mugla University, Turkey;
Southampton Solent University, UK;
ETA2U Timisoara, Romania

Project web page: http://skill2e.fh-salzburg.ac.at

DESCRIPTION

The SKILL2E project addresses the need for preparing higher education graduates for their future work environments with respect to multi-cultural, cross-organisational and cross-sectoral collaboration.

Higher educational institutions need to equip their graduates today with social competences and cultural awareness in line with the key competences for Lifelong Learning and the New Skills for New Jobs Initiative.

The SKILL2E approach is independent of sectors and disciplines. It offers a holistic concept on how acquisition and enhancement of intercultural skills through transnational student placements in enterprises can be integrated in educational offers in the best possible manner. Furthermore, the approach focuses on how this integration can be optimized and validated in order to ensure fitness for purpose.

The SKILL2E concept aims towards four outcomes:

i) SKILL2E pre-placement training model including the implementation of an assessment instrument with respect to intercultural competence.

ii) A prototypical implementation of the SKILL2E communication scenario for intercultural reflection in an online environment as a model for using social software for pedagogic purposes and individual learning curve evaluation.

iii) The SKILL2E evaluation model intended to validate the competency gain from the perspectives of all interest groups involved based on clearly defined learning outcomes.

iv) The SKILL2E enterprise handbook documenting best practice sample implementations of the SKILL2E cultural mentor concept designed to assist enterprises in fully utilizing the potential of international interns in the short term, but also international employees, cooperation partners and clients from a long-term perspective.

The universities and enterprises involved in the project reflect a cross-section of European culture, well suited for this multi-perspective approach and for generating useful and sustainable results beyond the project lifetime and boundaries.

The SKILL2E project has three major objectives:

1. Equipping graduates with transversal skills required to communicate effectively in today's and future multi-cultural and multi-disciplinary workplace.
2. Strengthening the dialogue between universities and enterprises in providing a model for mutual knowledge transfer in the context of intercultural competence.
3. Involving stakeholders at organisational as well as policy-making levels to ensure the impact of the SKILL2E approach beyond the project boundaries and lifetime.

In order to achieve these goals, the association of universities and enterprises will combine approaches and different findings in the fields of transnational student placements and related intercultural skill acquisition that have so far been isolated. This will be accomplished through a comprehensive training concept with accompanying measures, such as the online communication scenario and cultural mentorship at the enterprise. This action will involve the three relevant interest groups of students, universities and enterprises both actively in the project itself and as the intended beneficiaries.

The chosen approach is independent of both sectors and disciplines. The prototypical implementation of the SKILL2E concept in all of the associated universities and enterprises will facilitate the involvement of relevant institutional stakeholders. These stakeholders range from those who are responsible for the university-enterprise cooperation, to those who are responsible for the curriculum design at all faculty levels, in addition to the policy-makers that need to measure the relevance of the university-enterprise cooperation.

Furthermore, the SKILL2E cultural mentor concept will improve the mutual knowledge

transfer, increasing awareness of cultural and social issues in the business world and finally, help balance a theory-based academic approach with practical work place implications and employability aspects.

2. LLP project "CBVI - Cross Border Virtual Incubator", Agreement **510216-LLP-1-2010-NL-ERASMUS-ECUE**

Director: Assoc.lect.eng. Diana ANDONE
UPT Value: 25.280 EURO (7.116 EURO for 2011)
Members: Prof.dr.eng. Radu VASIU
Lect.dr.eng. Marian BUCOS
Lect.dr.eng. Mugur MOCOFAN
Dr.eng. Andrei TERNAUCIUC
Tatiana TERNAUCIUC
Partners: EADTU - European Association of Distance Teaching Universities - coord.;
iENTIRE - Netherlands Institute for Entrepreneurship and Innovations Research;
University of Wuppertal, Germany; UNED - National Distance Education University, Madrid, Spain;
International Development Management SA, Madrid, Spain;
Iberian Equities AV, Madrid, Spain;
University of Miskolc, Hungary; Chamber of Commerce and Industry Borsod-Abaúj-Zemplén County, Miskolc, Hungary;
Swansea University, Wales, UK;
Open University, Heerlen, Netherlands;
Timisoara Software Incubator (UBIT);
Technical University Graz, Austria; Tallinn University, Estonia;
City Conversity AB, Lund, Sweden;
International Telematic University (UNINETTUNO), Rome, Italy;
Marie Curie-Sklodowska University in Lublin, Poland;
Anadolu University, Turkey

Project web page: www.eadtu.eu/cbvi.html

DESCRIPTION:

Modern societies are in need of innovation to sustain their economy, but the individual and financial necessity of actually becoming entrepreneurial has diminished: a relative decrease of entrepreneurial activity is observed for economies progressing from agricultural and manufacturing towards innovation driven economies.

Accordingly, States must revitalise education & training to these skills, and especially appeal to the individual for which the (financial) need for entrepreneurship has diminished due to the welfare economy. In the innovation economy, entrepreneurship is key: post-2010 education & training programmes should be reinforced and restructured with that requirement in mind, and this not only concerns mainstream providers such as traditional universities, but the whole educational system. Especially Open and Distance Learning institutions (ODL) have a strong outreach: they have the possibility of addressing the adult population, a population (already) identified to have more chances of success with entrepreneurial activities as opposed to youngsters just leaving the university.

New flexible ways to promote entrepreneurship and start-ups must be invented and piloted. CBVI intends to reach (adult) workers/learners in an innovative and flexible manner, building on successful prior practice, and by infusion of open technologies and services. The vast capital of open & free tools and services on the Internet, is both an instructional asset in the process of social entrepreneurial incubation, as well as a business instrument in the actual start-up of a venture.

Finally, a strong force behind the formulation of the CBVI project has been the declaration of Good Practice for the projects Cross Border Virtual Mobility (CSVM) and Cross Border Virtual Entrepreneurship (CBVE), two projects which have been successful in their approach to improve university-business convergence for ODL by flexible modality approaches.

On the strategic level, CBVI aims to systematically improve discussion and cooperation between higher education institutions (both education and research-based) and regional stakeholders in order to optimise the opportunities for entrepreneurship and the design of the associated entrepreneurship ecosystem. It aims to provide for more transparency of practices to help stimulate improvements and accelerate knowledge transfer on these practices, taking into consideration that these partners are often located in so called science regions, innovative regions, collaborative regions or development regions.

On the tactical level, CBVI aims to support business planning & tenant incubation, utilising social and professional media & networking as a contributor to entrepreneurial success. CBVI subscribes to the need for (networked) business development and joint innovation, with purposive inflows and outflows of professional knowledge in order to accelerate enterprise start-ups. To improve the skilling of individuals in enterprise start-up, it hosts multiple development pilots, which are regional, and are conducted with students, stakeholders, SMEs and multipliers. Both professional intermediaries and experienced entrepreneurs assist in the transfer of knowledge and consultancy to starters. By virtue of the large

partner network, the sourcing of expertise is able to transcend one's own region.

On the operational level, CBVI intends to demonstrate that start-ups can utilise more contemporary open tools, technologies and services, in order to decrease the financial threshold of enterprise creation. Overall, CBVI is to sustain a social and learner-centric entrepreneurship environment, which is benign to (individual or multi-party) transfer of resources concerning market conditions, access to finance, technology, culture, legislation, showcases and practice models: a platform which is conducive to the training of non-traditional learners and the start-up of enterprises.

CBVI will effectuate far reaching pilots on (networked) business planning and successive field-oriented coaching of new entrepreneurs by universities, multipliers and SMEs. It takes full advantage of Web 2.0 technologies and utilises multi-level (open) services to exploit the social & technological connectivity of individuals.

The platform provides a larger social springboard on each new case. The environment has already been the springboard for the launch of 5 multilingual (pedagogically-rich) virtual Masterclasses in entrepreneurship and consecutive business planning trails inside the Good Practice of Cross Border Virtual Entrepreneurship (CBVE).

CBVI performs regional SWOTs of (pre)incubation approaches, education-based and research-based, to establish flexible technology opportunities for connecting starters and stakeholders. It organises open services to host tenants and professionals. It pilots materials, tools and guidance with virtual business planning. It executes methodologically different demonstrations of field coaching for (pre)incubation, and draws lessons from the entrepreneurship-centred environment, the business planning exercises, and the (pre)incubation pilots, to enable more regional and cross-border knowledge transfer, and a higher regional impact.

3. LLP project "I2AGORA - International Internship AGORA", Agreement **511784-LLP-1-2010-1-HU-KA4-KA4MP**

Director: Assoc.lect.eng. Diana ANDONE
UPT Value: 59.201 EURO (8.880 EURO for 2011)
Members: Prof.dr.eng. Radu VASIU
Lect.dr.eng. Marian BUCOS
Lect.dr.eng. Mugur MOCOFAN
Assist.dr.eng. Mihai ONITA
Dr.eng. Andrei TERNAUCIUC
Dr.eng. Iasmina ERMALAI
Eng. Bogdan DRAGULESCU – PhD student
Tatiana TERNAUCIUC
Partners: Miskolci Egyetem, Hungary (coord); EADTU - European Association of Distance Teaching Universities, Netherlands;
Katholieke Universiteit Leuven, Belgium Oulu University of Applied Sciences, Finland;
Open Universiteit Nederland;
UNED - Universidad Nacional de Educacion a Distancia, Madrid, Spain; Tallinna Ülikool (Tallinn University); Chamber of Commerce and Industry Borsod-Abauj-Zemplen County;
Euro-Contact Business School, Budapest, Hungary;
Timisoara Software Business Incubator

Project web page: http://edu.uni-miskolc.hu/

DESCRIPTION:

Universities of the 21st Century are expected to reconsider their relationship with both the regional and global economy. Practical placement may act as an important pillar of it, as well as a multifunctional tool for improving the employability of graduates. While flexibility of course delivery and physical/virtual mobility have received quite a lot of attention, leading to widely available good practice cases/guidelines, in contrast much less focus has been directed toward the improvement of flexibility and internationalization of practical placements.

The prime objective of the I2AGORA project is to open up synergic potential between EU projects, focused on this challenging area. Survey, systematization and synthetisation of previously implemented and running relevant projects will follow a 3*3 dimensional approach – a "Magic Cube" of Virtual Internship Programs - involving:

- vertical dimensions - periods of internship in chronological order, (pre-, implementation and post-internship activities),

- horizontal dimensions - pedagogical patterns, technological tools and methodological models, as elements of the "educational" approach,

- layers of actors/stakeholders: students, universities, enterprises and intermediaries / multipliers

Special pilot "Internship2.0" programs will be announced and managed by the partners - students from all over EU will be involved in different development activities.

I2AGORA will deliver:

(1) multilingual Intern-Gateway as a one-stop access point to virtual internship projects, guidelines, etc. (2) IdeAgora – a web-based meeting point for sharing ideas and solutions within the Community of Practice

(3) versatile support in using ICT-based, modern working environment by all stakeholders,

(4) a multiplication of the impact by "Employability Cliniques" events with proven showcases;

(5) a confrontation of conventional placement assumptions with flexible models, leading to recommendations for European policy.

NATIONAL RESEARCH PROJECTS

1. CNCSIS IDEI, ID_930, 667/19.01.2009
***Title:* Fuzing Statistic and Semantic Modeling in Image Sequences Analysis**
Director: prof.dr.eng Vasile GUI
Value: 167.831 RON
Members: prof.dr.eng. Florin ALEXA
Assoc.prof.dr.eng. Cătălin CĂLEANU
Teach assist.dr.eng. Ciprian DAVID
Teach assist.eng. Gheorghe POPA
Dr.eng. Georgiana SIMION

FIELD AND GRANT DESCRIPTION
Probabilistically oriented approaches for image sequence analysis have difficulties in modeling complex situation encountered in real world applications. To alleviate this problem, we propose a new theoretical framework for fusing the statistical thinking level with the semantical level in the benefit of both. We will test the effectivenes of the concept on object tracking and motion estimation tasks, related to human body motion analysis. We define three main research objectives. The first one is the development of a semantically guided kernel traker. The best method to exploit semantic information extracted from the iamge sequence through inference in the traking performance improvement will be investigated. Our second research objective is to find effective use of the new sparse representation in motion modeling and semantic inference. The third research objective is to enhance a foreground/background segmenter by higher level information extracted from the processed image sequence.

ACTIVITIES AND RESULTS
Development of a semantically guided tracker
Robust background estimation

Contact person:
vasile.gui@etc.upt.ro

2. Human Resources Development Project nr. POSDRU/89/1.5/S/52603
***Title*: Development and support for postdoctor al multidisciplinary programmes in priority technical fields according to the national research–developmen–innovation strategy" 4D–POSTDOC**
Director: Prof.dr.eng. Radu VASIU
Value 2011: 450,000 RON
Members: Prof.dr.eng. Alimpie IGNEA
Assoc.lect.eng. Diana ANDONE
Prof.dr.eng. Daniel GRECEA
Prof.dr.eng. Nicolae MUNTEAN
Prof.dr.eng. Vasile GUI
Prof.dr.eng. Lia DOLGA
Prof.dr.eng. Carmen GRECEA
Eng. Agnes STEPANIAN
Ec. Isabella MACARIE
Partners: Technical University Cluj-Napoca
Technical University of Iasi

FIELD AND GRANT DESCRIPTION:

The main objective of the project is to increase the quality of the management of the posdocoral research projects in the three involved universities.

The specific objectives are:

- increase of the participation rate of the experienced researchers in developing a carreer in research in technical fields, through better financing and quality of the research infrastructure;
- improvement of the postdoctoral research programmes, in: number of researchers, number of priority research subjects, quality of outcome publications;
- improvement of the acces to the research infrastructure, through co-operation with universities and research institutes in the EU;
- improvement of the postdoctoral research programmes' management.

A number of 16 postdoctoral researchers in the universities are financed for their research, including research periods abroad and costs of their participation to international conferences.

3. Human Resources Development Project nr. POSDRU/86/1.2/S/54956

Title: eSTART - Multi-regional Master Study Programme in the Field of eActivities

Director: Prof.dr.eng. Radu VASIU
Value: 2.081.662 RON
Period: 2010-2013
Members: Diana ANDONE
Florin ALEXA

Marian BUCOS
Mihai ONITA
Aurel GONTEAN
Lacramioara STOICU-TIVADAR
Sorin NANU
Marius OTESTEANU
Inocentiu MANIU
Nicolae ROBU
Vasile GUI
Dan LASCU
Vladimir CRETU
Delia TANASE
Andrei TERNAUCIUC
Bogdan DRAGULESCU
Muguras MOCOFAN
Iasmina ERMALAI
Vlad MIHAESCU
Silviu VERT
Tatiana TERNAUCIUC

Partners: Technical University of Cluj-Napoca
"Transilvania" University of Brasov
Babes-Bolyai University of Cluj-Napoca

Project web page: www.estart.utcluj.ro

FIELD AND GRANT DESCRIPTION:

The project's overall objective is to create new learning opportunities, training and development at the master level, based on a multi-regional approach, by developing a program of study focused on the use of new ICT technologies and innovative approaches in the field (collaborative environments) in the organization, teaching and operating in accordance with the Bologna process.

The program will be piloted in the training of professionals in the use, implementation and development of e-services, e-work, e-applications and platforms and related technologies.

Overall objective is conditional on achieving the following specific objectives:

- acquisition at the institutional level, of the procedures and methodologies in the organization, implementation and promotion of university master programs developed at multi-regional level, carried on the support and solutions offered by new ICT
- achieving an open structure of organization and operation of a training program at Masters student-centered, developed into a multi-regional form and allowing flexible access (time, location, curriculum) to the educational use of ICT
- description in terms of skills and a cross with a relevant curriculum development and implementation of e-activities dedicated (with specialization e-Business, e-Health, e-Government & Administration, e-Media), respecting the wishes of the National Accreditation Council
- providing a program of study focused on an integrated platform using online education and training, based on the innovative concept "blended-learning" and support offered by new technologies include intelligent monitoring and evaluation of educational activities to promote quality
- conduct a pilot training program using the procedures (how flexible the organization), methodology, educational materials and technology implemented with the creation of a virtual community of e-activities.

In line with the objectives of POSDRU, the project improves the quality and relevance of the specializations offered at Masters level in partner higher education institutions, with methodologies and processes chosen to implement the program of study and specialization of relevance especially for e-activities, aimed at engaging a number total of over 320 eligible beneficiaries in the target group (120 in the development program and 200 students in the pilot stage).

The open nature of the project will allow the transfer of knowledge and skills acquired for restructuring related to other curricular areas (computers, computer, information technology, etc.).

4. Human Resources Development Project nr. POSDRU/86/1.3/S/60891

Title: DidaTec – Lifelong learning and training for higher education teachers in the technical sciences and engineering fields

Director: Prof.dr.eng. Radu VASIU
Value: 2.506.564 RON
Period: 2010-2013
Members: Diana ANDONE
Muguras MOCOFAN
Toma Leonida DRAGOMIR
Virel-Aurel SERBAN
Florin ALEXA
Dan LASCU
Mugur DRAGOMIR
Carmen GRECEA
Carmen HOLOTESCU
Ivan BOGDANOV
Sabin IONEL
Mirela TOTH-TASCAU
Nicolae CRAINIC
Nicolae MUNTEAN
Daniel GRECEA
Aurel GONTEAN
Mihai ONITA
Andrei TERNAUCIUC
Vlad MIHAESCU
Silviu VERT

Tatiana TERNAUCIUC
Partners: Technical University of Cluj-Napoca
"Transilvania" University of Brasov

Project web page: www.didatec.utcluj.ro

FIELD AND GRANT DESCRIPTION:

DidaTec, a word that associates the "didactic" process with "technology", started as an initiative of the main technical universities in Romania for the effective implementation of modern educational instruments and blended-learning technologies in the teaching-learning activity.

The project's mission is to create the necessary framework for the adaptation of the current higher education environment in the field of engineering and technical sciences to a world and a way of living that follows the digital revolution. The vision in mind is that of a true, active and engaging experience for the university student, based on her/his gadgetfilled life in which science and engineering blend in, having the teacher as a companion.

The general objective of the project is the improvement of e**ducation and training processes in the technical higher education (engineering sciences) through a complete and unitary program (national approach) of lifelong learning and training for higher education teachers.** The project's aim is the acquiring of competencies in **interactive techniques of teaching & learning and IT&C**, as a key factor for a relevant education in accordance with the specific needs of the economy.

Mainly, this is to be achieved by:

- implementing a pilot program consisting of 6 courses on modern educational instruments and the use of IT&C for over 800 existing higher education teachers;
- implementing a mentorship program for over 200 young specialists/professionals starting a career in the field of engineering education;
- offering assistance and technical guidance for restructuring over 900 courses taught in universities throughout Romania in the field of engineering education.

In the context of the more general objective of the project, the specific objectives to be achieved are the following:

- The consolidation of intra- and inter-university cooperation as well as the cooperation with other interested actors, for the development of an efficient system of education and training for higher education teachers in the field of engineering sciences;
- The elaboration of a "Standard of quality for the program of lifelong learning and training for higher education teachers & trainers" and of a "Personal development plan" & "Career plan" - guidelines for the higher education teachers;
- At an institutional level, the acquiring of competencies, and the development of procedures and methodologies in what concerns the organization, implementation and promotion of lifelong learning and training programs;
- The training and assistance of teachers for the successful use of modern teaching & learning techniques (based on the support provided by IT&C and the integrated instruments for educational activity management);
- The professional/personal development of entry-level young teachers through the implementation of a mentoring program.
- The improvement of human resource involved in teaching activities through the creation of a knowledge and communication platform to sustain future actions and collaboration.

The project will influence directly over 1,000 beneficiaries performing in technical universities in Romania during the implementation period, and an indirect estimate of over 20,000 students in the following 3 years.

5. Human Resources Development Project no. POSDRU/90/2.1/S/56319

Title: IS – Simulated Enterprise for Working Skills in Technological Companies

Director: Dr.eng. Diana ANDONE
Value: 1.347.938 RON
Period: 2010-2013
Members: Radu VASIU
Nicolae ROBU
Mihai ONITA
Delia TANASE
Tatiana TERNAUCIUC
Andrei TERNAUCIUC
Muguras MOCOFAN
Partners: Ministry of Education
"Politehnica" University of Bucharest
"Constantin Brancusi" University of Targu-Jiu
Novensys Corporation, Bucharest
Gold Agama Consulting

Project page: www.intreprindere-simulata.ro

More specific requirements and complex corporate labor market in terms of skills that prepare students for employment had an important contribution in building the Lisbon Strategy, that requires each Member State to

focus on three things: attracting and maintaining as many people on the labor market, improving adaptability of workers and enterprises and increasing investment in human capital through better systems of education and training.

In the spirit of this initiative, Enterprise simulated student is a project funded by the Operational Programme Human Resources Development (HRD) 2007-2013, Priority Axis 2 - "Linking life long learning and labor market", in Key Area of Intervention 2.1 - "Transition from school to active life" which aims to attract young people in the labor market by preparing their strategic, focused and controlled even by technology companies that will hire.

The overall objective is to increase the adaptability and employability of a total of 600 graduates for future undergraduate and master the labor market, in the context of knowledge-based society by using an innovative tool (concept of "sham company"), adapted to the realities economic and labor market needs in Romania.

The overall objective will be accomplished through the following specific objectives:

- Increased access to information on innovative opportunities to facilitate the transition from student status to the employee, through "simulated enterprises";
- Implementation and adaptation of this innovative tool in the Romanian higher education, according to the specific economic context European / national / regional
- a human resource training for students training in simulated enterprises will be organized and will operate the project;
- an improvement in the labor market insertion students through interactive learning enterprise implementation methods simulated and internships.

Evaluation of project approaches in order to increase competitiveness of future graduates in the labor market by learning to work with tools developed.

The target of the project consists of:

- Students in the four study areas selected for project development (IT, computers and information technology, electronics and communications engineering and systems engineering);
- Tutors from companies interested in selecting, recruiting and training students in skills necessary spirit at work.

PUBLICATIONS

BOOKS

1. Radu Vasiu, Diana Andone: *Ideas and Concepts of ViCaDiS - A Virtual Learning Environment for Digital Students (Chapter 23)*, in Ifenthaler, Isaias, Spector, Kinshuk, Sampson (Eds.) - Multiple Perspectives on Problem Solving and Learning in the Digital Age, Springer, New York, pp. 359-376, ISBN: 978-1-4419-7611-6
2. Iasmina Ermalai: *Informational Technologies in eLearning*, LAP Lambert Academic Publishing, 136 pages, ISBN 978-3-8465-9448-3
3. Mugur Mocofan, Radu Vasiu, Diana Andone: *Introducere în tehnologii multimedia*, Editura Academiei Oamenilor de Ştiinţă, Bucureşti, 75 pages, ISBN 978-606-8371-59-7
4. Bucos Marian, Mihai Oniţa: *Realizarea de aplicaţii multimedia on-line utilizând software dedicat*, Editura Academiei Oamenilor de Ştiinţă, Bucureşti, 99 pages, ISBN 978-606-8371-31-3
5. Mocofan Muguraş, Vasiu Radu, Andone Diana, Ermalai Iasmina, Oniţa Mihai: *Tehnici informaţionale şi de comunicare*, Editura Academiei Oamenilor de Ştiinţă, Bucureşti, 82 pages, ISBN 978-606-8371-58-0
6. Mihai Oniţa: *Contribuţii la utilizarea tehnologiilor video în învăţământul electronic* (teza de doctorat), Editura Politehnica, 113 pages, ISBN 978-606-554-255-6
7. Mihai Oniţa: *Tutoriale multimedia*, Editura Politehnica, 106 pages, ISBN 978-606-554-385-0
8. Ternauciuc Andrei: *Contributii la dezvoltarea uneltelor de comunicare in cadrul platformelor web educationale* (teza de doctorat), Editura Politehnica, 136 pages, ISBN 978-606-554-371-3

PAPERS

1. Negrea Romeo, Eckstein Andrei, Alexa Florin; *Numerical solutions for a class of nonlinear systems and application to stochastic resonance*; WSEAS Transactions on Mathematics; Issue 3, Volume 9, March 2010, 161-170, ISSN 1109-2769
2. Mocofan Mugur, Ermalai Iasmina, Bucos Marian, Onita Mihai, Dragulescu Bogdan; *Supervised Tree Content Based Search Algorithm for Multimedia Image Databases;* Proceedings of the 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, May

19-21, pp. 469 - 472, ISBN 978-1-4244-9107-0

3. Dragulescu Bogdan, Ermalai Iasmina, Bucos Marian, Mocofan Mugur; *Using hCard and vCard for improving usability in Moodle;* Proceedings of the 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, May 19-21, pp. 473 - 476, ISBN 978-1-4244-9107-0
4. Mulec George, Vasiu Radu, Frigura-Iliasa Flaviu, Vatau Doru; *WLAN Security Performance Study*, 10th WSEAS International Conference on Electronics, Hardware, Wireless and Optical Communications, EHAC'11, Cambridge, UK, Febr. 2011, pp. 401-406, ISBN 978-960-474-276-9, 1792-8133 (print), 1792-8141 (CD)
5. Andone Diana, Vasiu Radu, Robu Nicolae; *Building a Virtual Campus for Digital Students*, 2011 IEEE Global Engineering Education Conference - EDUCON, "Learning Environments and Ecosystems in Engineering Education", Amman, Jordan, Apr. 2011, pp. 1069-1073, ISBN 978-1-61284-641-5
6. Vasiu Radu, Andone Diana; *Using Web 2.0 Technologies in Academic Education for Students in Engineering*, 11th IEEE International Conference on Advanced Learning Technologies, ICALT 2011, Athens, Georgia, USA, July 2011, pp. 582-584, ISBN 978-0-7695-4346-8
7. Andone Diana, Frydenberg Mark; *Across Continents: Using Web Based Collaboration Tools for Learning*, 11th IEEE International Conference on Advanced Learning Technologies, ICALT 2011, Athens, Georgia, USA, July 2011, pp. 100-102, ISBN 978-0-7695-4346-8
8. Mugur Mocofan, Sorin Petan, Radu Vasiu; *Educational Framework Model for Image Processing and Image Databases;* Computational Engineering in Systems Applications (vol. II), Proceedings of the International Conference on Energy, Environment, Economics, Devices, Systems, Communications, Computers, Iasi, IAASAT Press, 1-3 july 2011, pp. 143-146, ISSN 2223-9812, ISBN 978-1-61804-014-5
9. Mugur Mocofan, Dan Vâtcă; *Testing Performance of Virtualization and Storage in a Single Appliance;* 19th Telecommunications forum TELFOR 2011, Serbia, Belgrade, November 22-24, pp. 1382-1385, ISBN 978-1-4577-1500-6
10. Ternauciuc Andrei, Ivanc Dan; *Remote desktop solutions used in e-Learning scenarios*, Proceedings of the 6th IEEE International Symposium on Applied Computational Intelligence and Informatics – SACI 2011, May 2011, ISBN: 978-1-4244-9107-0
11. Vert Silviu, Vasiu Radu; *Mobile applications for smart homes: a case study*, Proceedings of the IADIS International Conference Applied Computing 2011, Rio de Janeiro, Brazil, 6-8 Noiembrie 2011, 5 pages, ISBN 978-989-8533-06-7
12. Mihăescu Vlad, Vasiu Radu; *Open Tourism - An eTourism Concept*, Proceedings of the International Conference IADIS WWW/Internet 2011 (ICWI 2011), Rio de Janeiro - Brazil, 5-8 noiembrie 2011, 8 pages, ISBN 978-989-8533-01-2
13. Popescu S, Gontean Aurel, Alexa Florin; *Improved FPGA-based detector;* Proceedings of the 6th IEEE International Symposium on Aplied Computational Intelligence and Informatics (SACI), 19-21 May; pp. 403-408, ISSN 1792-4251
14. Vatau Doru, Alexa Florin, Craciunescu A., Teslovan R.; *Sustainable development oriented power plant environmetal impact analysis*; Proceedings of the 6th IEEE International Symposium on Aplied Computational Intelligence and Informatics (SACI), 19-21 May; pp. 599-602, ISSN 1792-4251
15. Daniel Popa, Vasile Gui, Marius Otesteanu; *Semi-Automatic Hand/Finger Tracker Initialization for Gesture - Based Human Computer Interaction;* Digital Information and Communication Technology and Its Applications International Conference, DICTAP 2011 Dijon, France, June 21-23, Proceedings, Part I, in Communications in Computer and Information Science, vol. 166, Springer-Verlag; p.417-430, ISBN 978-3-642-21983-2, e-ISBN 978-3-642-21984-9
16. Ciprian David, Vasile Gui, Pekka Nisula and Veijo Korhonen; *Dynamic hand gesture recognition for human-computer interactions;* Proceedings of the 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI), 2011; pp. 165-170, ISBN 978-1-4244-9108-7
17. Vasile GUI, Gheorghe POPA, Pekka NISULA, Veijo KORHONEN; *Finger Detection in Video Sequences Using a New Sparse Representation;* Acta Technica Napocensis – Electronics and Telecommunications, vol. 52, nr. 1/2011; vol. 52, pp. 1-6, ISSN 1221-6542
18. Alexa Florin, Vesa Andy; *Oppening angle of a main lobe for radiation pattern of uniform array antennas;* 17th Conference on soft Computing Mendel 2011, 15-17

June; Conference proceedings; p.427-431; ISBN 978-80-214-4302-0 / 1803-3814

19. Ciprian David, Vasile Gui, Pekka Nisula and Veijo Korhonen; *Skin Video Segmentation and Trajectory Recognition in HCI Applications;* Simpozion 4D POSTDOC: „Technological Development in a Sustainable Economy'', Universitatea Tehnică „Gheorghe Asachi" din Iaşi, 11-15 Aprilie 2011; 12 pages;
20. Ternauciuc Andrei, Onița Mihai, Ivanc Daniel, Mugur Mocofan; *Designing an interactive user-guide for Moodle*, Proceedings of the 7th International Scientific Conference ELSE - E-Learning and Software for Education", 28-29, April, ISSN 2066-026X
21. Onița Mihai, Ermalai Iasmina, Ternauciuc Andrei, Ivanc Daniel; *Analysis of Video Technologies Used in e-Learning*, Proceedings of the 7th International Scientific Conference ELSE - E-Learning and Software for Education", 28-29, April, ISSN 2066-026X
22. Vlad Mihăescu, Silviu Vert; *Learnability testing: a case study*, Proceedings of the 6th International Conference on Virtual Learning, Cluj-Napoca, Romania, 28-29 Oct 2011, pp. 136-141, ISSN 1844-8933

PhD RESEARCH ACTIVITIES

1. *Prof. dr. eng. Corneliu I. TOMA*

PhD students:

- Artur MULLER: *Contributions in implementing of the multimedia databases, with local and remote access*
- Daniel C. HAIDUC: *Contributions in the color digital reproduction field*
- Radu TĂNASE: *Ultrasound electronic systems for the movement evaluation in the fluid environment*
- Radu CLESIU, *Applications of the Petri networks in robotics*.
- Gheza-Gavril DOHI-TREPZSKER, *Video surveillance techniques for the detection of wathersed pollution using floats*.
- Sorin IVASCU, *Advanced techniques in image processing*.
- Dan-Cristian BOGOS, *Inteligent communications networks*.
- Dan-Mihai MIHAILESCU, second year student.
- Florentina-Anica BOTEZATU, second year student.

2. Prof. dr. eng. Marius Oteşteanu

PhD students:

- Daniel POPA, *Object traking in videosequences*.
- Ion-Cosmin DITA, *Detections and recognitions of matrix codes.*
- Vasile-Horia MUNTEAN, *4G mobile communications networks.*
- Pross Wolfgang (Germania)*, Coding for error corrections for matrix codes.*

3. Prof.dr.eng. Radu VASIU

PhD students:

- Bogdan DRAGULESCU, *Semantic WEB ontologies in educational environment*.
- Daniel IVANC, *mLearning technologies*.
- Mohamed KUSSAY*, Video quality estimation over wireless network.*
- Alexandru-Sorin PETAN*, Contributions to the achievement of interoperability of e-learning platforms.*
- Andrei GABOR, second year student.
- George MULEC, *Contributions to the security of multi-hop ad-hoc wireless networks based on IEEE's 802.11 standard.*
- Silviu VERT, *first year student.*
- Vlad MIHAESCU, *first year student.*

PHD THESIS SUSTAINED

- Mihai I. ONIȚĂ: *Contributions to using video technologies in e-learning,* Scientific supervisors: Prof.dr.eng. Corneliu TOMA, prof.dr.eng. Radu VASIU
- Andrei TERNAUCIUC, *Contributions to develop communications tools in educational Web platform*, Scientific supervisor: prof.dr.eng. Radu VASIU

RESEARCH TEAM

- Prof. dr. eng. Corneliu TOMA: *Television, Analogue Electronics, Image Compression, Motion Analysis, Pattern, Recognition, Multimedia Technologies*;
- Prof. dr. eng. Marius OTEŞTEANU: *Television, Telephone Transmission Systems, Information Recording Techniques*;
- Prof. dr. eng. Vasile GUI: *Image Processing, Electronic Circuits and Devices*;
- Prof. dr. eng. Radu VASIU: *Multimedia, Image Compression, Digital Television, Interactive Multimedia Applications, Web Services, E-learning*;
- prof. dr. eng. Florin ALEXA: *Image and Sound Processing*, *Digital Television, Audio-video Compression, Radiocommunications;*
- Lect. dr. eng. Mugur MOCOFAN: *Machine Vision and Pattern Recognition, Multimedia, Studio Equipment, Video Production*;

- Assoc.lect.dr. eng. Diana ANDONE: *Multimedia Applications, E-learning, Adaptive and Adaptable Technology, Media Research*;
- Assoc. lect. eng. Daniel HAIDUC: *Computer Graphics, Animation Techniques*;
- Lect. dr. eng. Constantin Marian BUCOS: *Multimedia Databases, Object Oriented Programming*;
- Assist. eng. Mihai ONITA: *Audio-video Compression, Digital Television, Multimedia Applications*.
- Assist. eng. Gheorghe-Daniel POPA: *Telephone, Transmission System, Processors, Image Processing*.
- Assist. dr. eng. Ciprian DAVID: *Audio-video Systems, Image Processing*.

Contact Person

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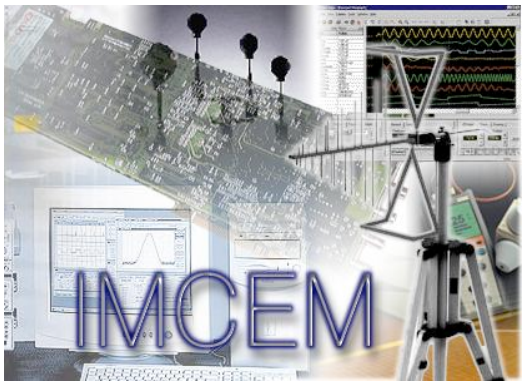
RESEARCH CENTER IN INSTRUMENTATION, MEASUREMENT AND ELECTROMAGNETIC COMPATIBILITY – *I.M.C.E.M.*



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GENERAL PRESENTATION

The Director of the IMCEM research center is **Prof. dr. eng. Alimpie IGNEA**.

The center was created in 11 May 2001, in accordance with the CNCSIS certificate nr. 102/CC-C. IMCEM belongs to the Department of Measurement and Optical Electronics, Faculty of Electronics and Telecommunications. For the Electromagnetic Compatibility field, IMCEM is part of the Multi-User Research Base "National Interuniversity Centre for High Voltage Engineering and Electromagnetic Compatibility".

The main research and development fields are:

- *Electric and Electronic Measurement and Instrumentation*: improving measurement methods, sensors and transducers;
- *Electromagnetic Compatibility*: EMC measurements and tests at high frequencies, electromagnetic supervision;

Main activities since the creation of the centre:

- IMCEM endowment with high specialized equipment for measurements, tests, and education through a TEMPUS programme, a Multi-User Research Base grant and other sources;
- the achievement of scientific and development research objectives through grants and scientific research contracts, consulting, technical expertise, technical assistance, design; ANTSI, CNCSIS grants were obtained and local collaboration with Siemens VDO Automotive and Solectron exist, to be continued and extended;
- Identification of new partners and research programs.

Researches in *SIGNALS SPECTRAL ANALYSIS AND SYNTHESIS WITH APPLICATIONS TO DIGITAL MEASURING SYSTEMS*

KEYWORDS
Data acquisition, spectral estimation, neural networks, digital synthesized AC calibrators

FIELD DESCRIPTION

Digital measuring systems standardization is one of the basic operations in measuring techniques. The standardization problem is more difficult when a higher resolution measuring device is used. Consequently, digital processed signals for standardization are frequently used. Their spectral content is revealed through spectral analysis.

RESEARCH TEAM

- Prof. dr. eng. Traian JURCA: *Electronic Measuring Instruments. Structural Components of Precision Instrumentation, Programmable Measuring Systems*
- Prof. dr. eng. Dan STOICIU: *Electronic Measuring Instruments, Metrology, Quality and Maintenance, Measuring in Industrial Processes*
- Prof. dr. eng. Aldo De SABATA: *Adaptive Methods in Measurements, Signal Processing*
- Assoc. prof. dr. eng. Septimiu MISCHIE: *Electronic and Electric Measuring, Programmable Measuring Systems, Structural Components of Precision Instrumentation*
- Assist. dr. eng. Robert PASZITKA: *Microprocessor System Architecture, Data Acquisition Systems*

Researches in *ELECTROMAGNETIC COMPATIBILITY*

KEYWORDS

Electromagnetic compatibility, EMC directives, immunity to electromagnetic interferences, conducted and radiated emissions, shielding, grounding, site surveys

FIELD DESCRIPTION

Main research-development directions: improving measurement methods, sensors and transducers, EMC measurements and tests at high frequencies, electromagnetic supervision.

ACTIVITIES AND RESULTS

The research in this field provides means and equipments for EMC and educational improvement in EMC design. It is intended to minimize conducted and radiated emissions and to suppress electromagnetic interferences, performing the tests and verification concerned with the electric, electronic and radio equipments in accordance to EMC directives.

RESEARCH TEAM

- Prof.dr.eng. Alimpie IGNEA: *Electronic and Electric Measurements, Measuring in Industrial Processes, Measuring Systems in Electromagnetic Compatibility, Electromagnetic Supervising of sites, Antennas calibration, Nonlinearities study of high frequency devices*
- Prof.dr.eng. Aldo De SABATA: *Microwave and Optoelectronics Measurements, Antennas calibration*
- Assoc.prof.dr.eng. Mihaela LASCU: *Measuring of the Electrical and Not Electrical Quantities, Electrical Measuring of the Non Electrical Quantities, Measuring in Industrial Processes, Virtual Instrumentation*
- Lect.dr.eng. Daniel BELEGA: *Measuring Systems in Electromagnetic Compatibility, Instruments for Measurements, Digital Processing Structures*
- Assist.eng. Ciprian DUGHIR: *Electromagnetic Supervision of Sites, Antennas calibration*

Researches in *SENSORS AND TRANSDUCERS*

KEYWORDS

Piezoelectric sensors, optical crystals, optical effects, piezoelectric crystals, bulk waves, surface waves, sensor arrays

FIELD DESCRIPTION

Optoelectrical and piezoelectric crystals are frequently used in technique. Due to their property of converting optical and mechanical signals, these materials fit for transducers construction.
Theoretical and experimental approaches were made on current measuring and magnetooptic and piezoelectric sensors. An I^2C interface has been experimented.

RESEARCH TEAM

- Lect.dr.eng. Adrian VÂRTOSU: *Microwaves, Microwaves and Optoelectronics Measurement, Television Channels Broadcasted Via Satellite.*

INTERNATIONAL PROGRAMMES

1. COST 2100 International Program

Prof. Dan STOICIU is representative of the "Politehnica" University of Timişoara.

PhD RESEARCH ACTIVITIES

1. Scientific Supervisor: Prof. dr. eng. Alimpie IGNEA

PhD students:

- Liliana STOICA: *Contributions to Digital Signal Processing*
- Cristina VĂLIU: *Contributions to the nonlinearities study of high-frequency circuits*
- Cora IFTODE: *Electromagnetic field effects on living organism*

- Gabriel GĂŞPĂRESC: *Perturbation monitoring in electrical networks*
- Adrian MIHĂIUŢ: *Contributions in anntenas calibration*
- Doru Lucian COCOŞ, *Neural Networks and Fuzzy Logic applications to electronic meter calibration*
- Teodor PETRIŢA, *Contributions to radiofrequency disturbances monitoring*

PHD THESIS SUSTAINED

- Gabriel GĂŞPĂRESC: *Perturbation monitoring in electrical networks*, Scientific supervisor: Prof. dr. eng. Alimpie IGNEA

PUBLICATIONS

BOOKS

1. Liviu Toma, Gabriel Vasiu, Septimiu Mischie, Robert Pazsitka, Ivan Bogdanov; *HCS12X Microcontrollers*; Vest Publishing House; 164 pages; ISBN 978-973-36-0528-7
2. Ionel Raul; *Modelling and simulayion. Experiments and applications,* Politehnica Publishing House, 2011, 116 pages (published in Romanian); ISBN 978-606-554-315-7

PAPERS

1. Daniel Belega, Dominique Dallet, Dario Petri; *A High-Performance Procedure for Effective Number of Bits Estmation in Analog-to-Digital converters;* IEEE Transactions on Instrumentation and Measurement; vol. 60, nr. 5, pag. 1522-1532; ISSN 0016-9456
2. Ioan Luminosu, Coleta de Sabata, Aldo De Sabata; *Solar Energy Based Industrial Applications at the "Politehnica" University of Timişoara;* Thermal Science; vol. 15, nr. 3, pag. 587-598; ISSN 0354-9836
3. Ladislau Matekovits, Aldo De Sabata, Karu P. Esselle; *Effects of a coplanar biasing network built into the ground plane on the dispersion characteristics of a tunable unit cell with an elliptical patch and multiple vias;* IEEE Antennas and Wireless Propagation Letters; vol. 10, pag. 1088-1091; ISSN 1536-1225
4. Daniel Belega, Dominique Dallet, Dario Petri; *Performance Comparison of the Three-Parameter and the Four-Parameter Sine-Fit Algorithms;* Proceedings of the I2MTC IEEE International Instrumentation and Measurement Technology Conference, Hangzhou, China; 4 pagini; ISBN 978-1-4244-7933-7
5. Ladislau Matekovits, Aldo De Sabata; *Analysis of the gap bandwidth of some high impedance surfaces in the microwave range;* Applied Electromagnetic Engineering for Magnetic, Superconducting and Nanomaterials, Book Series: Materials Science Forum, Vol. 670; pag. 497-503, ISSN 1662-9752
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