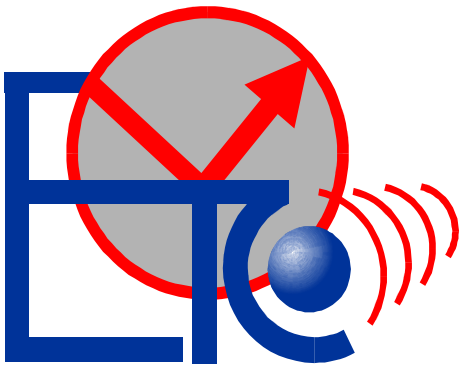
FACULTY OF ELECTRONICS AND TELECOMMUNICATIONS ENGINEERING



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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.

INTERNATIONAL PROGRAMMES

1. *SIARAS, Skill-based Inspection and Assembly for Reconfigurable Automation Systems*

Programme: EU Sixth Framework Programme FP6- 017146, 2007

Total value: 1,000,000 EURO (35,000 EURO for UPT, 4000 EURO for ETc).

Director: Prof.dr.eng. Ivan BOGDANOV

Members: Prof.dr.eng. Tiberiu MURESAN
Prof.dr.eng. Virgil TIPONUT
Prof.dr.eng. Vasile GUI
Prof.dr.eng. Alimpie IGNEA
Prof.dr.eng. Dan STOICIU
Lect.dr.eng. Cătălin CĂLEANU
Assist.eng. Dan ANDREICIUC

Partners:

1. Fraunhofer Gesellschaft, Germany
2. Asentics GmbH & Co.KG, Germany

3. ABB Automation Technologies AB, Germany
4. Sick AG, Germany
5. Inos Hellas SA, Greece
6. Lunds Universitet, Sweden
7. "Politehnica" University of Timisoara, RO
8. S.C. Robcon SRL, RO

FIELD AND GRANT DESCRIPTION

The project concerns about the novel concept "skill-based manufacturing", i.e. production units with embedded knowledge about their skills being able to interact to solve a given manufacturing task. Given the situation of the existing highly automated manufacturing systems, the automate design and/or reconfiguration of the known manufacturing systems has to be achieved.

ACTIVITIES AND RESULTS

- Modelling the skills of the systems components (actuators, sensors, robots, machines, machine components);
- Matching and modelling of production tasks;
- Creating of two main servers: the Skill Server and the Task Server for the main data bases;
- Skill-Mining;
- Automate design of systems configuration.

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RESEARCH PROJECTS

1. CNCSIS grant A, nr. 639
Integrated environment for assisted movement of visually impaired persons

Value: 30,000 RON
Director: Prof.dr.eng. Virgil TIPONUT
Members: Prof.dr.eng. Alexandru GACSADI
Assoc.prof.dr.eng. Stefan ONIGA
Lect.eng. Calin LAR
Lect.eng. Ioan GAVRILUT
Lect.eng. Ciprian GAVRINCEA
Assist.eng. Laviniu TEPELEA

FIELD AND GRANT DESCRIPTION

The project aims to an integrated environment that improves the mobility of blind persons in to a limited area. The proposed solution includes wearable equipment, placed on the subject, who guides the blind user to navigate autonomous with obstacles avoidance and stationary equipment, which supervises the motion, in order to avoid some unexpected events.

ACTIVITIES AND RESULTS

The research activity within the project has been focused in this year in the following main area of interest:

- Development of a sensorial module capable to give information on the presence and the position of obstacles in front of the subject; the same unit is responsible for the attitude of the blind person (the position of the head in both horizontal and vertical plains),
- Development of the supervising system, which monitors the position of the subject in his movement to reach the target,
- Research and experiments in order to develop a simple and efficient man-machine interface that will allow the communication between the subject and the electronic system.

A wearable prototype that meets all the above requirements will be developed by the end of this year.

2. CNCSIS grant A, nr. 2739/ 19.05.2007, theme 8, CNCSIS code 351
Image quality improvement in sonar systems by speckle noise reduction

Value: 9,500 RON
Director: Assoc.prof.dr.eng. Dorina ISAR
Members: Prof.dr.eng. Sabin IONEL
Prof.dr.eng. Andrei CÂMPEANU
Prof.dr.eng. Alexandru ISAR
Lect.dr.eng. Cornel BALINT
Assist.eng. Sorin POPESCU
Assist.eng. Maria KOVACI
Assist.eng. Andy VESA
Assist.eng. Marius SĂLĂGEAN
PhD Stud. Ioana ADAM
PhD Stud. Mircea BORA

FIELD AND GRANT DESCRIPTION

The images obtained using a set of sound or ultrasound transducers such the SAR images used in aerial navigation or the sea floor images acquired with sonar or the echo graphic images are perturbed by a multiplicative acquisition noise, called speckle noise. For the correct interpretation of the information contained in these images, the enhancement of the quality of those images, based on the rejection of the speckle noise is required. For this purpose the wavelets theory is used more often today. An algorithm dedicated to the reduction of the speckle noise has the following steps: the speckle noise is transformed into an additive noise by the computation of the logarithm of the acquired image; the discrete wavelet transform of the obtained result is then computed; then the non-linear filtering of the new result is performed, reducing the noise; the inverse discrete wavelet transform is then computed and the anti-logarithm of the new result is computed. So, the noise-free estimation of the acquired image is obtained. The purpose of our grant submission is to match this denoising algorithm to the specificities of the sea floor images acquired with sonar images: the statistics of the information contained, the statistics of the speckle noise, the time required for acquisition. The results obtained will be used for the realization of some computing programmes dedicated to the use of geologists for the interpretation of sea floor images, to study the

tectonic changes, for the appreciation of the age of different components or of the relief modifications tendencies or for the ecology or military control of different regions. The performances of those programmes will be superior to the performances of the programmes already conceived, affecting less the statistics of the useful image contained into the images to be processed, being faster and using less memory.

ACTIVITIES AND RESULTS

Our researches concentrated this year on the choice of the best wavelet transform for sonar image processing. At the beginning we had used the enhanced diversity wavelet transform, DEDWT, invented in our research team few years ago. Using this transform we decreased the sensitivity of the discrete wavelet transform with respect to the mother wavelet involved. Some diversification mechanisms were developed in the paper "Alexandru Isar, Sorin Moga, Corina Naforniţă, Marius Oltean, Ioana Adam, *Image Denoising Using Wavelet Transforms With Enhanced Diversity*, Proceedings of International Conference Communications 2006, Bucharest, June, 3-4, 2006."

The theoretical proof for the synthesis of partial results used in DEDWT computation can be found in "Quinquis A., Isar D., Isar A., *Multi-scale MAP Denoising of SAR Images*, Proceedings of IEEE International Conference Oceans'06, Boston, USA, September 20-23", because SAR images represent a more general case that SONAR images.

Later we found more useful a complex wavelet transform, namely the double tree complex wavelet transform, DTCWT. Its use for denoising SONAR images is treated in the paper "Alexandru Isar, Dorina Isar, Ioana Adam, *Denoising Sonar Images*, Proceedings of The Romanian Academy, Series A, Volume 7 , Number 2 May - August 2006, pp. 1-14", where we presented a comparison between our results and the results obtained using classical filters for SONAR images denoising, i.e. Lee and Frost filters. Discussing the subject whit the members of a research team from IFREMER Brest in France we agreed that the results obtained using DTCWT are better because it is a translation quasi-invariant transform with an enhanced directional selectivity. But the complex transform is very sensitive with the choice of wavelet mother. Consequently we proposed ourselves another objective: the design of diversity enhanced complex wavelet transform. The one-dimensional form of this transform, invented in our research team, was published in Proceedings of International Symposium ETc 2006:

"I. Adam, M. Oltean, M. Bora, *A New Quasi Shift Invariant Non-Redundant Complex Wavelet Transform*, Proceedings of International Symposium ETc 2006, September 21-22, 2006, Timişoara".

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. *CNCSIS grant AT MEdC, AT41, nr. 2739/ 19.06.2007 C SHARP/DOT NET Implementation for a Facial Detection and Recognition Neural System*.

Value: 20,000 RON
Director: Lect.dr.eng. Cătălin-Daniel Căleanu
Members: Lect.dr.eng. Muguraş Mocofan
Lect. dr. eng. Adrian Avram
Assist.eng. Valentin Maranescu
Caciora Radu, student
Adrian Harea, student

FIELD AND GRANT DESCRIPTION

The aim of this project is to develop a system for automatic face detection and recognition using a new and powerful programming language and technology, namely C Sharp and DOT NET. It is based on one of the most promising Artificial Intelligence's paradigm – Neural Networks, combined with advanced digital image processing techniques, e.g. Gabor filters. The motivations underlying chosen software are in relation with the need of a real time operation mode and a versatile implementation of the following stages required by above mentioned system: interfacing videocapturing devices and manipulate video

streams; image acquisition and theirs Internet broadcasting; image processing; object oriented neural networks implementation; Internet services; create/access/maintain multimedia databases. Among applications of such facial detection and recognition system, are: continue monitoring of public places, e.g. rail stations, airports, in order to locate certain individuals, searching large mug shot databases, sensitive areas access control, etc.

ACTIVITIES AND RESULTS

The knowledge dissemination of the research activity was done by proposing the following papers to some international journals and conferences:

1. C.D. Căleanu, C. Botoca, "*C++ Solutions for a Face Detection and Recognition System*", FACTA UNIVERSITATIS, Ser. Elec. Energ., Nis, Yugoslavia, 2006
2. C.D. Căleanu, V. Gui, F. Alexa, "*Face Recognition via Direct Search Optimized Gabor Filters*", 5th WSEAS International Conference on System Science and Simulation in Engineering, (ICOSSE'06) Tenerife, Canary Islands, Spain, December 16-18, 2006
3. C.D. Căleanu, V. Gui, F. Alexa, "*Direct Search Optimized Feature Extraction*", WSEAS Transactions on Systems and Control, 2006

All above mentioned papers have been accepted for publishing. The following paper was proposed for publishing into a Romanian Academy journal and is still currently under evaluation:

C.D. Căleanu, G. Pradel, V. Maranescu, F. Alexa, "*Combined Pattern Search Optimization of Feature Extraction and Classification Parameters in Facial Recognition*", Romanian Journal of Information Science and Technology, 2006

RESEARCH TEAM

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

Contact person
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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.

INTERNATIONAL PROGRAMMES AND GRANTS

1. LEONARDO DA VINCI Community Vocational Training Action Programme *E-learning Distance Interactive Practical Education (EDIPE)* CZ/06/B/PP-168022

Value: 25,000 EURO
Director: Assoc.prof.dr.eng. Dan LASCU
Members: Prof.dr.eng. Viorel POPESCU
Assoc.prof.dr.eng. Mihaela LASCU
Lect.dr.eng. Adrian POPOVICI
Lect.dr.eng. Dan NEGOIȚESCU
Lect.dr.eng. Adrian POPOVICI
Assist.eng, Mircea BĂBĂIȚĂ
Partners: Technical University of Brno, SK
Technische Universiteit Delft, NL
Technische Universität Wien, AT
Institut für Elektrische Antriebe und Maschinen, Wien, AT
Ruhr Universität Bochum, D
National Technical University of Athens, GR
Institut National Polytechnique de Lorraine, FR
Budapest Muszaki es Gazdasagtudomanyi Egyetem, HU
Fakulta elektrotechniky a informatiky Technická univerzita V Košiciach, SK
Trencianska Univerzita Alexandra Dubceka v Trencine, SK
University of Maribor FERI, SL

FIELD AND PROGRAM DESCRIPTION

So far the E-learning and Distance-learning via the Internet, is focusing on information delivery where

typically multi-media rich web pages are offered to the student sitting at home in front of the computer, taking lessons in a certain subject, while keeping contact to other students and teacher via e-mail, chat-rooms, on-line tests, etc.
Other issues focus on the style of teaching under the impression of extensive usage of multi-media like videoclips, audio or "slide shows" in the classroom or via distance (Internet). Advanced material use interactivity and combination of text explaining the theory with interactive programs that allow student to do little experiments via a simulator or solving some engineering problems. The rapid changes in society and technology have also generated a demand for more flexible engineers having many more qualifications than just a high level of technical or scientific specialisation. The drawback of a pure theoretical approach in undergraduate electrical engineering (EE) curriculum is that there is paid less attention to the phenomena that loom by laboratory experiments and exploration of system components. The result of this, in combination with the rapid development of computer applications, is that hands-on and laboratory experience vanished and computer simulations are getting more and more attention.
However, it is crucial to let students have some real practice. The real experiment gives the students a sense of practical testing and they can also see the influence of the second/higher order effects, real time effects, effect of parasitics which are difficult or impossible to be simulated perfectly. The reason is that the simulation is always based on more or less simplified model. Therefore it is important to give to the students a real world experience.
However, to build an experiment is expensive and it is impossible for an educational institute to have the complete scale of experiments. From the learner point of view, there is a need for easy accessible hardware experiment. The hardware experiment should therefore be redesigned such that they also can be accessed on the Web. This way the advance in ICT will be combined with the real practical experience.
The proposed virtual or distance laboratory does not present any web-based simulation. It is a real electro-technical experiment conducted in the laboratory but remotely accessed, controlled and monitored by web-based tools. The experiment is either conducted online or based on recorded valued (virtual experiment). It allows students to perform experiment safely, without a guidance and official working hours in the laboratory are not limiting the users. The students can also experience the appearance of the measurement instrument, the electronic components and many more factors such as lay-out. The facility is useful for today's requirement of teaching in the Internet.
The experiments should be not only analysis oriented (to measure and see the results) but also synthesis oriented. It should involve a design aspect. Therefore the measurements are designed as a project with educational philosophy. The technology of such integration is planned to be realised within framework of the project. First of all the technology of such an integration and guidelines to achieve distance Interactive Practical Education will be defined. With this new e-learning tool this technology will be applied to the basic fields of applied electrical engineering starting from fundamentals of EE, through electronics, power electronics, applications of power electronics, dynamics of electro-mechanical systems, including industrial application of electrical drives, motion control and also complex drive systems will be addressed. A complete set of 18 different interactive design oriented virtual or distance laboratories will be prepared with the active participation of the educational expert. This technology will enable us to transfer results of different sectors of education and it will revolutionize education as it is today.

During the kick-off meeting hold in Vienna on November 30th – December 1st the project web page, evaluation group, dissemination plan, financial management, contents of the materials, selection of software for distance practicals management and a workshop on profect oriented and design oriented education were established.

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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

Contact person
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Researches in *ELECTRONIC PACKAGING AND TESTING*

The research group in this domain is coordinated by prof. dr. eng. Horia CÂRSTEA, 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

- Alexandru DARIE: *Optimizing the Performance of a Mobile Robot Society*
- Ciprian GAVRINCEA: *Researches on a Neural Network Implementation for Processing the Signals Generated by Muscle System*
- Liviu LUCACIU: *Contributions to the Biometric Systems Development and Implementation*
- Marian BURSAŞIU: *Contributions to the Optimization of Neural Network Applications Developmen.*
- Alin BRÎNDUŞESCU: *Contributions to the biological signals simulation using artificial neural networks*
- Ionuţ MIREL: *Methods for Digital Video Images Processing*
- Călin LAR: *Contributions to the Sensorial Data Fusion*
- Sorin POPESCU: *Optimization of the electrical welding process by means of artificial neural networks*
- Laviniu ŢEPELEA: *Human-Machine Interface.*
- Lucian BUGLEA: *Smart Transducers Array*
- Philipp ROEBROCK, *Multi Sensor Controlled Assembly and Application with Manipulators*
- Ioan GAVRILUŢ: *Contributions to the Autonomous Mobile Robot Navigation Using CNN*

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

PhD students:

- Solomon MIMIS: *Integrated Circuits for Transmission Bit Error Rate Measurement*
- 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*
- Sebastian TIPONUŢ: *Researches regarding the implementation of embedded systems using predefined templates*

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

PhD students:

- Aurel FILIP: *Researches on CMOS Frequency References*
- Marllene DANEŢI: *Propagation time estimation algorithms for noise sources location*
- Beniamin DRAGOI: *Researches on CMOS Integrated Digital Correlator Conception and Design*
- Radu MIHAESCU, *Telecommunication-system integrated optimum structures based on mobile cellular automatic devices*
- Iosif MUDRA: *Researches on CMOS Integrated Fast Synchronous Comparators*
- Bogdan MARINCA: *Ultrasonic Investigation Optimization by Algorithms Implemented in Dedicated Integrated Circuits.*

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

PhD students:

- Mircea BĂBĂIŢĂ: *Reaserches on a.c.–d.c. converters*
- Cornel GLISICI: *Contributions regarding improved capabilities of uninterruptible power supplies*
- Corina IVAN: *Energy parameters optimization in dc-dc converters*
- Marin TOMŞE: *Contributions to theoretical and experimental study of inductive heating power supplies*
- Daniel ALBU: *Contributions regarding improved capabilities of switched mode converters with PFC applications*
- Dorin CIZMAŞIU: *Power factor control in ac-dc conversion systems*
- Dan SIMU: *Adaptive systems for unconventional technologies*
- Lucian PĂUN: *DC/DC converters with optimized energy parameters*
- Adrian ŞCHIOP: *Contributions to theoretical and experimental study of power converters with ac motor drive applications*
- Cristian VRÂNCILĂ: *Theoretical and experimental contributions regarding active power filters*

5. Scientific supervisor: *Prof.dr.eng. Horia CÂRSTEA*

PhD students:

- Dumitru MĂRGELOIU: *Contributions to the improvement of electronic equipment for monittoring and controlling of low and medium voltage electrical network parameters*
- Ovidiu MIŢARIU: *Contributions to the improvement of autotesting equipment in digital data conditioning and transmission*
- Mirel BURLACU: *Research regarding CMOS analog integrated circuits based on unconventional principles*
- Corneliu TRIPA: *Contributions to the development of fault diagnose and identification tests in applied electronics equipment*
- Mircea RIF: *Automated system for data acquisition, processing and management in industry*
- Mircea MIHĂESCU: *Contributions to the development of dynamical diagnose and*

reconfiguration tests in digital fault redundant systems

- Liviu ION: *Contributions to the development of digital regulation in electrical driven industrial processes*
- Andy BERCOVICI: *Contributions to the increase of fiability in digital electronics equipment*
- Cornel GLĂVAN: *Contributions to increased security of digital transmissions in special applications.*
- Liviu CHIȘ: *Contributions to pattern recognition test development in automated visual control*
- Călin SÂRBU: *Contributions to predictive test development concerning electrostatic discharge in electronic industry*

PHD THESES SUSTAINED

Marin TOMȘE: *Contributions to theoretical and experimental study of inductive heating power supplies*, Scientific supervisor Prof.dr.eng. Viorel POPESCU

PUBLICATIONS

BOOKS

1. G. Pradel, C. Căleanu, *Symbolic trajectory description in mobile robotics*, in Sascha Kolski (editor), *Mobile Robots, Perception & Navigation*, ISBN 3-86611-283-1, Pro Literatur Verlag, Germany, March 2007, 3-86611-283-1 Pro Literatur Verlag, V.Kordic, A. Lazinica, M. Merdan (eds.) 2007
2. L. Jurca, M. Ciugudean, *Analog Integrated Circuits. Handbook*, Course for the Study Center for Distance Learning, Politehnica Publishing House, 2007, 110 pages, (published in Romanian).
3. Lie Ioan, *Electronic Structures for Ultrasound Investigationes Systems*, Politehnica Publishing House, 2007, 978-973-625-509-0, 180 pages

PUBLISHED PAPERS

1. C.D. Căleanu, C. Botoca, *C# Solutions for a Face Detection and Recognition*, System FACTA UNIVERSITATIS, Ser. Elec. Energ., Vol. 20, no. 1, pag. 93-105, Nis Serbia, 0353-3670, April 2007.
2. C. M. Ivan, D. Lascu, V. Popescu, *Chaos in Discontinuous Capacitor Voltage Mode Dc-dc Converters*, WSEAS TRANSACTIONS ON Electronics Issue 2, Volume 4, p.1-9 ISSN 1109-9445, January 2007.
3. Tomoroga, M., Jurca, L., Ciugudean, M., Toma, C., *Low Voltage Low Glitch Current-Steering DAC Overlapping the Voltage*, Reference Circuit WSEAS Transactions on Circuits and Systems, Issue 3, Vol.6, pp. 273- ISSN 280 1109-2734, March 2007.
4. C. M. Ivan, D. Lascu, V. Popescu, *Modelling of Conduction Losses in Dc-to-Dc Converters Operating in Boundary Conduction Mode*, WSEAS TRANSACTIONS ON Electronics Issue 2, Volume 4, p. 23-31 ISSN 1109-9445, February 2007.
5. C. M. Ivan, D. Lascu, V. Popescu, *An Averaged Switch Model Including Conduction Losses for Boundary Conduction Mode Dc-to-Dc Converters*, Proceedings of the 6th WSEAS International Conference on Instrumentation, Measurement, Circuits & Systems, Hangzhou, China, April 15-17, 2007 p. 164-169 (ISI-Proceedings) 1790-5117, ISBN 978-960-8457-61-4, April 2007.
6. D. Belega, M. Ciugudean, D. Stoiciu, *Choice of the Cosine-Class Windows for ADC Dynamic Testing by Spectral Analysis*, Measurement - Journal of IMEKO, vol. 40, no. 4, pp. 361-371, ISSN 0263-2241, April 2007.
7. C. M. Ivan, D. Lascu, V. POPESCU, *Hopf Bifurcation in a Discontinuous Capacitor Voltage Mode Ćuk Dcdc Converter*, Proceedings of the 6th WSEAS International Conference on Instrumentation, Measurement, Circuits & Systems, Hangzhou, China, April 15-17, 2007 p. 78-83 (ISI-Proceedings) 1790-5117, ISBN 978-960-8457-61-4, April 2007.
8. C.D. Căleanu, D.S. Huang, V. Gui, V. Tiponuț, V. Maranescu, *Interest Operator vs. Gabor Filtering for Facial Imagery Classification Pattern Recognition Letters*, Vol. 28, nr. 8, pag. 950-956, Elsevier 0167-8655, August 2007.
9. D. Isar, A. Isar, A. Quinquis, *Multi-scale MAP Denoising of SAR and SAS Images Sea Technology Magazine*, 46-48 0093-3651, February 2007.
10. I. Jivet, B. Dragoi, M. Otesteanu, L. Jurca, *A Direct Digital Synthesis Firmware Development Framework*, 6th WSEAS Int. Conference on Computational Intelligence, Man-Machine Systems and Cybernetics, Tenerife, Spain, December 14-16, 2007, pp.166-170, December 2007.
11. I. Jivet, B. Dragoi, *A Programmable Electrode Support Module (ESM) with Current Conveyors High Impedance Output for Multi-frequency*, EIT Systems, 13th Sintes International Symposium On Systems Theory, Craiova, pp.153-156, October 2007.
12. C. M. Ivan, D. Lascu, V. Popescu, *An Averaged Switch Model Including Conduction Losses for Boundary Conduction Mode Dc-to-Dc Converters*, Proceedings of the 6th WSEAS International Conference on Instrumentation,

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25. Jurca, L., Gontean, A., Alexa, F., Curiac, D.I.; *Proposal to Improve Data Format Conversions for a Hybrid Number System Processor*; Proceedings of the 11th WSEAS International Conference on Computers, Crete Island, Greece, July 2007, pp.653-658, ISSN: 1790-5117, ISBN:978-960-8457-95-9.
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30. Ioan Jivet, *An Extension of the Xilinx PicoBlaze Architecture for DDFS Applications*, Scientific Bulletin of the Politehnica University Timişoara, Transaction on Electronics and Telecommunications, Tom 52(66), Fasc. 1, p. 44-50, ISSN 1583-3380

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32. Marius Rangu, *An Algorithm for Automated Translation of Crosstalk Requirements into Physical Design Rules*, Scientific Bulletin of the Politehnica University Timişoara, Transaction on Electronics and Telecommunications, Tom 52(66), Fasc. 2, p. 15-19, ISSN 1583-3380

RESEARCH INTERESTS

- Prof.dr.eng. Mircea CIUGUDEAN: *Conception of Analog Integrated Circuits and their Applications*
- Prof.dr.eng. Tiberiu MUREŞAN: *Digital Circuits, Industrial Robot Driving, Switched Mode Power Supplies*
- Prof.dr.eng. Viorel POPESCU: *Switched-Mode Power Supplies, Industrial Electronics*
- Prof.dr.eng. Virgil TIPONUŢ: *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*
- Prof.dr.eng. Horia CÂRSTEA: *Electronic Technology, Electrical Equipment Testing*
- Assoc.prof.dr.eng. Ioan JIVEŢ: *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*
- Lect.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*
- Lect. dr. eng. Ioan LIE: *Electronics, Doppler Telemetry*
- Assist.dr.eng. Dan NEGOIŢESCU: *Industrial Electronics, Power Factor Correction Circuits*
- Assist.eng. MIRCEA BĂBĂIŢĂ: *Digital Circuits*
- Assist.dr.eng. Valentin MARANESCU: *Conception of Analog Integrated Circuits*
- Assist.eng. Beniamin DRĂGOI: *Conception of Analog Integrated Circuits*
- Assist.eng. Marlene DĂNEŢI: *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

NATIONAL PROGRAMMES

Improvement of research & development facilities in the field of communications at the Faculty of Electronics and Telecommunications, Politehnica University of Timisoara, CDC

Director: Ioan NAFORNITA

The goal of this project is the endowment of the research & development laboratories of the Communications Department, Faculty of Electronics and Telecommunications (Politehnica University of Timisoara) with modern equipment. These laboratories have as objective the main branches of this particular important R&D domain from the National Strategy entitled *Information Technology and Communications*. This is one of the most dynamical fields of R&D at the present moment in Romania; it has a contribution of over 10% in the Gross National Product (GNP). The level of development from the west region of the country tends to be closer in this case to the global medium level. An important trend in the field is the development of integrated systems that transmit and process all types of data and information. Both the technology and the technical standards organizations are driving toward integrated public systems that make virtually all data and information sources around the world easily and uniformly accessible. Such a system allows integration of services such as telephony, television, and data communications. Computer networks are being widely used as architecture of a communications system. From an R&D point of view, we have seen a trend of designing and making 3G equipment described by UMTS or WiMAX standards. These standards integrate the newest results obtained in fundamental sub-domains with advanced technologies, developed in applications sub-domains. For instance, some of this equipment uses OFDM transmission – which is derived from a fundamental sub-domain – Signals Circuits and Systems, and/or turbocoding (Theory of Information Transmission). Such an association ensures high performance at the physical layer (1st level from the OSI model), as described by Claude Shannon at the beginning of XXth century. Implementing of functions from superior layers of the OSI model is adapted to new performance obtained at the physical layer with the use of protocols like Mobile IP or IPSec. With this project, improvement of the equipment will be made in eight research labs, where the following disciplines are developed: Signal Circuits and Systems, Theory of Information Transmission, Computer networks architecture, Data communications, Telecommunications Circuits, Network Protocols, Telecommunications Traffic, Optimizing telecommunications networks, Software for Telecommunications, Internet Data Security, Integrated digital networks, Systems for Digital commutation, Radio Communications, Multimedia.

We have in our research team specialists and researchers in the field. The Scientific Secretary of the Politehnica University of Timisoara, Prof. Radu VASIU, the Dean of the Faculty of Electronics and Telecommunications, Prof. Marius OTESTEANU as well as the Head of Department from the Communications Dept., Prof. Ioan NAFORNITA are a part of this team.

The team has seven Ph.D. advisors.

Estimation of the results from this program:

1. New investments in the infrastructure of Research-Development-Innovation 2576,455 thousands RON
2. Medium usage of equipment: 75%
3. Value of investment in infrastructure and communications services 1717,6 thousands RON
4. The number (percentage) of research members to have access at online scientific resources 100%
5. The number of supported entities needed for improvement of offered services capacity = 8.

Expected/estimated Profit:

1. Each lab will develop a contract with a telecommunications industry leading firm for instance, Alcatel-Lucent, with expected value of 5000 euro per year;
2. Each lab will win one CNCSIS funded research grant with an expected value of at least 30000 RON/year

Potential beneficiaries:

- Post-universitary courses – Matlab: Alcatel-Lucent, Solectron, Siemens, Kathrein
- Conferences, workshops, summer schools – teaching staff from other technical universities
- Equipments – suppliers, service
- Publishing houses where books will be edited
- Partner laboratories
- Ph.D. students that will successfully complete their doctoral studies.

RESEARCH PROJECTS

1. CNCSIS grant No. GR76/23.05.2007, CODE 637, type A, *Title Digital receivers' performance improvement using the wavelets' theory*,
Director: Alexandru Isar
Value: 16,000 RON
Members: Prof. Miranda Nafornita,
Prof. Andrei Campeanu,
Prof. Dorina Isar,
Lect. Cornel Balint,
Assist. Horia Balta,
Assist. Radu Lucaciu,
Assit. Andy Vesa,
Assist. Nafornita Corina,
Tehn. Virgil Popovici.

FIELD AND GRANT DESCRIPTION

Every communication system is composed of an emission unit and a receiver. These two parts are connected through a communication channel. The information content of the signal at the output of the emission unit is affected by the channel noise. The complexity of the coder from the emission unit and of the decoder from the receiver, is selected in accordance with the channel noise charactersitics. For more difficult channels, more complex and expensive coding-decoding systems must be used. If the communication channel is more difficult than expected then this detection system produces some errors. This is the reason why communication systems must be classified using the Bit Error Rate, BER, a decreasing function of the Signal to Noise Ratio, SNR, of the communication channel. The optimization of this function can be performed optimizing the channel coding-decoding systems, very modern solution, where the best results are obtained using turbocodes, or by the enhancement of the SNR at the input of the detection unit from the receiver. The present research takes into account this second strategy, and uses the properties of the wavelet functions. We propose the inclusion of a denosing system in the structure of a protopype receiver between the digital to analog convertor output and the input of the decoder, working in three steps: the computation of the discrete wavelet transform of the input signal, the nonlinear filtering of the result and the computation of the inverse discret wavelet transform of the new result. When all the other bloks of the prototype receiver are not modified, the BER(SNR) characteristic of the new receiver is better than the BER(SNR) characteristic of the proptotype receiver. If the realization of the same BER(SNR) characteristic for the two receiverrs is requiered then the structure of the channel coding-decoding system can be simplified.

ACTIVITIES AND RESULTS

- Two articles published in ISI indexed journals
- Four articles published in the proceedings of international conferences organized abroad,
- Six articles published in the proceedings of IEEE international conferences organized in Romania.

2. PNCDI 2 – Partnerships, Direction 5, Contract No. 120/01.10.2007, *Title New piezoelectric sensors based on α-quartz type materials, for safety and quality control food industry*
Durector: Dr. Nicolae Miclau
Value: 20,000 RON (for 2007)

3. *CNCSIS GR76/23.05.2007, CODE 342, type - A, Title Neural Networks Based System For The Diagnosis And Prognosis Of Urological Deseases*
Director: *Assoc.prof.dr.eng.Corina Botoca*
Value: 24,000 RON
Members: Prof.dr.eng. Gui Vasile
Assoc.prof.dr. Budura Georgeta
Assoc.prof.dr.eng.Alexa Florin
Assoc.prof. Bucuras Viorel, UMF
Assoc.prof. MD.Dema Alice, UMF
Lecturer MD.Botoca Mircea, UMF
Assist eng. Miclau Nicolae
Assist. MD.Cumpanas Alin, UMF
Assist. MD.Bardan Razvan, UMF
MD. Dragoi Razvan, UMF
Contact person: Corina Botoca
Tel: *+40.256.403308*
E-mail: *corina.botoca@etc.upt.ro*

FIELD AND GRANT DESCRIPTION

Thematic area: Advanced informatics systems and models for the assistance of medical diagnosis and preventive medicine. The diagnosis and prognosis of a patient are usually realized by processing clinical information. When the volume and the variety of the information become too demanding for the clinician, the need for supportive statistical prediction methods emerges. When the classical methods, like statistical modeling, are failing, due to computational complexity and to long processing times, the artificial neural networks (ANN) could offer effective solutions, being able to perform real-time prediction of the diagnosis and prognosis of a particular patient. Our project aims to develop and validate a neural integrated system, in an adequate programming medium, capable to offer solutions to urological and tumoral problems. The proposed system will contain a package of complex analyses and evaluation programs, similar with the evaluation-decision model from the clinical medicine. The system inputs are variables carefully selected, with different weights, obtained from the real situations and readily comparable with the real, functional, clinical models. In order to collect the clinical data necessary to develop a diagnosis and prognosis system for urology, clinical trials have been completed, on patients with prostate cancer, bladder cancer, kidney cancer, benign prostatic hyperplasia and urinary lithiasis. Models of clinical

urological applications are being developed using various ANN architectures, multilayers perceptrons, radial basis function and competitive ANN. The comparison of the performance of different ANN architectures and training algorithms will be accomplished and the model with the best accuracy/complexity ratio will be selected, in order to be integrated into a unitary diagnosis system. During the last year of the project the functionality of the implemented system will be analyzed and clinical diagnosis algorithms, using the predictions offered by the ANN will be elaborated. The experience acquired by the team will be shared with other interested research teams, forming a national research community in the field of neural networks applications in medicine.

ACTIVITIES AND RESULTS

A number of clinical trials on patients with prostate cancer, bladder cancer, kidney cancer, benign prostatic hyperplasia and urinary lithiasis have been performed, in order to collect the clinical data necessary to develope and train a neural system for diagnosis and prognosis

Special photografic equipment for microscopic digital images aquisition has been purchased Chemical and laboratory materials necessary for the clinical trials have been aquired.

Scientific contacts with researchers having similar preoccupations have been established with the occasion of "The 22nd European Association of Urology. Congress" held in Berlin in march, and "The European Association of Urology 7th Central European Meeting" wich took place in Zagreb, Croatia, in October 2007

The team researchers have become members of important international organizations, respectively at the IEEE, EAU and SIU. This gives easy access to the prestigious publications of the named organizations, thus permitting an up to date documentation.

As a result of the use of the special photoaquisition equipment, a book entitled: "Atlas of macro- and microscopical images from the tumoral urological pathology. Methods of acquisition and imaged processing is on the way".

Three licence papers concerning the applications of neural networks in medicine have been realized.

One of the team members has completed a PhD thesis entiteled: „The value of artificial neural networks in establishing the therapeutica indication in the localised and localy advanced prostate cancer".

The research results have been fructified also through participation to national and international congresses and conferences, through publishing in specialized journals, totalizing a number of 15 papers.

4. CNCSIS grant No. 403, CODE TD-403, type Grant for young Ph.D. Students, *Title: Optimization Techniques for Radio Channels Transmission*

Director: Marius Oltean

Value: 42,500 RON (7,080 RON for 2007)

FIELD AND GRANT DESCRIPTION

Data transmissions applications, including here audio and video signals on radio channels have known a spectacular growth in the last years. The efforts in this field are mainly oriented towards an increased efficiency of this type of transmissions. We can include here many transmission, equalization and filtering techniques that allow high throughput transmission in the difficult conditions characterizing the radio channel, which is both frequency-selective and time-variant.

Within this context, the multi-carrier modulations provide an excellent alternative to the classical single-carrier transmissions. Among multi-carrier based methods, Orthogonal Frequency Division Multiplexing is already widely used in systems and standards as DAVB, WiFi, WiMAX etc.

Nevertheless, this modulation has some drawbacks. An interesting idea which will overcome some of these drawbacks is to use wavelets carriers instead of complex exponentials (like in OFDM). This kind of approach has some important advantages: simplicity, increased spectral efficiency and flexibility in resource allocation.

The scope of this project is to deeper investigate these advantages and to go further, towards wavelet packets based modulation. The final goal of this research is to propose and test a technique which can be used at the physical layer of radio networks. This new method should lead to increased capacity, robustness and lower complexity for radio channel transmissions.

5 CNCSIS grant No. 189/09.10.2007, CODE -24, type – TD, *Title Contributions to the application of Kalman filtering in communications*

Director: Gal Janos

Value: 35,400 RON (7,080 RON for 2007)

FIELD DESCRIPTION

Estimation of the parameters of chirp signals affected by additive Gaussian noise. This model is linear and Gaussian, allowing the application of the Kalman filter which is optimal from the view of the minimum of variance in the case of monocomponent signals at moderate levels of additive noise.

ACTIVITIES AND RESULTS

In this approach consider the approximate linear state-space model for polynomial phase signals, and propose a random walk assumption for the time evolution of the amplitude of chirp. This assumption adjoins the amplitude to the linear phase parameters which can be estimated by the algorithm.

PUBLICATIONS

BOOKS

Nafornita, C. *Atacuri asupra imaginilor marcate transparent (Attacks on watermarked images)*, Politehnica Publishing House, 2007, ISBN 978-973-625-414-7, 130 pages

PAPERS

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2. Sorin Moga, Alexandru Isar, *SONAR Image Denoising Using a Bayesian Approach in the Wavelet Domain*, Proceedings of International Conference ASMDA 2007, May 29 – June 1, 2007, Chania Crete Greece, 1275-1281
3. Ioana Adam, Corina Nafornita, Jean-Marc Boucher, Alexandru Isar, *A Bayesian Approach of Hyperanalytic Wavelet Transform Based Denoising*, Proc. IEEE International Conference WISP'07, pp. 237-242, Alcala de Henares, Spain, October 3-5, 2007, ISBN 1-4244-0829-6
4. Alexandru Isar, Sorin Moga, Dorina Isar, Image Denoising *Using a Bishrink Filter with Reduced Sensitivity*, Proceedings of IEEE International Symposium SCS'07, Iasi, Romania, July 14-15, 2007, 469-472, ISBN 1-4244-0968-3, pp. 397-400
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8. Dema, A,.Taban, S, Botoca, M., Botoca, C, Cornianu, M,.Rosianu, E. Lazar, A, Iacob, M, Dobre, D, *Diagnostic utility of immunohistochemistry for PSA, high molecular weight CK and p63 in establishing the origin of bladder neck tumors*, acceptată la Simpozionul aniversar al Institutului « Victor Babeş « The (un)predictable future of cellular and molecular medicine", Simpozion Naţional de Patologie Bucureşti, 31 octombrie – 2 noiembrie 2007
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10. Alexandru Isar, Sorin Moga, Dorina Isar, *Image Denoising Using a Bishrink Filter with Reduced Sensitivity*, Proceedings of IEEE International Symposium SCS'07, Iasi, Romania, July 14-15, 2007, 469-472, ISBN 1-4244-0968-3, pp. 397-400
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31. Marius Oltean, *Wavelet OFDM Performance in Flat Fading Channels*, Scientific Bulletin of the Politehnica University Timişoara, Transaction on Electronics and Telecommunications, Tom 52(66), Fasc. 2, p. 3-8, ISSN 1583-3380

32. János Gal, Andrei Câmpeanu, Ioan Nafornita, *A Kalman Filtering Algorithm for the Estimation of Chirp Signals in Gaussian Noise*, Scientific Bulletin of the Politehnica University Timişoara, Transaction on Electronics and Telecommunications, Tom 52(66), Fasc. 2, p. 35-38, ISSN 1583-3380

33. Marius Salagean, *The Use of the Improved Time-Frequency Method Based on Mathematical Morphology Operators*, Scientific Bulletin of the Politehnica University Timişoara, Transaction on Electronics and Telecommunications, Tom 52(66), Fasc. 2, p. 45-48, ISSN 1583-3380

PhD RESEARCH ACTIVITIES

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

PhD students

- Mirela BIANU, *Contributions on adaptive signal processing in telecommunications*

- Cristian IGNEA, *Contributions* on *finding and measurement antenna parameters*
- Adrian FILIPESCU, *Contributions on Digital Filters Optimal Design*
- Ciprian DAVID, *Contributions on faults detection using image processing techniques*
- Romulus REIS, *Non-Stationary Signal Description by Non-Parametrical Method*
- Janos GAL, *Contributions on Kalman Filters Use in Telecommunications*
- Marius SALAGEAN, *Non-Stationary Signal Description by Non-Parametrical Method*
- Florin VANCEA, *Data Protection in Communication Networks*
- Andy VESA, *Improvement of Digital Radio Systems Detection*,
- Mircea COSER, *Systems Optimization using TRIZ Technique*,
- Teodora PELA, *Traffic Optimization on Metropolitan Area Networks*,
- Adina DABA, *Non-Stationary Signal Description by Non-Parametrical Method*,
- Florin Dumitru CHIS, *Improving Security Level In Broadband Networks*.
- Arpad IOZSA, first year student.
- Mirela MIOC, first year student.

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

PhD students:

- Horia BALTA, *Hierarchical coding for spread spectrum transmission systems*
- Radu LUCACIU, *Optical communication systems with OCDMA*
- Maria KOVACI, *N-PSK multiresolution modulations in the COFDM hierarchical systems*
- Caius ULITA, *Equalizers for radio channel modems*
- Mirela VIOR, *Quality transmission improvement using turbo codes*
- Sorin POPA, *Synchronization techniques improvement for radio channel transmission systems*
- Marius OLTEAN, *Radio channel equalization using cyclic prefix*
- Florin Lucian MORGOS, *Radio channels equalization techniques improvement*

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

PhD students:

- Ioana Firoiu (Adam), *Despeckling of sonar images by multi-resolution filtering*
- Cristina Stolojescu (first year student)

PhD ESSAYS PRESENTED

- Janos GAL, *Kalman filtering*, PhD Advisor: Prof. dr. eng. Ioan NAFORNIȚĂ
- Romulus REIS, *Use of time-frequency representations for non-stationary signal description*, PhD Advisor: Prof. dr. eng. Ioan NAFORNIȚĂ
- Sorin POPA, *Radio Transmission Systems Syncronization Methods*, PhD Advisor: Prof. dr. eng. Miranda NAFORNIȚĂ
- Florin Lucian MORGOS, *Radio Channels*, PhD Advisor: Prof. dr. eng. Miranda NAFORNIȚĂ
- Radu LUCACIU, *Optical systems with OCDMA performance analysis*, PhD Advisor: Prof. dr. eng. Miranda NAFORNIȚĂ

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*
- Assist.eng. Horia BALTĂ: *Optical Transmission and Processing of Information, Statistical Theory of Information Transmission, Theory of Information and Coding*
- Assist.eng. Maria KOVACI: *Statistical Theory of Information Transmission, Theory of Information and Coding, Signals Circuits and Systems*
- Assist.eng. Janos GAL: *Signals, Circuits and Systems, Telecommunication Circuits*
- Assist.eng. Radu LUCACIU: *Optical Transmission and Processing of Information*
- Assist.eng. Nicolae MICLĂU: *Optical Transmission and Processing of Information, Theory of Information and Coding*
- Assist.eng. Corina NAFORNIȚĂ: *Digital Signal Processing, Digital Watermarking*

- Assist.eng. Marius OLTEANU: *Data Transmission on Radio Channels*
- Assist.eng. Marius SĂLĂGEAN: *Signals, Circuits and Systems*

CONTACT PERSON

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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

RESEARCH PROJECTS

1. CEEX Project, Contract Nr. CEX 60 / 28.07.2006, *Control and Monitoring from the Distance System for Intelligent Buildings „COMODICI”*, period 2006-2008

Director: Prof.dr.eng. Radu VASIU
Value 2007: 150,000 RON
Members: Lect.dr.eng. Mugur MOCOFAN
Assist.eng. Marian BUCOS
Assist.eng. Mihai ONITA
PhD student Iasmina ERMALAI
PhD student Andrei TERNAUCIUC
PhD student Cristian TECU
PhD student Bogdan DRAGULESCU
Partners: Technical University of Cluj-Napoca
“Transilvania” University of Brasov
Siemens PSE Brasov

FIELD AND GRANT DESCRIPTION: Intelligent buildings apply technologies to improve the building environment and functionality for occupants/tenants while controlling costs. Improving end user security, comfort and accessibility all help user productivity and comfort levels. The owner/operator wants to provide this functionality while reducing individual costs. Technologies make this possible. An effective energy management system, for example, provides lowest cost energy, avoids waste of energy by managing occupied space, and makes efficient use of staff through centralized control and integrating information from different sources. An efficient integrated system enables a modern, comprehensive access and security system to operate effectively and exchange information with other building systems. Fully integrated functionality includes the ability to open doors, notify responsible staff of unwanted intrusions and ensure that lighting, fire and other building management systems are informed of staff that arrive or depart the building. This information can then be used to manage the local environment and the resulting energy usage. Life safety systems, notably fire systems, are heavily regulated by stringent code requirements. These requirements do not, however, prevent the information from a fire system being provided to other systems. This opportunity can be exploited to open doors and illuminate a building when fire alarms are received. Transducers (detectors) can measure many building parameters, e.g., vibration, strain and moisture, to continually monitor the building’s infrastructure condition. To integrate these systems and exchange information effectively, a ubiquitous and reliable communications infrastructure is needed. These systems are typically managed by personal computers (PCs) using data processing communication techniques and both wired and wireless communication technologies. The key communications issues are redundancy, resilience, security and the assurance for all users that “their data” is secure. Integration considerations may be addressed through standards and conventions, or manufacturers’ protocols. Since proprietary solutions permeate the industry, total interworking is currently unattainable, but the future will require full interoperability, with information exchanged among all systems, hence we will need technologies that translate

2. CEEX Project, Contract Nr. CEX 05-D8-77 / 19.10.2005, *Foresight Scenarios for the Romanian Economical Sectors with Innovation Potential in the View of the Year 2020 „INOVFOR”*, period 2005-2008, UPT coordinator

Director: Assoc.prof.dr.eng. Marian MOCAN

Value 2007: 190,000 RON
Members: Prof.dr.eng. Radu VASIU
Prof.dr.eng. Corneliu TOMA
Assoc.lect.eng. Diana ANDONE
Lect.dr.eng. Mugur MOCOFAN
Assist.eng. Marian BUCOS
Assist.eng. Mihai ONITA
Eng. Marius CONDREA
PhD student Iasmina ERMALAI
PhD student Andrei TERNAUCIUC
PhD student Cristian TECU
Partners: I.N.C.S.M.P.S. Bucharest
I.P.A. SA Bucharest
CURS SA Bucharest
INOE Bucharest

FIELD AND GRANT DESCRIPTION: The main goal of the project is to elaborate a National Strategy for Research – Development – Innovation, and according to that to develop a R&D National Plan for the period 2007-2013. This plan will be correlated with:

- the general external and security policy objectives, aiming to asses Romania as a power and stability factor in the Black Sea and the Balcan Peninsula area;
- the necessity of European integration, with minimal costs, having in view the strengthening of the Romanian economy in order to face the competition on the new market;
- the strengthening of the functionality of the specific economical mechanisms of an emerging market;
- the creation of the premises to decrease the differences between Romania and the other members of the European Union;
- the move towards an economy based on knowledge;
- the necessity to create the premises for the development of the domestic market, the increase of the work opportunities and of the professional training, the amelioration of the working conditions, of the health and living conditions for the population, the creation of the local brands and trade marks;
- the creation of a scientific and technological stock, concentrated to the areas with good opportunities to make the most from the human capital;
- the design of the institutional system and of the regulations able to allow the sustainability, the development, the use and the efficiency of the scientific and technological capital, as determined;
- the coherent development of the resources and their correlation to the need of scientific and technological capital, for the areas with development potential.

The project's objectives are:

- to make an analysis of the strong points, of the weak points, of the effective and potential opportunities, of the effective and potential factors of risk resulting from the economical evolution on long term, medium term and short term
- to develop a strategy and a potential national plan for R & D
- to make proposals able to create the framework and the instruments needed for valorising the existing opportunities, for translating some potential opportunities into effective ones, for minimizing the existing risks and for preventing the identified potential risks
- to elaborate the main scenarios for the Romanian economical and social development until 2020, as a premise for the elaboration of a consolidated foresight endeavour, made up from „critical domains / technologies"
- to elaborate the National Plan for research – development – innovation, that will include the means and ways to encourage and support the critical domains / technologies, the modalities for their effective implementation, the monitoring and evaluation tools, the financing mechanisms and resource allocation principles, the modalities to promote excellence.

Project details can be found at:
www.cm.upt.ro/inofvor

3. CEEX Project, Contract Nr. CEX 05-D8-5/ 10.10.2005*, Development of the Concept of Social Responsability in the Romanian Companies, in the European Context „RSE & UE",* period 2005-2008

Director: Assoc.prof.dr.eng. Marian MOCAN
Value 2007: 60,000 RON
Members: Prof.dr.eng. Radu VASIU
Assoc.lect.eng. Diana ANDONE
Lect.dr.eng. Mugur MOCOFAN
Assist.eng. Marian BUCOS
Assist.eng. Mihai ONITA
Eng. Marius CONDREA
Eng. Iasmina ERMALAI
Coordinator: I.N.C.S.M.P.S. Bucharest
Partners: I.P.A. SA Bucharest
CURS SA Bucharest
INOE Bucharest

FIELD AND GRANT DESCRIPTION: The Lisbon Agenda (2000) establishes as the main strategic objective that „the EU should become the most competitive and dynamic knowledge based economy in the world, capable of sustainable economical growth, with more and better work places and with a bigger social cohesion". The project represents an effective contribution to the implementation of those desires.

The project objectives are:

- Realization of a report about the existing situation at international level, including in the EU, referring to the concept of social cohesion
- Design of information instruments for documentation, communication, collaboration and implementation of some activities
- Elaboration of some empirical analyses regarding the existing situation in Romania, including the external dimension (Corporate Social Responsibility – CSR)
- Elaboration of a methodology for the investigation of the internal dimension of IRS/CSR in Romania
- Elaboration of a methodology for the investigation of the dimension of IRS/CSR at the level of organisation in Romania
- Evaluation of the dimension of the economical, social and environmental aspects, at the elvel of organisation, in Romania
- Evaluation of the impact of IRS/CSR towards the competitivity, occupational quality, inclusion and social cohesion
- Determination of some directions of perspective in applying IRS/CSR in Romania, in European context.

Project details can be found at:
www.cm.upt.ro/rse&ue

4. PNCD II project nr. 11-057/14.09.2007: Bio-medical signal acquisition and remote transmission over mobile computing equipments BIOMED-TEL

Director: Prof.dr.eng. Radu VASIU
Value 2007: 20,000 RON
Members: Prof.dr.eng. Corneliu TOMA
Assoc.lect.eng. Diana ANDONE
Lect.dr.eng. Mugur MOCOFAN
Assist.eng. Marian BUCOS
Assist.eng. Mihai ONITA
Eng. Marius CONDREA
PhD student Iasmina ERMALAI
PhD student Andrei TERNAUCIUC
PhD student Cristian TECU
PhD student Bogdan Dragulescu
Partners: Transilvnia University of Brasov
Technical University of Cluj-Napoca
Siemens PSE Brasov
IBCI – Institute for Cardiovascular Diseases Iasi

FIELD AND GRANT DESCRIPTION:
Cardiovascular affections are a prime cause of mortality and morbidity in Romania. The risk of cardiovascular morbidity and mortality remains high despite the attempts of correcting the cardiovascular risk factors. In the field of cardiovascular pathology the death risk by cardiovascular or vascular-cerebral accident persists even after the patients have left the hospital. Monitoring the health condition of these and the analysis of evolution trends of the biophysical and biochemical parameters represents an essential prevention factor.

The project envisages research, design and implementation of a flexible and self-adapting system for the monitoring of biological signals. Research and design activities will be oriented towards developing a system architecture and organization for remote monitoring and creating the interfaces for acquisition, monitoring and remote transmission to a hospital unit (hub). The signals acquired from the patient include: heart bio-potentials, blood pressure, blood O2 concentration, heart and breath rate, temperature, blood glucose concentration etc. The mobile computing equipments (MCE) integrated in the systems will be: Personal Digital Assistant (PDA), and/or „smart phones" (mobile phones MP).

The project will use hard – and software platforms (PDA and MP) of broad usability, which correspond to the requirements of the application in terms of computing power and also by their low price. Based on intelligent interfaces that will be designed, the system will automatically integrate the sensors in „plug & play" mode and also adapt its communication strategy with the hub/dispatcher for cost minimization and for ensuring the reliability and availability of the data link. It cannot be neglected, that this system development strategy will offer high versatility and scalability and will allow for expanding project results beyond the field of remote medicine.

The project will develop and integrate two categories of **intelligent interfaces**: 1. specific to signal **acquisition** from sensors placed on the patient and 2. **communication** – dedicated (by wire or wireless) necessary for warning/alert messages transfer and also for data transfer to the hospital hub. Remote data-transmission will allow for communication technologies, like: Near Field Communication (RFID, ZigBee, RuBee, Bluetooth), remote wireless: GSM/GPRS, EDGE, UMTS, Wi-Fi, WiMax as well as the wire based ISDN and Ethernet.

The project is relevant to research direction *"1 – Information and communication Technology"*, theme priority: *"1.6. Technologies for distributed systems and embedded systems"*, aimed at developing of new technologies for integrated systems based on biomedical sensors networks (specific objective 1.6.14). The project objectives envisage also the development of applications for communication and computing embedded systems (specific objectives 1.6.17 and 1.16.16) ensuring local data processing and transmission to the hospital hub.

The purpose is to develop new technologies for integrated systems based on intelligent sensor networks for monitoring biological signals, remote transmission and processing for prevention and

diagnosis. Envisaged are both theory development of architecture and organization of the systems for intelligent sensor networks (wire based or wireless) as well as practical implementation and testing of the mobile monitoring system carried by the patient. The proposal has innovative characteristics: the architecture and organization; the „plug&play" interfaces in compliance with the IEEE 1451 standard; the integration based on widespread platforms (PDA, MP); processing, analysis and detection of alerts using also „artificial intelligence" methods, development of strategies allowing for high reliability of the data link with the hospital hub, all these are characteristics of a modern and extremely useful solution for the developments in the field of bioengineering. The project will create the conditions for radically improved material bases required for the monitoring of the main biological parameters of the patient in the ambulatory which will increase the efficiency of the medical art, especially prevention, reduce the costs of medical assistance and extend the experimental base, very necessary in the field. Also, the formative component, especially by integrating young researchers in a field with real prospects contributes to the relevance of the project.

MAIN ACTIVITIES:

- Analysis of the current world wide developments in the field of ambulatory monitoring of biological parameters acquired signals of processing techniques and methods, instrumentation and dedicated sensors. The stress will be laid on advanced signal processing techniques for preventing or early detection of the patient's health state deterioration;
- Definition of the full specifications – hardware and software for the monitoring application;
- Development of system architecture and organization, adequate for monitoring;
- Design of acquisition and communication interfaces at MCE in accord with the specification including those regarding energy consumption minimization;
- Development of acquisition, processing, analysis, storage/archiving, alert and communication MCE programs with the hub for the acquired signals;
- Training of the young researchers, result dissemination and increase of team visibility for attracting new partners and creating accession conditions to European funds;
- Development of the material research bases of the partners and subsequently of interdisciplinary research laboratories: electronics, medicine, telecommunication in the four university centers. It is envisaged that these will function financially autonomous which will allow for the permanent updating of the proposed system.

5. PNCD II project nr. 3598 / 2007 "Efficiency Increasing of the Support Processes for International Transfer on Managerial Know-How in the Applicative Research and Innovation Field" WINMAN

Director: Prof.dr.eng. Radu VASIU
Value 2007: 19,000 RON
Members: Prof.dr.eng. Corneliu TOMA
Assoc.lect.eng. Diana ANDONE
Lect.dr.eng. Mugur MOCOFAN
Assist.eng. Marian BUCOS
Assist.eng. Mihai ONITA
Eng. Marius CONDREA
PhD student Iasmina ERMALAI
PhD student Andrei TERNAUCIUC
PhD student Cristian TECU
Partners: Academy of Economic Studies
Institute of National Economy
"Politehnica" University of Bucharest
Centre for Industries and Services Economy
Bridgeman SRL
Commercial Academy Satu Mare
Artifex University

FIELD AND GRANT DESCRIPTION: The coherent contribution to the triangle competitivity – technological transfer – research-innovation supposes the elaboration of new methods and processes for knowledge management for the research activities. The recognition of the role of technology transfer mechanisms and / or of the know-how elements is more an more underlined by the academic areas, by the partnerships between research – industry – financial services companies. The role of the new technologies in improving the productivity and the competitivity of different economical sectors / economic clusters / or even national economies takes to the reconfiguration of the traditional relations between the research results suppliers and the final beneficiaries of those results. The XXI-st century Romania is still characterized by significant gaps regarding the technical efficiency, delays and disfunctionalities in resource administration for the adoption of new technologies in the industry. It is absolutely necessary to correlate, on short term, the requirements related to the increase of the absorbtion capacity of the European founds and the necessity to increase economic performance. Consequently, new decision making models are required, to the benefit of the industrial companies in the field of human resources development for Romania as a whole.

The consortium of the WINMAN project has the purpose to elaborate and to propose models for managerial processes and practical methods related to different aspects of the research activities:

managerial transformation based on innovation strategies, technological transfer as support for knowledge based developments, intellectual property rights implementation in the research strategy, innovation support as source of competitivity advantages, human resources management in R&D activities.

MAIN ACTIVITIES:

- Analysis of the risk factors in the evolution of the international technology transfers, especially at the level of small and medium enterprises in Romania;
- Realization of new models for the technology transfer processes in the field of international know-how management, according to the specific Romanian conditions (business intelligence)
- Re-engineering of the processes related to Intellectual Property, with the goal to involve universities as main actors in the field
- Creation of an intuitively and interactiv instrument on the web (e-business portal), able to support the use of the models of international know-how management
- Initiation of new collaborative business processes in the field of technological transfers, able to stimulate innovation in Romania.

6. CNCSIS grant No. 2738/23.05.07, A1 / GR76, Code 600, type A, *Object tracking estimation in video sequences*

Director: Florin ALEXA
Value: 16,000 RON
Members: Prof.dr.eng Corneliu I. TOMA
Prof.dr.eng Vasile GUI
Lect.dr.eng. Muguras MOCOFAN
Lect.dr.eng Catalin CALEANU
Assist. eng. Andy VESA
Assist. eng. Ciprian DAVID
Assist. eng. Artur MULLER
Eng.Codrut IANASI
Andreea GALEANU, PhD student
Stud. Daniela CLIM

FIELD AND GRANT DESCRIPTION: In the context of rapid developped of multimedia technologies, visual surveillance with traffic estimation and facial recognition, represent an important goal for many applications. The objective is to develop a tool for people counting intended to offer statistical knowledge useful in the objective evaluation of the efficiency of the services delivered to clients in fast foods. The system will be able to accurately estimate the number of people passing through different areas and to derive mean, minimum and maximum amount of time for servicing clients at different moments of the day or to average such information on different time intervals. Always, it will be possible to used in automat traking of mobile robots. The system will operate based on a PC environment in connection with a variable number of webcams in an Ethernet network.

The goal of the work is to developp a system with robust and real-time operation. The system has to cope well with crowded environments. This will be achieved through the following contributions:

- a fast background detection using nonparametric kernel density estimation
- a robust and accurate tracking method for people tracking in crowded environmernts
- use of a multimodal strategy to improve segmentation and tracking results
- find robust solutions for using deformable models in people counting

Accomplishing the proposed goals enables extention of the application range to several related fields, such as multimedia image sequence compression, video indexing for browsing, road traffic analysis etc.

7. CNCSIS grant CODE 17, type TD, *Title: Dinamical scene analize with 3D sensors*

Director: PhD student Georgiana SIMION
Value: 5,210 RON

FIELD AND GRANT DESCRIPTION: This project is trying to implement a tracking algorithm for drivers' faces for safety applications. It is proved that some face expression and the number of eye blinks per minute are relevant to evaluate the level of tiredness. In this project the main purpose is to track the eyes of the driver using practical filters and to recognize some drivers face expression witch shows the tiredness level.

ACTIVITIES AND RESULTS:

1. Tracking and recognition improvement
2. Specific application model searching
3. Project management
4. Dissemination

8. CNCSIS grant CODE 16, type TD, *Title: Robust techniques in image registration*

Director: PhD student Daniela FUIOREA-BULUCEA
Value: 5,210 RON

FIELD AND GRANT DESCRIPTION: In this project a new method of feature based 2D image robust registration is proposed. The image distortion is modeled as a similarity transform with four parameters, estimated sequentially by 1D transforms, resulting in an increased sample density as compared to 4D space processing. By adopting a mean shift estimator, advantages of RANSAC and M-estimators can be combined within a single and sound theoretical framework. Based on this method, the projects is proposing to use image registration techniques to solve node localization problem in a

Wireless Sensor Network based on video sensors. Moreover, the proposed solution adds video-field overlap estimation to classical spatial localization. Several registration algorithms are analyzed and tested for performance evaluation.

ACTIVITIES AND RESULTS:

1. The features optimization selection, in order to realiye the image registration.
2. The combination of methods based on points with the methods based on regions using segmentation methods with generates good regions.
3. The project management.
4. Dissemination results.

9. CNCSIS grant CODE 15, type TD, *Title: Contributions to the use of new informational technologies in the eLearning process*
Director: PhD student Iasmina Leila ERMALAI
Value: 5,210 RON
FIELD AND GRANT DESCRIPTION: This research project aims the development of an educational platform, which would offer the adaptation of the existing courses to the new informational technologies from the eLearning field (eg. mLearning - Mobile Learning). This platform will be initially tested with the students from the distance Learning Centre of the Politehnica University of Timisoara.

ACTIVITIES AND RESULTS

1. Choosing a mobile device for implementing and testing the concept.
2. Choosing one of the existing courses.
3. The development of an eLearning and mLearning platform
4. Testing the platform on a group of students.
5. Conclusions and further directions.

INTERNATIONAL PROJECTS

1. Socrates Erasmus Curriculum Development project: *International On-Line Master in Multimedia (IMM – CD)*
Director: Prof.dr.eng. Radu VASIU
Value: 40,600 EURO
Members: Prof.dr.eng. Nicolae ROBU
Assoc.lect.eng. Diana ANDONE
Lect.dr.eng. Mugur MOCOFAN
Assoc.lect.eng. Daniel HAIDUC
Assist.eng. Marian BUCOS
Assist.eng. Mihai ONITA
Eng. Marius CONDREA
Iasmina ERMALAI, PhD student
Partners: Univ. of Nice, FR
JME Associates, UK
Univ. of Technology, Kaunas, LT
E-Collegium, Budapest, HU
Univ. of Godollo, HU
Mimoza Kft, Budapest, HU
Univ. of Zvolen, SK

FIELD DESCRIPTION:The scope of the project, which is funded by the European Commission for 2 years (Oct. 2004 – Sept. 2006) is to introduce an International on-line Master degree in Multimedia. The consortium of participants established an International Academic Board that is responsible for establishing the curricula and for checking the quality of the courses. Each partner university takes part to the course development, the allocation of courses being done based on competition. Some of the courses might be allocated for development to recognized experts in e-learning from USA, Finland and Greece.

After course development, the degree program will run through e-learning, tutoring being realized on-line by the course developers. The partner universities will ensure local support centres, in order to allow face-to-face meetings for the students they enrolled. Final examination will be done through face-to-face examination done by the course leaders, the only participants to the degree program that will have to travel internationally.

"Politehnica" University of Timisoara is the program coordinator and contractor.

Further details on the project can be found at:
www.immaster.net

2. Leonardo da Vinci II project: *E-REPORT. Transnational virtual study circles: e-learning supports for tutorship and learning groups*
Director: Prof.dr.eng. Radu VASIU
Value: 75,000 EURO
Members Assoc.lect.eng. Diana ANDONE
Assist.eng. Marian BUCOS
Assist.eng. Mihai ONITA
Lect.dr.eng. Matei TAMASILA
Eng. Iasmina ERMALAI, PhD student
Eng. Cristian TECU, PhD student
Eng. Andrei TERNAUCIUC, PhD student
Eng. Marius CONDREA
Lucia RAZMERITA, journalist
Partners: Università degli Studi di Palermo, IT
University of Salzburg, AT
Confederación Empresarial de la Provincia de Alicante – COEPA, ES
Gotland University, Gotland, SE
Karolinska Institute, Stockholm, SE

FIELD DESCRIPTION: *E-REPORT* project will contribute to set up a communitarian repertory of reference material with regard to the development of innovative methods and best practices in the field of e-learning system for VET (universities and vocational institutes). Particularly, the project is aimed at setting up the basis for the constitution of a transnational virtual study circle.

This demands a comprehensive and transnational approach that implies:

- analyses of the educational and training needs in the field of e-learning;
- international comparison of the quality and the quantity of the existing online courses provided by both universities and vocational institutes;
- international comparison between contents, methods and services adopted in this field in order to standardize them;
- the elaboration of a shared repertory of contents, methodologies, services and training tools;
- the testing and validation of this repertory to a significant sample of the final users of the project's output;
- the promotion of processes of virtual mobility among european students and teachers/trainers;
- the transnational communication and exchange between universities and vocational centres, public and private;
- the ongoing valorisation and dissemination of the results during the project, involving the final users of the outputs

3. LLP project: *"VICADIS – Virtual Campus for Digital Students",* Agreement **2007-2611/001-001,** Project number **134039 - LLP - 1 - 2007 - 1 - RO - ERASMUS - EVC**

Director:	Prof.dr.eng. Radu VASIU
Value:	365.747 EURO
Members:	Assoc.lect.eng. Diana ANDONE Lect.dr.eng. Mugur MOCOFAN Assist.eng. Marian BUCOS Assist.eng. Mihai ONITA Eng. Marius CONDREA Lucia RAZMERITA, journalist Cristian TECU, PhD student Iasmina ERMALAI, PhD student Andrei TERNAUCIUC, PhD student Bogdan DRAGULESCU, PhD student
Partners:	University of Palermo, Italy Baltic Education Technologies Institute, Lithuania University of Miskolc, Hungary Oulu University of Applied Sciences, Finland University of Brighton, UK VISIONI Di Caro arch. Ernesta, Italy Euro-Contact Business School, Hungary BRIDGEMAN SRL, Romania JME Associates Ltd, UK

FIELD DESCRIPTION: The main objective is to build a virtual campus for digital students aimed at providing open educational resources and tools available and accessible for all students and ensuring the interoperability between the different eLearning environments used in the partner universities.

Aims of the project:

• To overview and implement emerging tools and technology commonly referred to as "social software" that can create personal as opposed to institutional learning environments, as well as the mobile learning tools

• To support practitioners in becoming aware of the new features of the digital students, to learn to effectively use and develop resources with new digital technologies and new communication tools in ways that are aligned with what they want to achieve educationally.

• To provide the organisational and technical framework for the development of an interoperable virtual campus

• To make available a virtual campus based on Open Educational Resources which will offer a free, open personal learning environment

• To improve the quality of education in eLearning by international co-operation and by new methodological approach to learning. The project intends to develop an interoperable virtual campus, not a new one to replace the existing ones used in the universities, and to provide a new methodology based on modern techniques of education such as open sources, adaptability and interactive learning.

• To evaluate, test and transfer the ICT tools, pedagogical methodology and the Set of Guidelines to other education and training areas and throughout Europe.

The main scope of ViCaDiS is to provide an accessible and attractive environment for all students within the Member States, using already existing tools which will be enhanced with new tools wanted by the new generation of students. By providing students the tools which they use anyway extensively outside the institutional framework of learning (wiki, blogs, forums, IM, podcasting, RSS) ViCaDiS will support the learning attractiveness of the university curricula, will improve the quality of the learning process by encouraging the exchange of information/knowledge between students from different universities, and will reduce university drop-out or student de-motivation for learning. It will also produce an instructional or pedagogical shift inside the universities eLearning moving the focus from the education materials and technology to the user- student, to user generated content.

In ViCaDiS, a wide range of ODL actors from EU and CEE countries will focus on developing an innovative approach for enhancing international eLearning by moving the strength from the institutional learning environment to the personal learning environment (PLE) which focuses on students. It will also produce an instructional or pedagogical shift inside universities eLearning

moving the focus from the education materials and technology to the user-student, to user generated content.

The main objective is to build a virtual campus for digital students aimed at providing open educational resources and tools available and accessible for all students and to ensure the interoperability between the different eLearning environments used in the partner universities.

The goal of ViCaDiS is to create an attractive environment for all students within the Member States, using already existing tools which will be enhanced with new tools wanted by the new generation of students. An innovative multilingual ICT-based environment unique in Europe (as an international virtual campus), it will incorporate several open educational resources (library, glossary, external links, student projects, course activities), open educational tools (wiki, blog, forum, calendar, podcasting, instant messaging communication, audio-video conferencing over IP,

RSS, mobile text messaging, mobile accessibility to ViCaDiS) and will promote social networking as an instructional method.

The project **workpackages** are:

- Developing and testing of the ViCaDiS scenario
- ViCaDiS tools design and implementation
- Piloting/testing and evaluation of ViCaDiS
- Evaluation and elaboration of the Set of Guidelines
- Exploitation of ViCaDiS
- Dissemination and Awareness raising of ViCaDiS
- Project management of ViCaDiS

The main **outcomes** of the project are:

- open personal learning environment methodology
- ViCaDiS scenarios
- ViCaDiS multilingual virtual campus: online environment and mobile environment based on Open Educational Resources
- Multilingual web portal
- Multilingual Set of Guidelines (on paper, CD and online)
- ViCaDiS evaluation
- Promotional and multiplication materials

PUBLICATIONS

BOOKS

Marza E., Alexa Fl., Simu C., *Radio communications. Fundaments*, West Publishing House, Timisoara 2007, ISBN 978-973-36-0446-4, 260 pages (published in Romanian)

PAPERS

1. Simion Georgiana, *Target Detection in Low Visibility Condition and Artificial Lighting Using a Laser Sensor*, "Doctor ETc", Timisoara, Sept. 2007, ISBN 978-973-625-494-9, pp. 23-28
2. Sârbu Georgiana, Rugină S., Otesteanu M, Gontean A, *Target Detection Using A Laser Sensor*, MicroCAD 2007, International Scientific Conference, Section I: Automation and Telecommunication, ISBN 978-963-661-750-9, pp. 23-28
3. Otesteanu M., Gontean A., Sârbu Georgiana, Rugină S., *Software Environment for the Laser Precipitation Monitor*, WSEAS Transactions on Information Science and Applications, Issue 1, Volume 4, January 2007, ISSN 1790-0832, pp. 214-219
4. Marc Donias, Ciprian David, Yannick Berthoumieu, Olivier Lavialle, Sebastien Guillon, Naamen Keskes, *New fault attribute based on robust directional scheme*, Society of Exploration Geophysicists: Geophysics pp. 39-46, 2007, ISSN: 0016-8033
5. Mihai Onita, Marian Bucos, Iasmina Ermalai, Sorin Petan, Corneliu Ioan Toma, *Streaming technologies in education and entertainment environment*, ELSE "E-Learning and Software for Education", Bucharest, 12-13 April 2007 ISBN 987-973-663-535-9 (general), ISBN 978-973-663-529-8, pp. 303-308
6. Andrei Ternauciuc, Mihai Onita, *Multimedia Tutorial Guide in e-learning*, ELSE "E-Learning and Software for Education", Bucharest, 12-13 April 2007 ISBN 987-973-663-535-9 (general), ISBN 978-973-663-529-8, pp. 309-314
7. Vasile Gui, Florin Alexa, Cătălin Căleanu, Daniela Fuiorea, *Motion Segmentation and Analysis in Video Sequences*, WSEAS Transaction on Circuits and Systems, Issue 1, vol. 6, pp. 142-148, Jan. 2007, ISSN 1109-2734
8. Muguras Mocofan, Radu Vasiu, Mircea Abuceanu, *Redundancy for the Security Systems in a Smart Building Using Internet (WEB) and GSM (SMS) Technologies*, Acta Technica Napocensis, Volume 48, Number 3, 2007, pp. 49-53, ISSN 1221-6542
9. Radu Vasiu, Muguras Mocofan, Iulia Radu, *Scenarios Control for Smart Buildings Using Relational Databases*, Acta Technica Napocensis, Volume 48, Number 3, 2007, pp. 54-57, ISSN 1221-6542

10. Fuiorea Daniela, Gui Vasile, Pescaru Dan, Toma Corneliu, *Using Registration Algorithms for Wireless Sensor Network Node Localization*, 4th International Symposium on Applied Computational Intelligence and Informatics, May 17-18, 2007, pp. 209-214, ISBN 1-4244-1234-X

11. Fuiorea Daniela, *A new point macthing method for registration-based sensor localization*, "Doctor ETC", 20 Sept 2007, pp. 29-33

12. Iasmina Ermalai, *Podcasting at The Politehnica University of Timisoara*, "Doctor ETc", Timisoara, Sept. 2007, ISBN 978-973-625-494-9, pp. 19-22

13. Iasmina Ermalai, Marian Bucos, Mihai Onita, Radu Vasiu, *Putting the M- in Front of Learning at the "Politehnica" University in Timisoara*, ELSE "The South-East European Space in the Context of Globalization", Bucharest, April 2007, ISBN 987-973-663-535-9, ISBN 978-973-663-529-8, pp. 339-344

14. Radu Vasiu, Diana Andone, Marian Bucos; *The implementation of an International master in Multimedia – a model for a Europe wide degree*; IEEE Learning Technology Newsletter, ISSN 1438-0625, Vol. 9, Issue 1, pp. 16-19; ISSN 1438-0625

15. Daniela Fuiorea, Vasile Gui, Florin Alexa, Toma Corneliu; *A New Point Matching Method for Image Registration*; Proceedings of the 6th WSEAS Int. Conf. on Computational Intelligence, Man-Machine Systems and Cybernetics (CIMMACS '07), Tenerife, Canary Islands, Spain, December 14-16, 2007, pp. 135-139, ISSN 1790-5117

16. Dan Pescaru, Vasile Gui, Corneliu Toma, Daniela Fuiorea; *Analysis of Post-Deployment Sensing Coverage for Video Wirelesss Sensor Networks*; Proceedings of the 6th RoEduNet International Conference, Craiova, Romania, November 23-24, 2007, pp.109-112, ISBN 978-973-746-581-8

17. Marian Bucos, Iasmina Ermalai, Mihai Onita, Radu Vasiu, *Developing Tools for Virtual Communities*, Proceedings of the International Conference ELSE "E-Learning and Software for Education", Bucharest, Romania, April 2007, ISBN 978-973-663-529-8, pp. 315-320

18. Radu Vasiu, Diana Andone, Nicolae Robu, *E-Learning in Romania - A Critical Analysis*; Proceedings of the ON-LINE EDUCA 2007, Berlin, 28 November - 2 December 2007, CD version

19. Popa, D., *Robust techniques for video tracking*, "Doctor ETc 2007", Timisoara, 20 Sept. 2007

20. Nicolae Robu, Diana Andone, Radu Vasiu, *Using On-line Tools for E-learning in Romania;* Proceedings ON-LINE EDUCA 2007, Berlin, 28 November - 2 December 2007, CD version

21. Daniela Fuiorea, *A New Point Matching Method for Image Registration Using Pixel Color Information*, Scientific Bulletin of the "Politehnica" University of Timişoara, Trans. on Electronics and Telecommunications, Tom 52(66), Vol. 2, pp. 15-19, ISSN 1583-3380

PhD RESEARCH ACTIVITIES

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

PhD students:

- Ionel STANCIU: *Multimedia Communications Over Wireless Networks*
- Andreea GĂLEANU: *Contributions at the performance improvement of the GSM system*
- Artur MULLER: *Contributions in implementing of the multimedia databases, with local and remote access*
- Mirela L. IOANEŞIU: *Contributions at the network security by the using of the virtual private networks (VPN)*
- Daniel C. HAIDUC: *Contributions in the color digital reproduction field*
- Constantin M. BUCOS: *Modelling and analysis of mobile virtual organizations*
- Radu TĂNASE: *Ultrasound electronic systems for the movement evaluation in the fluid environment*
- Mihai I. ONIŢĂ: *Video communications in multimedia applications.*
- Mircea TOMOROGA: *Contributions at the conception and design of the analogue integrated circuits in CMOS technology*
- Florin-Josef LĂTĂREŢU: *Contributions at the intelligent telecommunication network achievement.*
- Daniela Narcisa FUIOREA – BULUCEA
- Alin SCOROŞANU

2. Prof. dr. eng. Marius Oteşteanu

PhD students:

- Sandra RUGINA, first year student
- Georgiana SÂRBU-DOAGĂ, first year student
- Hay BOENKE, first year student
- Daniel POPA, first year student

3. Prof.dr.eng. Radu VASIU

PhD students:

- Constantin M. BUCOS: *Modelling and analysis of mobile virtual organizations*
- Mihai I. ONIȚĂ: *Video communications in multimedia applications*
- Iasmina ERMALAI, *Contributions to the Use of New Information Technologies in e-Learning*
- Artur SRAUM, *Contributions to Interactive Web Programming*
- Cristian TECU, *Contributions to the Use of Video, Photo and Audio Applications in Professional Presentations*
- Andrei TERNAUCIUC
- Virgil ROTARU
- Bogdan Dragulescu, first year student

PHD THESIS SUSTAINED

- Valentin I. MARANESCU, *Contributions to the improvement of voltage stabilizers performances using interconnected integrated voltage regulators*, PhD advisor: Prof. dr. eng. Corneliu TOMA
- Codruț N. IANĂȘI, *Nonparametric density estimation technigues for background substraction in video surveillance*, PhD advisor: Prof. dr. eng. Corneliu TOMA

PhD ESSAYS PRESENTED

- Gheorghe Daniel POPA, *Nonparametric estimation techniques*, PhD advisor: Prof. dr. eng. Marius OTESTEANU;
- Gheorghe Daniel POPA, *Robust methods in video tracking*, PhD Advisor: Prof. dr. eng. Marius OTESTEANU;
- Mihai I. ONIȚĂ, *Mobile telephony and internet networks streaming technology*, PhD advisors: Prof. dr.eng. Corneliu TOMA, prof.dr.eng. Radu VASIU
- Daniel C. HAIDUC, *The present and outlook stage in the image display technologies*, PhD advisor: Prof. dr.eng. Corneliu TOMA
- Daniel C. HAIDUC, *Calibration of the image displays. Color management systems*, PhD advisors: Prof. dr.eng. Corneliu TOMA
- Mircea TOMOROGA, *The models of the digital-to-analogue converter using in the design*, PhD advisor: Prof. dr. eng. Corneliu TOMA
- Mirela L. IOANEȘIU, *Data security by cryptography*, PhD advisor: Prof. dr. eng. Corneliu TOMA
- Mirela L. IOANEȘIU, *VoIP service extension using adaptive personal mobile communication*, PhD advisor: Prof. dr. eng. Corneliu TOMA
- Sandra RUGINĂ, *Analysis, Modelling and Measuring Rain Characteristics*, PhD advisor: Prof. dr. eng. Marius OTESTEANU
- Georgiana SÂRBU-DOAGĂ, *Study of Functions and Components Required for Building a Rain Simulator*, PhD advisor: Prof. dr. eng. Marius OTESTEANU
- Sandra RUGINĂ, *Software Environment for the Laster Precipitation Monitor*, PhD advisor: Prof. dr. eng. Marius OTESTEANU
- Georgiana SÂRBU-DOAGĂ, *Programming Siemens Simatic S7-200. LabView-PLC Communication*, PhD advisor: Prof. dr. eng. Marius OTESTEANU
- Iasmina ERMALAI, *The Use of PDAs in the Actual Generation of M-learning Environments*, PhD advisor: prof. dr. eng. Radu VASIU
- Cristian TECU, *Definition of a Software Application to Control the Use of Video, Photo and Audio Applications in Professional Presentations*, PhD advisor: prof. dr. eng. Radu VASIU
- Andrei TERNAUCIUC, *Interoperability and Portability between Different eLearning Platform*, PhD advisor: 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 OTEȘTEANU: *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*;
- Assoc. prof. dr. eng. Florin ALEXA: *Image and Sound Processing*;
- Lect. dr. eng. Mugur MOCOFAN: *Machine Vision and Pattern Recognition, Multimedia, Studio Equipment, Video Production*;
- Assoc. lect. eng. Diana ANDONE: *Multimedia Applications, E-learning, Adaptive and Adaptable Technology, Media Research*;
- Assoc. lect. eng. Daniel HAIDUC: *Computer Graphics, Animation Techniques*;

- Assist. eng. Constantin Marian BUCOS: *Multimedia Databases, Object Oriented Programming*;
- Assist. eng. Mihai ONITA: *Audio-video Compression, Digital Television, Multimedia Applications.*

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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. Liviu TOMA: *Data Acquisition Systems. Microprocessor System Architecture, Digital Processing Structures*

- 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*
- Lect. 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.

GRANTS AND CONTRACTS

1. *Platform for the Study of Electrical, Electronical and Chemical Concurent Phenomena that Occur in the Thermo-Solar Conversion Process and in the Photo-Voltaic Effect. Automation of Functioning and Exploitation of Solar Assets Based on Thermo-Solar and Photo-Voltaic Conversion*

Granted by the Ministery of Education and Research

Director: Prof.dr.eng. Nicolae ROBU, Rector of the "Politehnica" University

Chief of the Electronics Laboratory: Prof.dr.eng. Aldo DE SABATA

Duration: three years, 2006-2008

Total value: 4,232,764 RON

PROJECT OUTLINE

Researches on the use of new sources of energy and quality of the environment are developing at a high pace in the European Union in the present. For example, a 5,5 million EURO Energetically Independent Solar House has been built in Germany, at Freiburg. In all countries of the EU, an intense campaign is directed for drawing attention and education of the public on energy problems such as decrease of home and industrial consumption and economy of classical energy resources.

In order for the know-how and experience gained at the "Politehnica" University of Timisoara in the field of alternate sources of energy to be effectively applied, it is necessary to educate students and staff in solar techniques. In this way, our research in this inter- and multi-disciplinary field can be further developped, by taking advantage of oportunities provided by accessing the European Union.

Th efficiency of solar pannels varies between 30 and 50%, and it is considered good, the efficiency of photovoltaic pannels is between 9 and 24%, and it is considered satisfactory, the efficiency of thermal stocking is about 60%, the efficiency of electrical stocking is approximately 80%. The efficiency of stocking as hydrogen reaction heat is larger than 96%, and the efficiency of nanostructured cells is about 4%.

Consequently, it is necessary to create diatherman materials with very high transmittance in the visible domain, atherman materials with very high absorbtion properties on a large wavelength spectrum, insulating materials with very low thermal conductivity, selective layers, antireflection layers, semiconductor materials with efficiency of 30%, nanostructured cells with efficiency of about 12%.

The "Politehnica" University of Timisoara has built its Solar House as an energetic system in 1982-1986. The asset, built by self funding, has been designed by specialists from the Civil Engineering Faculty, and it contains two floors and underground. The best construction materials that could be found at that time have been used, in order to minimize thermal losses.

We want to create a platform of five integrated, electronically connected laboratories around the Solar House, at five faculties: Energetics, Automatics, Electronics, Architecture and Civil Engineering, and Physics. The purpose is to create, study, and measure new materials, measure solar radiation in our region, design new structures of solar architecture, find new ways of thermal and electrical stocking of solar energy, design and built home and industrial solar energy systems. We propose to introduce new subjects for license, master, and doctoral students.

These objectives can be realized by the rehabilitation of the Solar House and of its

energetic chain based on thermo-solar conversion and photo-voltaic effect, by the creation and connection of the five laboratories, and acquisition of modern equipment.
The University might have financial benefits by providing spectro-photometric measurements and customized solar design.
We can introduce now 12 new license laboratory subjects, e.g. *Solar Energy Supplied Electrolysis.* We can introduce at this moment 14 master laboratory subjects, e.g. *Study of an Integrated Thermal-Photovoltaic System.* For the PHD school we can introduce now 4 themes, e.g. *Complete Analysis of the Energy Chain in a Photovoltaic Pannel*. We have now 13 research subjects pending by lack of financement, e.g. *Creation of New, High Transmittance Materials*. We have 12 new chapters to be introduced for the master/PHD school.
The Platform facilities will be used for research, design of solar systems and buildings, publishing of books and papers in journals, organization and participation at national and international conferences and exhibitions, license, master, and doctoral schools on alternative sources of energy, public demonstrations, home and industrial solutions and design.

2. *Partnership grant for projects execution Nr.3/21039/2007, Researches concerning the elaboration and promotion for solar architectural solar solutions for PV systems integrated in buildings.*
Director: Prof.dr.eng. Traian JURCA
Finance: State Budget – Education, Research and Young Ministery, Partnership Programs in Prioritary Domains
Value: 360,000 lei
Duration: 36 months
Contractor: Trading Society for Research, Design and Equipment Production and Automatization
Partner P3: Politehnica University of Timisoara

FIELD AND GRANT DESCRIPTION
The photovoltaic system is regarded as the main electricity supply and is connected in parallel to the supply from the local grid. Energy from the solar array is consumed by the ac loads in the house, with any excess being exported to the local grid. Any shortfall in output from the array is made up by importing from the local grid. This is a fully automatic process, completely invisible to the householder. To spread the electricity requirements of the house, careful timing of the use of the electrical appliances is essential.

ACTIVITIES AND RESULTS
Installation on the rooftop photovoltaic system of a data acquisition system to measure ambient temperature, solar radiation, wind speed, and electrical power delivered to the grid. A silicon photovoltaic sensor provides the radiation measurement. Data is captured each minute and average or integrated, as appropriate, over 15-minute intervals. The amount of storage available for the minute and 15 minute data is limited to approximately two hours and two weeks, respectively.

3. CNCSIS grant No. 1, CODE 350, type A, *Title: New Methods for Dynamic Testing of High-Resolution Analog-to-Digital Converters*
Director: Assoc. Prof. Dr. Eng. Daniel Belega
Value: 30,000 RON
Members: Assist. Eng. Dughir Ciprian
Assist. Eng. Dragoi Beniamin

FIELD AND GRANT DESCRIPTION
Testing Analog-to-Digital Converters and Measuring systems based on digital signal processors.

ACTIVITIES AND RESULTS
- Presentation of a new procedure for dynamic testing of analog-to-digital converters (ADCs) by means of the three-parameter sine-fit algorithm.
- Determination of a condition for the integer part of the recorded sine wave cycles which ensures that the systematic errors due to the contribution from the image part of the sine wave spectrum are very smaller compared with the quantization noise.
- Determination of a condition for the number of samples which ensures that the influence of the quantization errors on the ADC effective number of bits estimation is negligible.
- Presentation of a new Weighted Multipoint Interpolated DFT Method for normalized frequency estimation.
- Presentation of a new Weighted Multipoint Interpolated DFT Method for estimation the amplitude of a multi-frequency signal component.
- Development of a test system for ADCs in which the ADC dynamic parameters are estimated by the proposed procedure.

4. CNCSIS grant No. 58GR/19.05.2006, Theme No. 19, Code CNCSIS 369, *Modern Techniques for Biomedical Signal Processing and Hypermedia Transmitting*
Director: Assoc.prof.dr.eng. Mihaela LASCU
Value: 10,000 RON
Members: Prof.dr.eng. Alimpie IGNEA
Prof.dr.eng. Traian JURCA
Prof.dr.eng. Aldo DE SABATA
Assist. eng. Liliana STOICA
Assist. eng. Gabriel GĂȘPĂRESC
Assist.eng. Cora IFTODE
Assist.eng. Adrian MIHAIUTI
Master student Adrian Val HAREA
Master student Marius Ady MIKLOS

FIELD AND GRANT DESCRIPTION
The purpose of the present project is biosignal acquisition, processing and modelling as well as

presenting different analysis techniques and implementing the most effective methods for information storage, sorting and display. The clinically relevant information in the signal is often hidden by noise and interference, and the signal features may not be readily comprehensible by the visual or auditory systems of a human observer. In most of the cases biomedical signal processing requires a filtering operation for noise and power-line interference removal; spectral analysis is performed to understand the frequency characteristics of the signals and while modelling is necessary for feature representation and parameterization. Computer analysis of biomedical signals has the potential to add objective strength to the interpretation of the expert. Thus it becomes possible to improve the diagnostic confidence or accuracy even for an expert with many years of experience. This approach to improved health care could be labelled as computer-aided diagnosis. The main task is biomedical signal acquisition, data base realisation and the development of algorithms for biomedical signal analysis. It is intended to setup comparative performance study regarding the different implemented methods that lead to a correct diagnosis. The project will contribute to high quality human resources (PhD's, graduating students, postgraduate students).

ACTIVITIES AND RESULTS

The research results will be disseminated by publishing books, papers and by direct contact with the interested hospitals. The main purpose is to have in future an illness diagnosis with a greater accuracy.

The project is fitting the strategy plan of Politehnica University Timisoara. The research activities will take place in the Electromagnetic Compatibility Laboratory, which is equipped with high performance measurement, acquisition and processing systems, as a result of different research projects.

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. Mircea CHIVU: *Electronic and Electric Measurements, Measuring of the Electrical and Non Electrical Quantities, Television Channels Broadcasted Via Satellite*
- 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

- Prof.dr.eng. Sever CRIŞAN: *Optical Electronics, Electrical Measurement, Sensors and Transducers*
- Assist.eng. Emil LUZAN: *Measuring of Environmental Factors, Measuring of the Electrical and Non Electrical Quantities*
- 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. Sever CRIŞAN

PhD students:

- Octavian LUCA: *Spectral analysis of bioelectrical signals*
- Ovidiu VETREŞ: *Perturbations study of low frequency electromagnetic fields*

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

PhD students:

- Liliana STOICA: *Contributions to Digital Signal Processing*
- Ciprian DUGHIR: *Contributions to anntenas calibration*
- Cristina VĂLIU: *Contributions to the nonlinearities study of high-frequency circuits*
- Cora IFTODE: *Electromagnetic field effects on living organism*
- Gabriel GĂȘPĂRESC: *Perturbation monitoring in electrical networks*
- Adrian MIHĂIUȚ: *Contributions in anntenas calibration*
- Doru Lucian COCOȘ, *Neural Networks and Fuzzy Logic applications to electronic meter calibration*
- Teodor PETRIȚA, *Contributions to radiofrequency disturbances monitoring*
- Raul Ionel: *Contributions to noise sources detection algorithms using virtual instrumentation*
- Michael Kleinkes (Germany): *Mathematical analysis of off-line programmed robots in industrial application cells monitoring*

PhD ESSAYS PRESENTED

Raul IONEL, *Imbunătățirea preciziei de localizare prin utilizarea filtrelor de albire*, 2007.

PUBLICATIONS

BOOKS

1. Ignea, A., Electromagnetic Compatibility, West Publishing House, Timișoara, 2007, ISBN: 973-36-0453-2, 400 pages (published in Romanian).
2. Lascu, M., *Advanced Techniques in LabVIEW Programming*, Politehnica Publishing House, Timișoara, 2007, ISBN 978-973-625-532-8, 310 pages (published in Romanian).

PAPERS

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