University of Craiova, ROMANIA

INCESA

Research Infrastructure in Applied Sciences

Content

INCESA
INFRASTRUCTURE OF THE FUTURE TECHNOLOGY

INCESA is a Research Infrastructure that promotes excellence in the field of applied sciences.

Our inter- and multidisciplinary team is able to deliver findings of basic and applied research to our partners and potential customers by using its own interface, INCESA Technology Transfer Center.

The state-of-the-art equipment and advanced technologies, multidisciplinary expertise, as well as the dynamism and commitment of our staff are our main strengths. Therefore, we are capable of meeting in an evolutionary manner the beneficiary demands in the field of electrical power and smart grids, electromechanical systems, mechatronics and robotics, mechanical engineering and materials science, chemical characterisation and materials testing, microtechnologies, biotechnology and bioengineering, computer science and communication infrastructures or applied mathematics..

We also show outward-looking to the next generation of creative researchers and developers by promoting Master's and doctoral students integration to our teams, and long-term training in specific know-how for our core competencies.

INCESA is an individual entity that is able to be embedded in national or international research networks. Together with our academic and business partners we can transfer our basic innovations to functional applications.

Prof. Dr. Eng. Leonardo Geo Manescu
General Manager
Email: amanescu@elth.ucv.ro
Phone: 004. 0754462726
Fax: 004.0251436447

INCESA FOR THE FUTURE

INCESA is currently one of the three largest Romanian organisations for applied research. It was designed to support the regional evolution of R&D infrastructure and activities according to the institutional strategy of the University of Craiova that will enhance:

- integration to European research networks;
- compatibility with the EU research infrastructure ;
- multidisciplinary research capacity.

The INCESA platform is focused on:

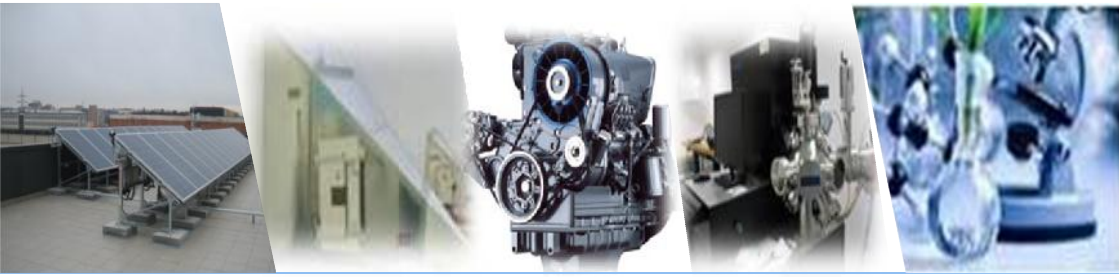
- identifying original solutions with applicative potential by new or existing SMEs, as well as by Chambers of Commerce and Industry and IRC 4D (Innovation Relay Centers);
- boosting the research appetite of companies through using consultancy and direct access to this infrastructure for their own R&D activities and resources, and convergent projects in a partnership underlying innovative approaches.

Our areas of research are geared directly to the needs of the society: energy, mobility, communication, environment, health. The quality and efficiency of the research activities will be enhanced by implementing and replicating in industry the outcomes of a successful research work.
INCESA is designed to be a community able to offer a set of productivity tools and to connect with global technology professionals.
As a pyramid research organisation it is able to:

- connect the doctoral schools with the initial and continuing cycle of training and professional development developed in our university;
- bring together international scientists for joint research activities;
- train the researchers from the business environment.

Our strength is our inter- and multidisciplinary approach. Our team of engineers, computer scientists and natural scientists develop all-round solutions, from concept development to implementation, assisted by dedicated software.
We design and optimise products, improve processes, shape technology according to the current and future industry interests and needs.

INCESA



INCESA
DRIVING THE AGENDA FORWARD

The INCESA platform aims to be a promoter of innovative solutions from a multidisciplinary perspective. This approach allows for the identification of new lines of action and new developments in relation to the business environment.

The four research centres embedding the thirteen laboratories of innovative techniques and processes within INCESA will develop research activities as follows:

- Contract-based classic research;
- Studies on strategic topics and on future-generated ones, for decision-making and correction bodies;
- Specialised consultancy for institutional beneficiaries;
- Collaborative research, within joint research entities with the beneficiaries;
- Research assistance for the beneficiaries by fully exploiting the platform logistic support and know-how;
- Research hosting carried out by employees of the beneficiaries within the Master's or doctoral programmes;
- Start-up research for firms aiming to apply the solutions, techniques and methods developed within the platform;
- Research in partnership with similar entities in Europe supported by national and/or EU research programmes.

Research Centre for Electrical Engineering

<< As part of INCESA, our centre (CEE) integrates theory and practice to incubate a culture of innovation and entrepreneurship in the electrical field, aiming to develop the critical thinkers and leaders of tomorrow. With its research team, CEE is committed to finding solutions to the challenges of clean energy and climate change through education and research. >>

Prof. Dr. Eng. Lucian Mandache
Email: lmandache@elth.ucv.ro
Phone: 004.0754562726
Fax: 004.0251436447

Centre for Electrical Engineering
Laboratory of Innovative Techniques and Processes in Complex Electromechanical Systems

Research topics

- Active Power Filter
- High energetic performance static converters
- Regenerative systems
- Induction heating systems
- Electrical traction motors
- Neuro-fuzzy control algorithms
- Optimised orientation of solar panels
- Digital motion control by DSP, MCU, FPGA
- Renewable energy sources
- Clean energy
- CAD programs
- Very high level programming language

Objectives

1. Development of theoretical and experimental research in the field of complex electromechanical systems;
2. Technology transfer to industry through partnership research and projects;
3. Enhancing access to financial resources for research through participation in national and European projects;
4. Creating the appropriate framework for the development and exploitation of research potential of Master's and doctoral students;
5. Increasing the national and international visibility of the Faculty of Electrical Engineering of the University of Craiova.

Services

Industrial research and experimental development in the field of complex electromechanical systems: active power filters; high energetic performance static converters for dedicated applications (induction heating systems, regenerative systems); electrical traction motors; high performance control algorithms; efficient storage technologies for intermittent generation units; integration and management of the clean energy sources for improving the quality and operation stability.

Research team

Laboratory Head: Alexandru Bitoleanu
17 researchers
4 doctoral students
2 technical research assistants

" Mission of the laboratory Development of scientific research in the field of complex electromechanical systems and associated control systems."

Prof. dr. Eng. Alexandru Bitoleanu
Email: alex.bitoleanu@em.ucv.ro
Phone: 0040744614486
Fax: 0040251435255

Laboratory of Innovative Techniques and Processes in Complex Electromechanical Systems

Research Facilities and Tools

Integrated DSP system for control, monitoring and diagnosis in power electronics applied to active filtering and high performance electric drives:
• Portable Industrial Computers;
• Programmable three-phase non-sinusoial voltage sources;
• Three-phase PWM Rectifiers.

System for the analysis and diagnosis of resonant and PWM converters:
• High performance industrial computers Tektronix MSO4104B-L scope;
• DSP R&D DS 1104;
• Three-phase resonant inverter.

Equipment for the determination of the loss factor, relative permittivity and resistivity of insulating liquids.

System for the study of distributed generation systems:
• Wind turbine with integrated brake unit;
• Equipment for evaluation of renewable energies potential (weather data-logger for air temperature/humidity, wind speed/direction, pyranometer);
• Industrial computers.

System for the study of electrical equipments for ecological vehicles:
• Diagnosing the defects of electrical machines;
• Study of electronic stability control ABS+ASR+EBD+ESP;
• Stand for study of electrical equipments of a car engine;
• Computerized fuel cell.

Integrated system for the validation of industrial process control algorithms:
• Complete platforms for motion control for brushless motors and induction motors;
• Integrated Development Environment with very high level programming language;
• Real-time development system programmable under Matlab;
• FPGA development system.

Hybrid system for electric power supply based on renewable:
• Polycrystalline Photovoltaic panel;
• Remote monitoring system.

Centre for Electrical Engineering
Laboratory of Innovative Techniques and Processes in Mechatronics and Robotics

Research topics

- Complex and unconventional algorithms and control systems for MRSS (fuzzy, neuronal, adaptive, robust, control in fault conditions, etc.)
- Flexible manufacturing processes
- Applications of the MRSS to specific domains (assembly tasks, medical services, person assistance, rehabilitation, etc.)
- Wheeled mobile robots navigation, path planning and control systems, collision avoidance
- Biped and multi-legged locomotion
- MRSS in automotive industry
- Telecontrol systems of the MRSS, telepresence and teleoperation
- Control systems of the robots in cooperative and coordinative tasks
- Using smart materials (ER, MR, SMA etc.) to MRSS
- Unconventional MRSS (hyper-redundant structures, modular and reconfigurable structures, biorobotics, under actuated structures, MEMS, etc.)
- Haptic and human-machine interfaces
- Smart houses
- Pattern recognition, robot vision, visual servoing
- Wearable robotics
- Virtual reality.

"Our laboratory's mission is to conduct cutting-edge research in Mechatronics and Robotics, as well as provide solutions for current and potential future needs of regional and international industries."

Robotics and Mechatronics are rapidly developing, interdisciplinary areas of engineering research dealing with the design and realisation of intelligent products, systems and processes.

The laboratory mainly undertakes basic and generic research in these areas in collaboration with the industry, other research centres and laboratories, and universities. The laboratory is very well equipped with all the advanced facilities and equipments.

Objectives

- Mechatronic or Robotic Structures and Systems (MRSS) design;
- MRSS kinematic and dynamic modelling and simulation;
- MRSS control ;
- MRSS integration in complex manufacturing systems, applications design.

The laboratory is involved in a broad array of research that includes both disciplinary and interdisciplinary work supported by a number of funding sources. The objective of research is to deterministically produce higher performance at lower costs.

Research team

Head of Laboratory
10 researchers
5 doctoral students
1 technical research assistant

Prof. Dr. Eng. Viorel Stoian –
Email: stoian@robotics.ucv.ro
Phone: 0040.251436999
Fax: 0040.251436999

Laboratory of Innovative Techniques and Processes in Mechatronics and Robotics

Research Facilities and Tools

3D design software – design, simulation, animation for a wide range of applications in mechatronics and robotics.

SCADA software and testing system – for the development and testing of SCADA applications.

Full-HD 3D display Alioscopy 42" – for real-time computer graphics, professional imaging, design and prototyping.

HMI and programmable logic controllers – for control algorithms and systems implementation.

Robot Kuka KR 6 R900 sixx Agilus with gripper and compliance system – for robotic applications design.

Computer-controlled milling machine with 3 axes and dedicated software – for achievement of designed components.

Lathe; the machine is controlled by a PC (with dedicated software) in conjunction with a control keyboard - for the achievement of designed components.

Laser engraving and cutting machine with dedicated software - for the achievement of designed components.

Digital printer for printing directly on objects with dedicated software.

Linear axes with control system – for mechatronic system design and implementation.

Laboratory of Innovative Techniques and Processes in Mechatronics and Robotics

Research Facilities and Tools

"All in one" HMI and PLC; with dedicated software - for control algorithms and systems implementation.

Dual Channel Function/Arbitrary Waveform Generator.

Head Mounted Display - Oculus Rift Developer – for virtual application testing and design.

CyberGlove Data Glove, Polhemus Fastrak, CyberGlove SDK – for hand motion analysis, hand rehabilitation.

System for high speed image acquisition with dedicated software – for image acquisition and pattern recognition.

Pneumatic components and air compressor for pneumatic actuated mechatronic structures - system design and implementation.

Measurement and control devices / systems (multimeters, oscilloscope, signal generators, power supplies, etc.).

Computers, scanner, printers.

Actuators, servo drivers.

Microcontrollers, sensors, electronic components.

Centre for Electrical Engineering
Laboratory of Innovative Techniques and Processes in SMART GRIDS

The SMART GRIDS laboratory complements the simulation studies with testing and analysis of components of power systems. The laboratory activity is supported by the most valuable specialised software library at the national level, as well as by highly-performance test equipments. This will make the power system research and education bring benefits to both university and industry.

Research topics

- Grid Side Management
- Generation and Distributed Energy Resources (DER)
- Integration of distributed generation
- Real time monitoring of the grid
- Virtual power plants
- Smart Home/Buildings
- Driving active electrical consumers
- Demand response
- Advance Metering (AM)
- Energy efficiency
- Voltage control and reactive power
- EMC (electromagnetic compatibility) tests
- PQ (Power Quality) tests and analysis
- Microgrids
- Diagnosis tools
- Big data analysis for grid management
- Electricity Market
- Analysis of technology market in the Smart Grids
- Regulation schemes
- Trading schemes
- Impact of RES integration

"The research and modelling studies in our laboratory address key issues related to energy transmission and integration of renewable energy systems to the current grid and future smart grids. The goal is cleaner, more resilient and less expensive power system operation."

Capabilities

Offline Power System Modelling, Simulation and Analysis
Static and dynamic analysis with software-based models of large T&D systems
Reliability and security assessment of power grids and distributed generation systems
Testing of DER systems

Real Time Simulation and Component Testing
Dynamic analysis of hardware & software portions of T&D systems
Power hardware-in-the-loop

Power Components Testing
Mobile testing of smart grid components
Testing and validation of grid relevant functions
Communication and dissemination

Workgroups

Power systems
Prosumers
Renewable energy sources
Smart Grid technologies
EMC & PQ LAB (ELTRES with ISO 9001 and ISO 14001)

Research services

Contract-based *classic research and Specialised consultancy*;
Research assistance for beneficiaries intending to use the platform's logistic support and know-how;
Research hosting within the laboratory carried out by employees of the beneficiaries within the Master's or doctoral programmes;
Start-up research for companies by applying the solutions, techniques and methods developed within the laboratory;
Research in partnership within national or EU research programmes with similar entities in Europe, in areas of power systems & Smart Grids.

Dr. Eng. Denisa Rusinaru
Email: drusinaru@elth.ucv.ro
Phone: 004.0754077373
Fax: 004.0251436447

Research team

Head of Laboratory
12 researchers
8 doctoral students
2 technical research assistants

Laboratory of Innovative Techniques and Processes in SMART GRIDS

Research Facilities and Tools

Software library for design, simulation and analysis of power systems – commercial and academic licenses

- ETAP 12.6.5
- PowerWorld Simulator 18
- Paladin DesignBase 5.0
- PSCAD x4
- EMTP-RV 2.6
- NEPLAN 5.5.3
- ELCAD/ Engineering Base
- SmartFlow EUROSTAG 5.1
- Matlab & Simulink 6
- LabVIEW 2014

Tools for assessment of energy system operation and efficiency

- Professional 2-points RayCAm infrared thermal vision camera CA1888
- Intelligent Fault and cables locator system vLOCPro2
- 3-phase x 3-points power analyzer system MAVOWATT 30
- Secondary circuits analyzer MI2892

Tools for prosumers evaluation

- ALLENERGY 7 energy efficient building software design
- Professional software for building energetic evaluation EnergyPro & EnergyAudit
- Fluids experimental plant with data acquisition GUNT variable speed pump 370 W
- WS-GP1 Compact Weather Station

Facilities and tools for testing and analysis of RES operation

- Experimental system for analysis of solar conversion phenomena: PV system 3.45 kW & energy storage units 12V-250 Ah & thermo solar installation 43 kW
- National norms agreed system for renewable energy units performance evaluation: remote acquisition system, power analyzers, specialized software PqVIEW PRO

EMC and Power Quality Testing

- GTEM 750 Cell
- Compact system for immunity testing, ITS 6006 Model
- Specialised software for immunity, emission and radiation test WIN6000, EMC32, GTEM3

Research Centre for Mechanical Engineering and Materials Science

<< **The Research Center for Mechanics and Material Science (RCMMS)** is a modern one, with high-tech equipments that support interdisciplinary and multidisciplinary research topics of applied mechanics and advanced material science.

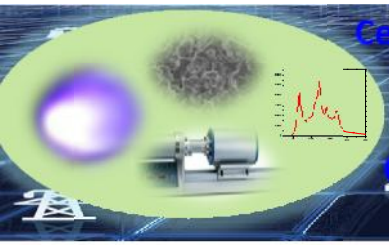
The RCMMS mission enables INCESA Research Infrastructure to take up research challenges of a broader scope and complexity than those addressed by a single investigator and to address issues that require the advantages of a larger infrastructure and interdisciplinary expertise provided by INCESA.

The RCMMS goals are:

-To conduct cutting-edge research in the applied mechanical engineering and advanced materials science domains with an interdisciplinary character;

-To use the resources provided by the research staff and high-tech equipments so as to achieve a broader impact in the areas of science, education, technology transfer, human resource development and creation of a more diverse scientific community. >>

Prof. Dr. –Eng. Nicolae DUMITRU
Email: nicolae_dtru@yahoo.com
Phone: 0040251543739
Fax: 0040251416630



Centre for Mechanical Engineering and Materials Science

Laboratory of Physical-Chemical Characterisation and Materials Testing

Research topics

- Processing of advanced materials such as thin film and nanostructures films
- Complex complementary investigation of thin films and multistructure
- Structural and morphological investigation of materials by HR-XRD, confocal Raman spectrocopy , SEM
- Investigation of thermal behaviour by dilatometry and thermal treatment under oxidative, inert and reducing atmosphere
- Electrochemical investigation of solides oxides

"Our mission is to provide high-quality research activities for a great variety of users based on our experience in synthesis, processing and characterization of advanced materials. "

Recent developments in the field of nanomaterials synthesis, functionalisation and processing fostered the dynamic development of optical, electrical and mechanical devices. In this context, the understanding of the complex relationship composition-structure-properties will enable the design of devices with the intended performance.

Our research is focused on:

- Pulsed laser deposition thin films, nanostructured films for gas and bio-sensing;
- Pulsed laser deposition of thin oxide films on various substrates investigation of chemical composition and kinetics of facial layer growth during deposition;
- Innovative ceramic materials for fuel cells;
- Hybrid materials for waste water treatment;
- Pulsed laser deposition (PLD), reactive PLD of nanostructured films for new applications in nanoelectronics, chemistry and metallurgy;
- Complex complementary investigations of thin films and multi-structures.

Research team
Head of Laboratory
3 researchers
4 doctoral students
1 technical research assistants

Prof. Dr. Cezar Spinu – Head of Laboratory
Email: spinu_cezar@yahoo.com

Lecturer Dr. Nicoleta Cioatera
Email: cioatera.nicoleta@ucv.ro

Assoc. Prof. Dr. Mariana Osiac
Email: m_osiac@yahoo.com

Laboratory of Physical-Chemical Characterisation and Materials Testing

Research Facilities and Tools

Pulsed Laser Deposition System

The research focuses on the laser processing functional materials based on thin film and nanostructures by means of PLD pulsed deposition (PLD).

The system consists of the high vacuum chamber (10^{-7} torrs) equipped with six target carrousel, high temperature heating systems and Yag:Nd laser with four harmonics 266nm, 355nm, 532mn and 1064nm.

X-Ray Diffraction System SmartLab RIGAKU

The high resolution XRD system equipped with an Anton Paar HTK 2000N high temperature chamber is featured by a great variety of optical components. This system allows for phase identification and texture analysis. ICDD PDF4/Organics and ICSD databases are available to confirm the phase identification. In addition, analysis software are available for qualitative and quantitative analysis, Rietveld analysis, reflectivity and pole figure analysis, small angle particle size distribution.

Ultra-high Resolution Scanning Electron Microscope Hitachi SU8010

Hitachi SU8010 cFE-SEM is used for high resolution Imaging (SE resolution 1.3 nm at landing voltage 1.0 V) with magnification up to 800 000X. The microscope is equipped with an Oxford EDXS unit capable to determine elements down to Be.

inVia confocal Raman microscope Renishaw

The high resolution Raman microscope equipped with two laser lines (532 nm and 785 nm, respectively) and a Leica DM2500 microscope allows line scans, area mapping and volume scans. Moreover, with Linkam CCR1000 stage, structural evolution of materials with temperature under different atmosphere can be investigated.

Horizontal Dilatometer/DTA L75 PT Linseis

It allows for the evaluation of thermal behaviour for a wide variety of samples. Measurements can be performed under vacuum, as well as under oxidizing and reducing atmospheres. The following physical properties can be determined: CTE, sintering temperature, softening point, decomposition temperature, glass transition temperature.

Centre for Mechanical Engineering and Materials Science

Laboratory of Microtechnologies

Research topics

- Medical hybrid imaging and navigation applications development
- Medical equipment and instrumentation design and prototype manufacturing
- Computational analysis of anatomical structures under normal and pathologic conditions.

"Our laboratory provides R&D services in medical engineering, from complex software application development to instruments concept design and prototype manufacturing."

Our laboratory meets the current need for interdisciplinary knowledge in clinical and medical engineering research activities: developing state-of-the-art medical software applications and bringing to life from design to prototyping of valuable ideas of new instruments.

Our expertise

- Hybrid CT/ultrasound imaging using electromagnetic navigation application development, for CAD (lung and digestive cancer diagnostic and stadialization);
- 3D blood vessels reconstruction and endovascular procedure simulation (coronary stenting, obstruction analysis, etc);
- Instrumentation design and prototype manufacturing for interventional radiology, trauma, endovascular applications;
- Complex equipment design and development including mechatronics systems and medical robotics;
- Computational modeling and simulation of tissues behaviour, prosthesis-tissues interaction, bone remodelling, blood flow in large vessels and capillaries, tissue perfusion.

Research team

Head of Laboratory
2 researchers/postdoc students
1 doctoral student

Assoc. Prof. Dr. Lucian GRUIONU
Email: lgruionu@gmail.ro
Phone: 0040721244200

Laboratory of Microtechnologies

Research Facilities and Tools

STRATASYS FORTUS 400MC

The Fortus 400mc 3D professional printer builds in 11 real thermoplastics for applications that require high-performance, biocompatibility, static dissipation or resistance to heat, chemicals or UV radiation.

VERTICAL CNC MILLING CENTER FADAL VMX 2216

The Center is used for milling or drilling of any complex part from virtually any material. The working area is: X=558mm, Y=406mm, Z=508mm, Precision: 0.005mm. Maximum rotation: 8000 rot/min.

4 AXES LASAG LASER SYSTEM

Nd:YAG laser system LASAG KLS 246 has an excellent beam quality and could be used for precision cutting, drilling and welding of small parts (up to 2mm width. This is one of the world most common lasers in medical industry for instruments or stents fabrication.

HUMAN LUNG SIMULATOR

Computer controlled lung simulator actuated by 2 servomotors for abdominal and cardiac movements. The simulator includes real size airways molded in silicone and it is used to test bronchoscopy procedures instruments.

HBM QUANTUM ACQUISITION SYSTEM

Analysis and acquisition system HBM Quantum MX840 with sensors and Catman software. This system is used for force, moments and displacements measuring and stress and strain state evaluation in mechanical assemblies.

ELECTROMAGNETIC TRACKING SYSTEM AURORA NDI V3

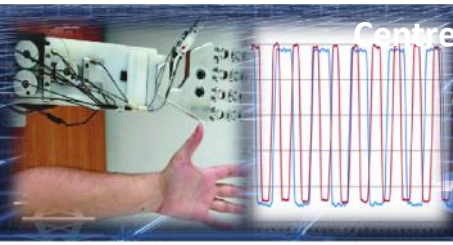
Electromagnetic tracking system Aurora NDI with 5 and 6DOF sensors that it is used to develop surgery and interventional radiology instruments.

KNEE JOINT SIMULATOR

5DOF Human Knee Joint Simulator that could be used to acquire reaction forces, contact pressure or strain for a normal or prosthetic joint. This simulator was developed in 2008 during one of our research grants.

R&D SOFTWARE

ANSYS
SOLIDWORKS
MATLAB
CIMATRON



Centre for Mechanical Engineering and Materials Science

Laboratory of Biomechanics

Research topics

- biomechanics
- biomedical engineering
- rehabilitation systems
- exoskeletons
- human gait
- ortothics & prostetics
- nonlinear dynamics of the human movement
- chaos theory applied in human biomechanics
- robotics

<<Our laboratory conducts research in the field of biomechanics, biomedical engineering, rehabilitation systems, orthotics and prosthetics, exoskeletons, robotics.">>

Objectives

- Human gait motion rehabilitation;
- Prosthetics optimisation;
- Improvement of human biomechanics;
- Design and optimisation of systems for human movement rehabilitation;
- Innovative solutions for prosthetics and orthotics.

Partners

- University of Medicine of Craiova
- Emergency Hospital Craiova.

Interdisciplinarity

- Medical sciences
- Orthopedics
- Rehabilitation
- Advanced materials
- Mechatronics
- Robotics
- Sport sciences
- CAD, FEA
- Rapid prototyping
- Mechanical systems optimisation

Research team

Head of Laboratory
2 researchers
3 doctoral students
1 technical research assistant

Prof. Dr. Eng. Daniela TARNITA
Email: tarnita.daniela@ucv.ro
Phone: 0722292228

Laboratory of Biomechanics

Research Facilities and Tools

Equipment for 3D complex analysis of human movement
Used for the kinematic and dynamic analysis of human movement, and for human vibrations analysis.

MSC. Adams Software
Used for dynamics of multibody systems, optimisation, deformable kinematic chains

System for the capture and analysis of human movement used for human biomechanics and for mechanical systems movements

Centre for Mechanical Engineeering and Materials Science

Laboratory of Advanced Engineering in Automotive and Transportation

Research topics

- Testing of road vehicles parameters under laboratory and traffic conditions
- Research of the urban traffic
- Development of technologies of transportation and traffic

*" **D**evelopment of experiments and scientific studies, applications and technologies for the: determination of the interdependences of the dynamic and energetic parameters of road vehicles at the urban level, road traffic management; modelling and simulation of the regimes of internal combustion engines of vehicles; experimental investigation of energetic and ecologic performance of engines; studies of public transportation and active and passive safety."*

The laboratory is intended to develop innovative products and technologies for transportation and automotive manufacturing.

Objectives

- study of engines at partial and full loads;
- studies of the interdependence between dynamic and energetic parameters of vehicles at the urban level;
- development of technologies for ecological vehicles;
- functional optimisation of vehicles and road traffic;
- biofuels study and implementation to internal combustion engines;
- analysis of pollutant emissions for different blends of biofuels;
- fuel consumption analysis and traffic management based on GPS technologies;
- research on the dynamic performance specific to hybrid vehicles;
- research on risks and vulnerability in road transport;
- research on intelligent transport systems;

Research team

Head of Laboratory
5 researchers
1 doctoral students
1 technical research assistant

Assoc. Prof. Dr. Eng. Ilie Dumitru
Email: dumitru_ilie@yahoo.com
Phone: 0040 745377391
Fax: 0040 251416630

Laboratory of Advanced Engineering in Automotive and Transportation

Research Facilities and Tools

Engine Deutz 4fl 912

Used for testing different biofuels, fuel consumption, partial and full loads of the engine, pollutant emissions, noise and vibration.

Gear wheel flowmeter

The flow meter measures the flow of fuel which enters in the engine.

HLD Multifunctional balance

DEWE-101 Miniatur Automotive Analyzer

In-vehicle measurements top applications: NVH, Noise and Vibration, Vehicle dynamics, Drivability tests, Brake tests, Ride comfort tests, Road load testing, Motorcycle test, NASCAR development, Fork-lift and small vehicle test.

RT 2 universal tachometer

Used for measuring the engine speed

Temperature sensor type K

Used for air temperature measurement coupled with system DEWE-101 Miniatur Automotive Analyzer

MSI-BR-TH-K connection signal adapter for heat-resistant

Automatic adapter detection by TE (Transducer Electronic)

ATAL AT 505 gas analyzer

Used for measuring and recording pollutant emission data of the studied vehicle

Mixtra traffic analyses

16 inductive loops and 2 pneumatic valves for traffic analysis - Counting on loops: simple flow and occupation rate; mean speed; speed, lengths, inter-vehicle distance and times on 15 classes; shape classification into 15 categories using standard 2 loops and discrimination LGV/HGV with one more single loop.

Portable traffic analyzer

Portable traffic analyzer design for the accurate count, speed and classification data , using Vehicle Magnetic Imaging (VMI)

Virtual vehicle counting

PTV Planning & Simulation

The PTV Planning & Simulation package contains the following software for

transport planning, traffic engineering and traffic simulation: PTV Visum and PTV Vissim.

Research Centre for Biotechnology and Bioengineering

“The Research Centre for Biotechnology and Bioengineering aims to be a catalyst for advancing biotechnology and bioengineering research and innovation through industry collaborations and partnerships.”

Prof. Dr. SUZANA DANOIU
Email: suzanadanoiu@yahoo.com
Phone: 0040721217452
Fax: 0040251422743

Centre for Biotechnology and Bioengineering
Laboratory of Innovative Techniques and Processes in Bioengineering

Research topics

- **Health**
- **Biomechanics**
- **Neuromuscular assessment**

Objectives

▪Assessment methods for the evaluation the muscle function, integration of nervous system in human motion performance;

▪ Development of research in field of health and application of the biomechanical and neuromuscular assessment in the design of neurorehabilitation, physical therapy and development human physical performance.

Services

The movement analysis, neuromuscular assessment (EMG, Tensiomyography), balance assessment, gait analysis, protocols for rehabilitation in orthopedic and neurologic disorders, design of orthotic and prosthetic devices.

Approaches

▪ Protocols for the design of algorithm of evaluation of human body movement, and fulfillment of the goals of rehabilitation or training.

Partners

▪ Hospitals, rehabilitation units, fitness centres, athletes, companies working in field of orthotic and prosthetic devices manufacturing.

Interdisciplinarity

▪ Engineering (mechanical engineering, robotics, mechatronics), agriculture - food security, sport science.

"Our laboratory is the adequate environment to examine the application of the methods for neuromuscular and biomechanical assessment of health to increase human performance."

Prof. Dr. Ligia Rusu
Email: rusuligia@ucv.ro;
ligiarusu@hotmail.com
Phone: 0040 723867738
Fax: 0040 251422743

Research team

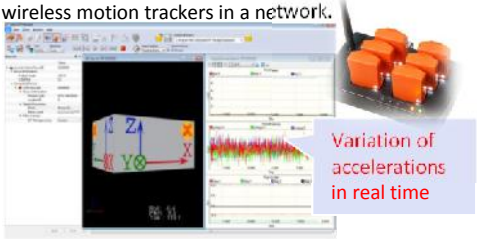
Head of Laboratory
8 researchers
10 doctoral students
1 technical research assistant

Laboratory of Innovative Techniques and Processes in Bioengineering

Research Facilities and Tools

X Sens MTw™

The X Sens MTw™ is a miniature wireless inertial measurement unit incorporating 3D accelerometers, gyroscopes, magnetometers (3D compass), and a barometer (pressure sensor). The MTw provides real-time 3D orientation for 7 wireless motion trackers in a network.

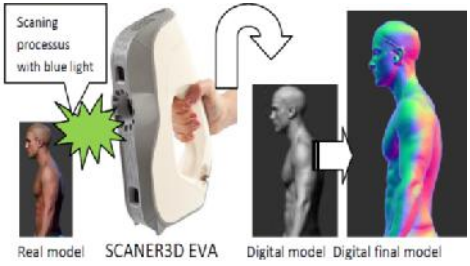


Fields of use

- Sports and exercise science
- Biomechanics, Rehabilitation
- Ergonomics, Animation
- Virtual reality , Motion capture

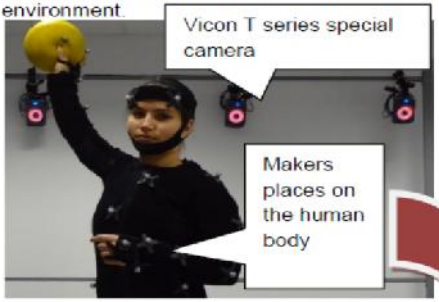
Artec™ Eva 3D Scanner

Artec™ Eva 3D Scanner is similar to a video camera which captures in 3D with up to 16 frames per second. These frames are aligned automatically in real-time and do not require markers or research, industries and animation. calibration. It captures objects quickly in high resolution and textured models. Artec Eva 3D scanner is the ideal choice for medical and biomechanical investigations.

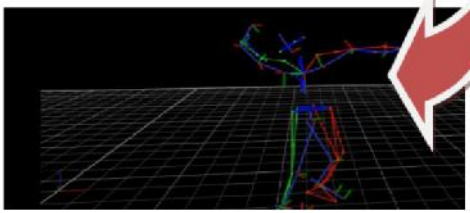


Vicon system

The Vicon is a system design to capture the movement of subjects in a laboratory, in a studio or in their real environment.

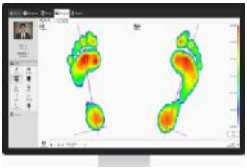


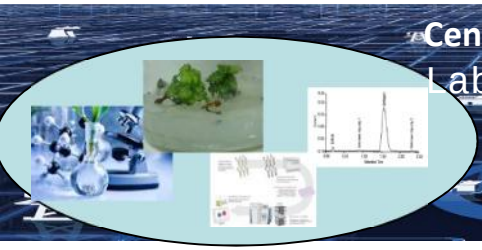
Nexus 2, Vicon's data capture software, transforms the real movement into a virtual model special developed for analisys in biomechanics.



Tensiomyograph-system for neuromuscular assessment of muscle fatigue, muscle fiber type composition, muscle balance, monitoring the rehabilitation programmes.

RSScan force plate provides professional yet affordable solutions for accurate dynamic pressure measurements for biomechanical research labs, clinics, sports and leisure footwear shops and many more applications.





Centre for Biotechnology and Bioengineering
Laboratory of Innovative Techniques and Processes in Biotechnology

Research topics

- The influence of parameters of water, soil and applied technology on productivity and quality of food products.
- Monitoring of water quality and soil by GIS and GPS photogrammetric technologies.
- Research on identification, quantification and capitalisation of bioactive compounds from raw materials of plant and animal origin.
- Monitoring of equipment for processing and storing of food products..

"Our laboratory provides research services for the Romanian business environment in order to increase competitiveness in agricultural and food biotechnologies, as well as in environmental protection. "

The Laboratory of Innovative Technique and Processes in Biotechnology aims to capitalise on the existing expertise in the field at the University of Craiova, to create a learning environment for young people through research, and provide research services for the business environment in food and agricultural biotechnology. The research topics addressed are diverse and fall within international thematic areas: agriculture and food security, climate change, biodiversity preservation, infrared thermovision evaluation monitoring the processes for food produce storage and processing.

Research in **Laboratory of innovative techniques and processes in biotechnologies** aims at developing a system of national and international partnerships, which will address topics of interdisciplinary research, and foster participation in European research competitions.

Research team
Head of Laboratory
10 researchers
7 doctoral students
3 technical research assistants

Assoc.Prof. Dr. Habil. Sina Niculina Cosmulescu
Email: cosmulescu.sina@ucv.ro;
sinacosmulescu@hotmail.com
Phone: 0040251414541
Fax: 0040251414541

Laboratory of Innovative Techniques and Processes in Biotechnology

Research Facilities and Tools

The UltiMate 3000 / Q-Exactive (Thermo Fisher Scientific) is a UltraHigh Performance Liquid Chromatograph coupled with a High Resolution and Accurate Mass mass spectrometer (U-HPLC/HRAM MS) allowing for advanced studies of biological samples with applications in proteomics, metabolomics, lipidomics, biomarkers discovery etc., as well as wide applicability in small molecules analysis (one step identification, quantitation and confirmation) of carbohydrates, aminoacids, etc., and contaminants: pesticides, micotoxins, bio-toxins, etc.

Spectroscopy (UV-Vis; NIR Bruker, FT-IR Bruker) for spectra analysis of simple and complexes organic agricultural and food products. The equipment for UV-VIS Spectroscopy is PG Instruments T92+ type and a high performance double beam spectrophotometer with a variable spectral bandwidth from 0.1-5nm coupled with an efficient and well proven electronic control system ensures high stability and low background noise.

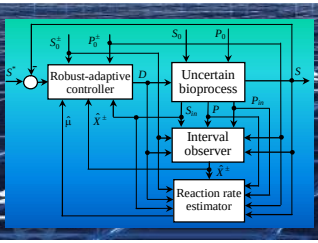
Total Carbon Analyzer - TOC cube is fully automatic with a very high sample throughput and low operational costs. Simultaneous TOC and total bound nitrogen (TN_b) determinations may be performed on all types of samples including drinking water, industrial wastes and suspensions of solids even in difficult matrices. TOC select operates in full compliance with all relevant national and international norms or standards like ISO 8245, 10694, EPA 415.1, European standard acc. to EN 1484, ENV 12260.

The Supercritical Fluid Extraction Helix System by Applied Separations (U.S.A.). The **Helix** is a laboratory supercritical fluid process development unit specially engineered by Applied Separations for maximum flexibility. The modular Helix is optimised, so the system can easily be modified for changing process development needs. This equipment can be used for research regarding the effects of applied big pressure and low temperature in food technologies and for for separation-concentration of bioactive compounds.

TRIMBLE S6 DR PLUS total station is a robotic total station with a GPS Trimble R10 integrated, provides the power and flexibility required by today's Surveying Professionals. The other instuments used are: **prercision digital level**, **portable GPS**, **distomat**, **digital planimeter**, will facilitate the development and use of a cadastral network positioned in territory.

GC System Thermo-Sceintific with Head Space for flavors and volatile. Headspace GC is used for the analysis of volatile and semi-volatile organics in solid, liquid and gas samples. Other common applications include laboratory analyses.

Infrared Thermovision System, consists in: **I**nfrared Camera SC 5210M (InSb detector type; 2.5 to 5µm waveband; resolution 320 x 256 pixels; NETD <25 mK); Infrared Camera FLIR US 440T (FPA uncooled microbolometer detector type; 7.5 to 13µm spectral range; resolution 324x256pixels; N.E.T.D < 0.045°C). *Main goal.* Infrared thermovision evaluation of materials and processes.



Centre for Biotechnology and Bioengineering

Laboratory of Modelling, Identification and Control of Biochemical and Biotechnologies Processes

Research topics

- bioprocess modeling
- off-line identification
- on-line estimation
- bioprocess control (non-linear)
- bioprocess control (adaptive)
- bioprocess control (hybrid)
- data acquisition
- real-time monitoring

"The main research goal within the laboratory is to design advanced procedures for modelling, identification and non-linear control of biological, biochemical and biotechnological processes, including related areas."

The improvement of performance in significant areas such as bioindustry, medicine and wastewater treatment can be done by using modern monitoring and control methods. The bioprocesses are complex systems, characterised by non-linearities, delays, uncertainties and lack of cheap and reliable sensors. The modelling, identification and control of such processes can be achieved by using interdisciplinary approaches (control systems, biochemistry, mathematics, informatics).

Objectives

- Systematic methodologies for developing various models of biochemical and biotechnological processes;
- Model properties analysis and the role of these properties in estimation and control;
- Development of novel identification and estimation methods for state and parameters of bioprocesses;
- Design of advanced non-linear control strategies for some classes of bioprocesses.

The applicability of the developed research can be extended to other related areas.

Traditional partners

"Politehnica" University of Timişoara, "Dunărea de Jos" University of Galaţi, Calafat Mill MC, Department of Automatic Control - Supelec, France.

Research team

Head of Laboratory
5 researchers
3 doctoral students
2 technical research assistants

Prof. Dr. Eng. Emil Petre
Email: epetre@automation.ucv.ro
Phone: 0040.251.438198
Fax: 0040.251.438198

Laboratory of Modelling, Identification and Control of Biochemical and Biotechnological Processes

Research Facilities and Tools

Brunswick's BioFlo®/CelliGen® 115

The New Brunswick's BioFlo/Celli Gen® (Eppendorf) is a benchtop bioreactor, designed to provide the versatility to grow a wide variety of cells. It can be used for biotechnology, pharmaceuticals, biofuels, R&D, testing labs, etc.

- The system is pre-programmed with both fermentation and cell culture operating modes.
- Grow virtually any cell type: aerobic or anaerobic; microbes, yeast, insect, plant and mammalian cells.
- The compact control station includes everything needed for process control: color touchscreen interface, three built-in pumps, gas flow controllers for up to four gasses (air/O2/N2/CO2), foam/level sensors, pH/DO controllers, etc.

CAN interface module plus simulation, implementation and testing software

The equipment and the software allow the simulation, implementation and testing of CAN communication with Matlab/Simulink/State flow compatibility.

- It can be accessed from Matlab®/Simulink in a standard library form.
- It allows the simultaneous use of multiple CAN databases.

QNET HVAC and QNET DC Motor Control Trainers

Both tools provided by Quanser and National Instruments are useful for control teaching and research.

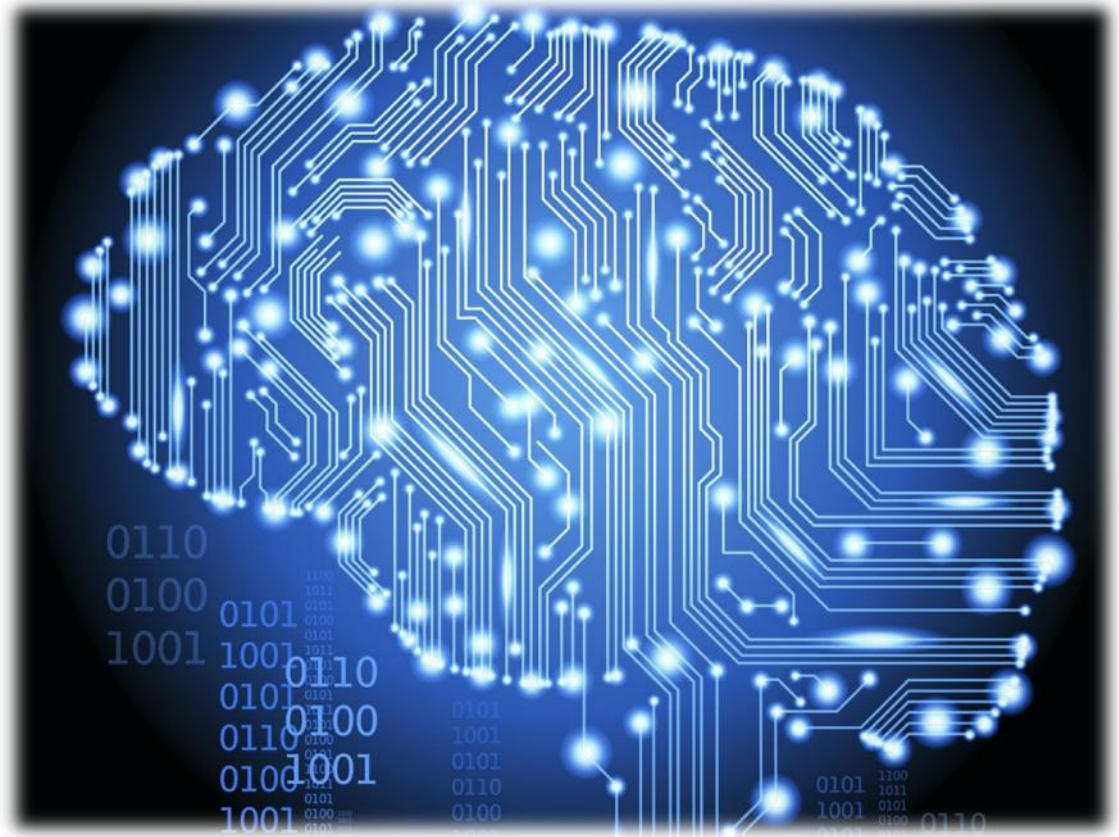
- QNET Heating, Ventilation and Air Conditioning Trainer for NI ELVIS platform is used for research in the field of fluid dynamics and thermodynamics control.
- QNET DC Motor Control Trainer for NI ELVIS platform is a versatile unit useful motor servo control.

Experimental platform for data acquisition and control

The platform is suited to manage advanced control concepts and theories relevant to real world applications.

- Useful for develop feedback laws to control position and speed for linear cart systems.
- Allows the implementation the controllers on the actual system and evaluate its performance.

Research Centre for Computer Science



<< Provide and promote an advance and interdisciplinary research framework by the optimal exploitation of centre's resources and by development of collaborations with other researchers and with the industry in order to fulfill our mission. >>

Senior Lecturer Dr. Eng. Gabriel Stoian
Email: gstoian@ucv.ro
Phone: 0040
Fax: 0040

Centre for Computer Science
Laboratory of Formal Intelligence
Integration in Analysis, Simulation, Development, Testing, and Certification of Computation Infrastructures

Research topics

- Analytical characterisation of the behaviour of communications network traffic
- Identification of IT attacks based on traffic characteristics
- Determining the intrinsic characteristics of the carried information (correlation, coherency, consistency, etc.)
- Design of formal methods for automatic testing of protocol implementation compliance
- Use of intelligent agents in testing, diagnosis and certification of communications networks
- Exploiting the advantages of mobile agents systems (cooperation, mobility, negotiation) in solving communication issues: web applications reliability, modelling of collective customer behaviour
- IoT callenges: connectivity, security, complexity, adaptability, precision in terms of latency and determinism, scalability, maintenance, updates, and cloud services.

<< We seek to identify innovative and intelligent solutions to solve specific challenges of communication networks. >>

Objectives

- Establishing analysis methodologies in order to facilitate diagnosis of capacities;
- Design of metrics used to measure the performances of a service or a services bundle;
- Solving communication network challenges by the development of mobile agents systems;
- Improvement of the communication network defense capacity.

Services (for third parties)

- Testing and validation of network devices;
- Testing and performance measurements of network infrastructures;
- Optimisation of communication infrastructures;
- Modelling and simulation.

Partners

- Ixia Romania

Interdisciplinarity

- Industry applications of sensors networks;
- Applications for the optimisation of power distribution systems.

Research team
Head of Laboratory
20 researchers
4 doctoral students

Senior Lecturer Dr. Claudiu Ionut Popirlan
Email: popirlan@ucv.ro
Phone: 0040
Fax: 0040

Laboratory for Formal Intelligence Integration in Analysis, Simulation, Development, Testing, and Certification of Computation Infrastructures

Research Facilities and Tools

Ixia IxLoad

General
- Seeks test objective goals automatically, including concurrent connections, connection rate, simulated users, and throughput
- Real-world network configurations, including multiple sub-networks, unique MAC addresses, 802.1q, 802.1p, and emulated router support

Troubleshooting and analysis
- Real-time packet captures with filtering and ladder diagrams analysis
- Network diagnostics of network-layer statistics in real-time for complete insight into test operation, allowing debugging and troubleshooting of complex network configurations

VoIP
- SIP user agent, trunk and server emulation, multiple Audio CODEC supported
- Real time Quality of Voice analysis using E-Model or PESQ

IPTV, Over The Top (OTT) Video
- Emulate broadcast TV and video on demand (VOD) subscriber traffic
- Support for IGMP, MLD and multicast server source
- Perform real-time video quality analysis performed on all streams to calculate perceptual MOS on hundreds of streams

Storage
- Comprehensive NAS/SAN protocol emulation, including SMB, NFS, iSCSI, and DCBx

Wireless core
- Supports 3GPP UMTS Gn interfaces

Ixia IxVeriWave

L1-7 802.11ac testing
•Used by Wi-Fi chipset, access point (AP), wireless LAN (WLAN) controller manufacturers, service providers, and enterprises worldwide

Large-scale testing of wireless LAN
•Highly realistic client and application traffic generation enables testing of BYOD, DPI, and policy engines at scale

Comprehensive testing of Wi-Fi-enabled devices
•Performance: End-user QoE by application: voice, video, unified communications (UC), specialized (medical, retail, financial)

Ixia IxChariot

Pre-Deployment and Live Network and Application Assessment Tool
•Run Endpoints Anywhere – LAN, Cloud, Public
•Performance Endpoints run on "Everything"
•Centrally Manage Endpoints
•Assess Performance of NFV/Virtual *Infrastructure*
•Securely Access and Run Tests from Any *Browser*
•Application Emulation
•Voice over IP Call Emulation and Quality Assessment
•Interactive Real-Time Statistics
•100% Software Performance Endpoints

Centre for Computer Science
Laboratory of Computer Engineering

Research topics

- Intelligent Distributed Systems
- Multimedia Applications
- High Performance Computing

The aim of the Computer Engineering laboratory is to ensure a high performance infrastructure for the activities carried out by the research groups of the Computer and Information Technology Department of the Faculty of Automation, Computers and Electronics, University of Craiova.

Our objective is to contribute to the advancement of theoretical foundations, principles and technologies within computer engineering, as well as to more pragmatic issues concerning their everyday applications by developing real systems and solving real-world problems.

The research activities are mainly focused on Intelligent Distributed Systems, Multimedia applications, and High Performance Computing.

Research team
Head of Laboratory
30 researchers
8 doctoral students

Assoc. Prof. Dr. –Eng. Dan Mancas
Email: dmancas@dcti.ucv.ro
Phone: 0040 726260000
Fax: 0040 251435666

Laboratory of

Computer Engineering

Research Facilities and Tools

Servers Dell PowerEdge R720

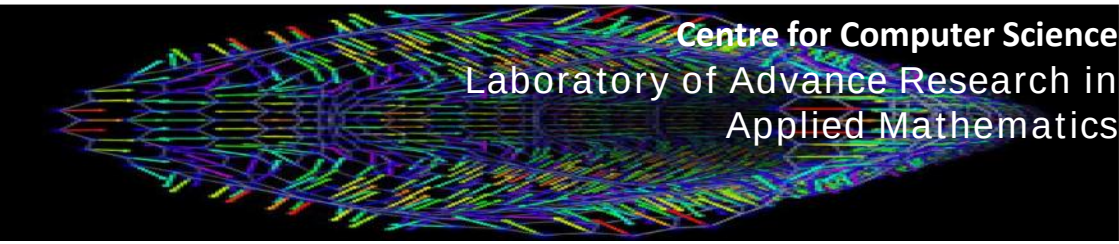
- 2 x Intel Xeon E5-2690, 2.90GHz, 20M Cache, 8.0GT/s QPI, Turbo, 8C, 135W, Max Mem 1600MHz
- 256GB RAM, DIMM min 1600 MHz RDIMMS
- 16x1.2TB HDD, 10K RPM, SAS 6Gbps, 2.5in Hot-plug Hard Drive
- RAID H710p, RAID5, 3-16 HDDs
- Integrated RAID Controller, 1GB NV
- Network interfaces Broadcom 5720 QP 1Gb Network Daughter Card
- Adaptor de retea Add-in: Broadcom 5719 QP 1Gb Card
- Window s Server® 2012,Standard Ed

Blade Servers Dell Power Edge M620

- 2 x Intel Xenon E5-2670, 2.6 GHz, 8 cores
- 32 GB RAM RDIMM 1600 MHz
- RAID controller, 6 Gbps, NV cache
- Hot Plug disks support
- Network interfaces: quad port 1 Gbps + dual port 10 Gbps
- Operating system: Windows Server 2012 R2

Smart IC Card Reader/Writer

- 5-7 cm Proximity Sensor Distance Reader
- Low frequency 125/134.2 kHz
- Connectivity: USB, RS232
- Supporting various operating systems



Centre for Computer Science
Laboratory of Advance Research in Applied Mathematics

Research topics

- Applications of the theory of categories in the study of algebras of fuzzy logi
- Nonsupersingular elliptic curves subspaces study with applications on Digital Declaration
- Nonlinearities on elliptic curves with application in cryptanalysis
- Nonlinear models on encoding systems

Research approaches

- Dynamics and bifurcation in dynamic systems with applications in economy and biology;
- Optimisation of projection algorithms used for data analysis;
- Parallelisation techniques applied for optimised iterative methods;
- Fuzzy models with applications in reasoning and pattern recognition;
- Nonlinear analysis with applications in mechanical engineering;
- Calculus of variations with applications in non-smooth mechanics;
- Applications of convex analysis in elasticity;
- Optimisation problems in convex analysis;
- Controllability and stability properties of partial differential equations;
- Optimal and approximate control of finite-difference approximation schemes for partial differential equations.

Research team

Head of Laboratory
10 researchers
8 doctoral students
2 technical research assistants

Prof. Dr. Dumitru Busneag
Email: busneag@central.ucv.ro
Phone: 0040 730118668
Fax: 0040 351403142

CONTACT

INCESA Research Infrastructure for Applied Sciences
107, Decebal Bld.
200440-RO, Craiova, ROMANIA
Phone 0040251414548
Fax 0040251414549
www.incesa.ro

Contact for business
Prof. Dr. Eng. Leonardo Geo MANESCU (General Manager)
Email: leman78@hotmail.fr
Phone: 004.0754462726