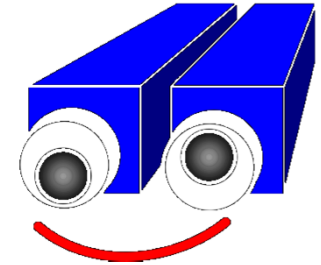




Image Processing and Pattern Recognition Research Group



Prof. Sergiu Nedevschi, PhD EE

Head of the Group,

Technical University of Cluj-Napoca

Faculty of Automation and Computer
Science

Computer Science Department

28 Memorandumului str. RO-400114 Cluj-
Napoca, ROMANIA

Tel: (+40 264) 202 395 ; 401 456; 401 457

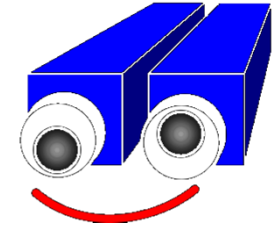
Fax: (+40 264) 594 491

[E-mail: Sergiu.Nedevschi@cs.utcluj.ro](mailto:Sergiu.Nedevschi@cs.utcluj.ro)

www.cv.utcluj.ro

- **Staff:**
 - **8 senior researchers**
 - **10 PhD students**
- **Research activity:**
 - **more than 30 national and international research projects (10 projects in the field of medical image analysis)**
- **Research facilities:**
 - **3 laboratories with hardware and software for image acquisition and processing**

Area of expertise



- **Image acquisition systems:** setting up imaging solutions, cameras synchronization, adaptation to lighting conditions.
- **Stereovision and 3D reconstruction**
- **Motion estimation and analysis:** dense & accurate optical flow computation for real life scenarios.
- **Color, grayscale and 3D image processing:** filtering, analysis and image noise removal, feature extraction, textural analysis, segmentation.
- **Object detection, classification and tracking.**
- **Real-time computer vision.**
- **Medical image analysis:** use of texture analysis, probabilistic segmentation methods, and machine learning solutions for automatic or computer assisted diagnosis.

Relevant research projects in the field of medical image analysis



SONOFIBROCAST - "A stage diagnosis and prediction algorithm of the liver fibrosis evolution using non invasive ultrasound techniques, optimized by stochastic analysis and image processing", Joint Applied Research Project, financed by the Romanian Authority for Scientific Research, Contract 41-071/2007 (2007-2010)

<http://www.granturi.umfcluj.ro/sonofibrocast/rezumat.html>

Texture based diffuse illness investigation in ultrasound imaging:

<http://www.cv.utcluj.ro/tdii.html>

SIDEF - "Intelligent System for the Noninvasive Detection and Evaluation of Liver Fibrosis, Restructuration and Dysplastic Nodules, Using 2d/3D Ultrasound and Molecular Markers", national research grant financed by Romanian Ministry of Research , Program CEEEX no. 71/2006 (2006 - 2008)

FINALISM – "Non-alcoholic fatty liver, viral C hepatitis and gallstone disease – components of the metabolic syndrome. Clinical epidemiology, pathogenesis, non-invasive diagnosis", national research grant financed by Romanian Ministry of Research , Program CEEEX no. 94/2006 (2006 - 2008)

Relevant research projects in the field of medical image analysis

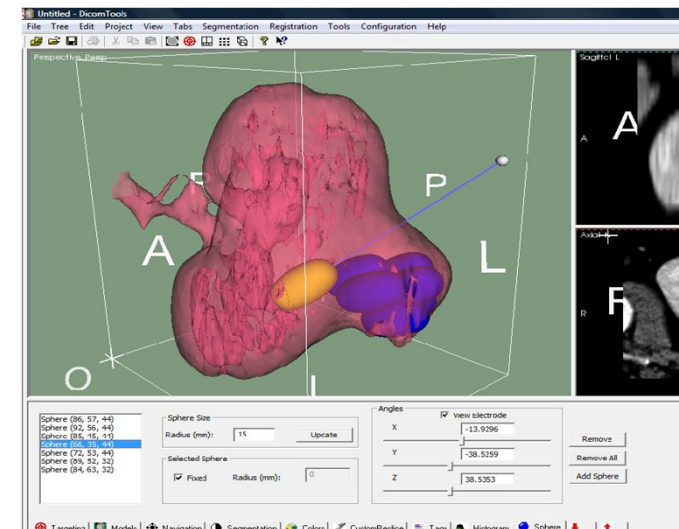
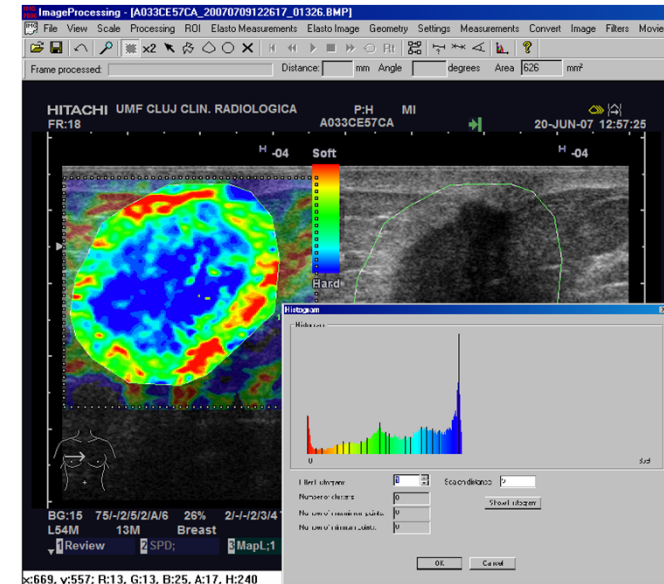


ElastoBreast – “Qualitative and Quantitative Study of Ultrasonic Elastography and of Native Three-dimensional Angioultrasonography in Detection, Diagnosis and Monitoring of Breast Cancer with Noninvasive Techniques”, national research grant financed by Romanian Ministry of Research , Program CEEEX, no. 149/2006

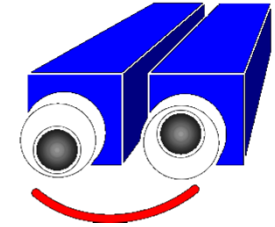
http://www.granturi.umfcluj.ro/elastobreast/elastobreast_eng.html

CRIOLAPSIM - “Laparoscopic criosurgical treatment of the renal tumors, individualized using simulation on three-dimensional reconstructed model ”, national research grant financed by Romanian Ministry of Research , Program CEEEX, no. 121/2006.

[link](#)



Relevant research projects in the field of medical image analysis



INTELPRO - "Intelligent System for assisting the therapeutical decision at patients with prostate cancer", national research grant financed by Romanian Ministry of Research , Program CEEEX, no. 18/2005 (2005 - 2008)

<http://www.cv.utcluj.ro/intelpro.html>

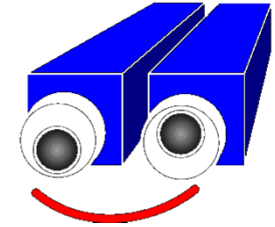
TELEHEPASCAN - "Telemedicine Network for Ultrasound Screening and Monitoring of Hepatocellular Carcinoma ", national research grant financed by Romanian Ministry of Research , Program CEEEX, no. 3/2005 (2005 - 2008)

http://www.automation.ro/telehepascan/index_eng.php

DICOM "Distributed system for medical image acquisition processing, storing and retrieval in hospital environment, compliant with the DICOM Standard" - national research grant financed by Romanian Ministry of Research (2001-2004)

<http://www.cv.utcluj.ro/dicom.html>

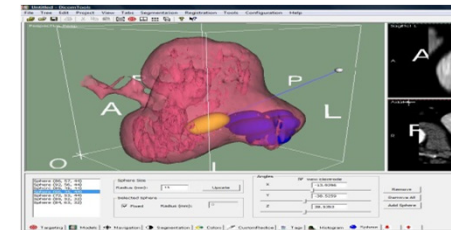
Significant results



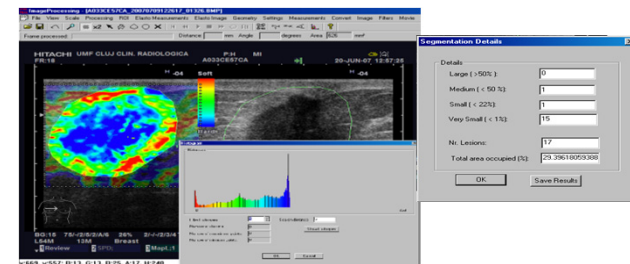
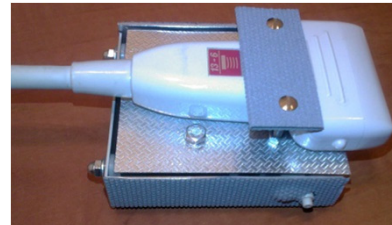
Products and technologies

Medical diagnosis assistance system based on ultrasonic image texture analysis, for detection of diffuse diseases, malign and benign liver tumours, prostate cancer

Cryoablation simulating software on individualized, 3D, reconstructed model



Electromecanic device for controlled induction of vibrations for US elastography and software for elastographic image processing



Publications

<http://www.cv.utcluj.ro/publications.html>



Department Basis of Electronics Faculty of Electronics and Telecommunications

Senior lecturer. dr. ing. Ramona Galatus

ramona.galatus@bel.utcluj.ro

- Optical waveguides and optical fiber communication based applications

- Design
- Implementation

Selected bibliography:

1. Modelling of the Bragg gratings fabricated on Er³⁺-doped Ti:LiNbO₃ optical waveguides
<http://proceedings.spiedigitallibrary.org/proceeding.aspx?articleid=823505>
2. Evaluation of the attenuation and the optical coupling between optical fibers and waveguides
<http://proceedings.spiedigitallibrary.org/proceeding.aspx?articleid=1321095>
3. Theoretical Study of the Statistical Properties of Single- and Double-Pass *M*-Mode Er³⁺-Ti:LiNbO₃ Straight Waveguide Amplifiers
<http://www.tandfonline.com/doi/full/10.1080/01468030802267013#.UqYVucavwA>

- Optical sensors

- Design: microring sensor (codopedEr/Yt), SPR sensor, bending sensors
- Implementation: optical fiber SPR sensor

Selected bibliography:

1. Detection of trinitrotoluene based on SPR in molecularly imprinted polymer on plastic optical fiber
<http://proceedings.spiedigitallibrary.org/proceeding.aspx?articleid=1690528>
2. Sensors based on surface plasmon resonance in a plastic optical fiber for the detection of trinitrotoluene
<http://www.sciencedirect.com/science/article/pii/S0925400513008022>
3. Performance Comparison of Two Sensors Based on Surface Plasmon Resonance in a Plastic Optical Fiber
<http://www.mdpi.com/1424-8220/13/1/721>
4. A Simple Optical Sensor Based Approach for Early Stage Dry Eye Symptoms Detection
<http://www.multidisciplinarywulfenia.org/auto/index.php/archive/part/20/9/1/?currentVol=2¤tIssue=9>
5. Highly Yb/Er-codoped phosphate glass add-drop filter
<http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=6419761>

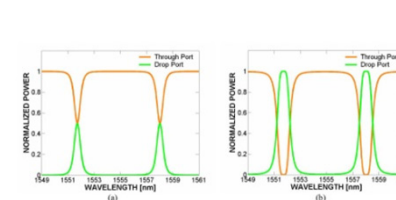


Fig 1. Microrings array – filter and sensor

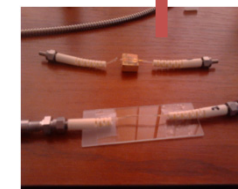
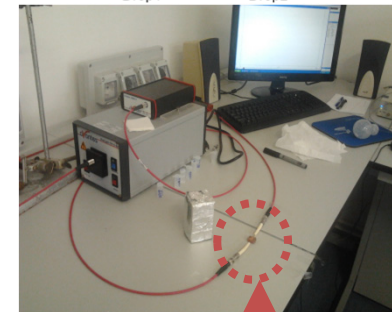
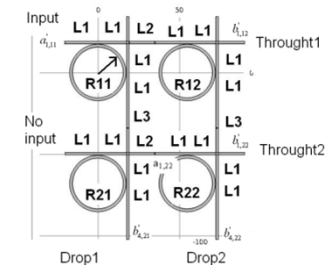


Fig 3. Setup for low-cost SPR

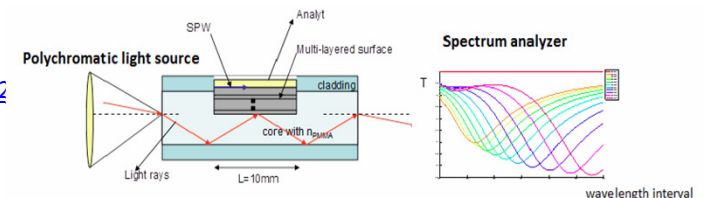
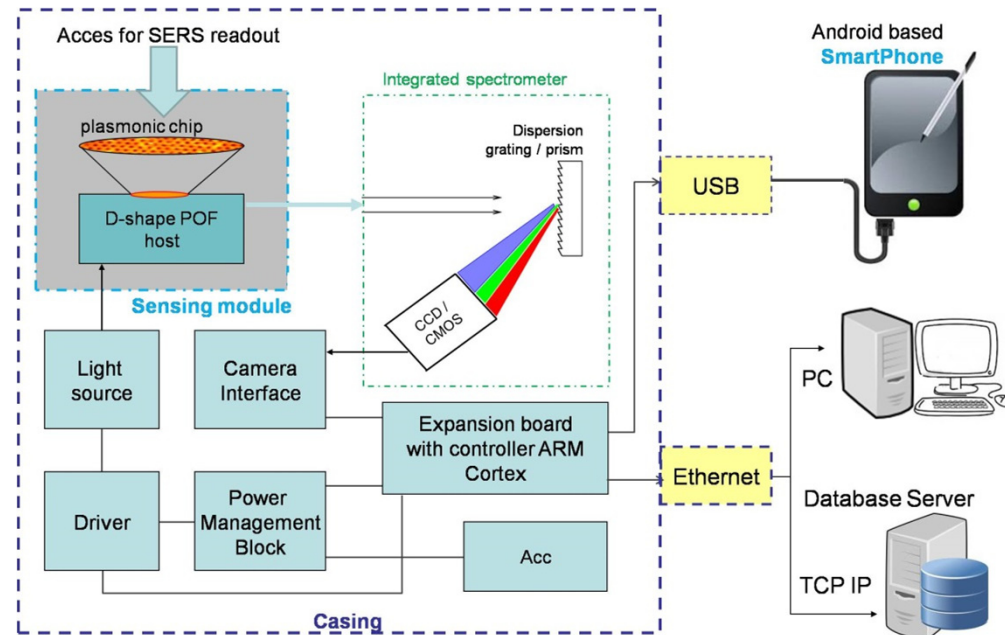


Fig 2. SPR sensor based on POF



Aimed/envisaged applications – embedded sensors



Experience in other topics :

- Biostatistics
 - Statistic tests
 - Survival analysisSelected bibliography:
- Database design
- Image processing algorithms:
 - Feature extraction algorithms and
 - Statistic classification algorithms



Department of Automation Faculty of Automation and Computer Science

Prof. dr. Daniel Moga

Daniel.moga@aut.utcluj.ro

Phone:+40726362327

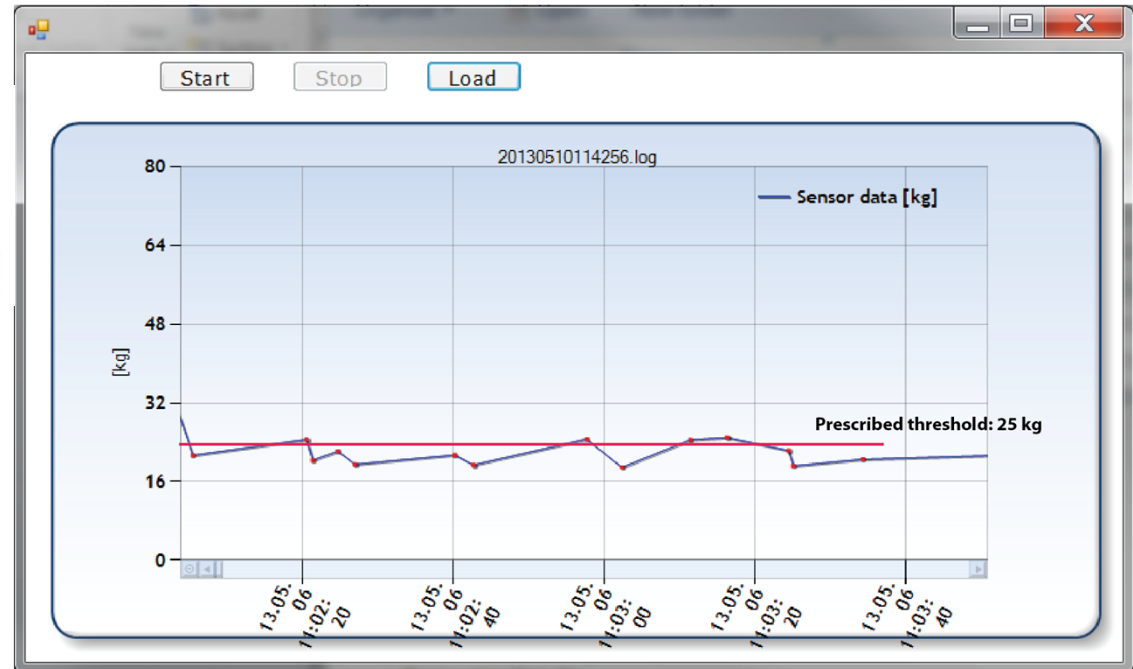
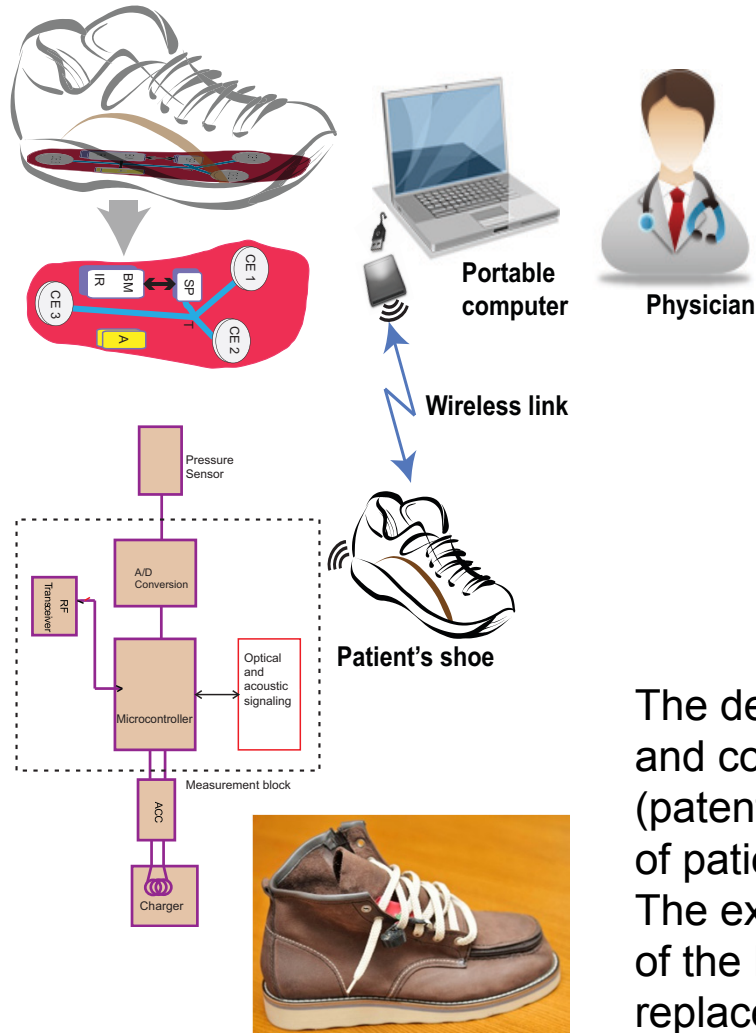
www.utcluj.ro

- Staff: three professors, two phd, two phd students
- Research activity:
 - Smart sensors for medical applications
 - Body sensor network
 - Hardware/software codesign
- Research facilities:
 - 2 fully equipped laboratories for development of embedded sensors



Recent projects

Wireless System for Monitoring the Progressive Loading of Lower Limb in Post-Traumatic Rehabilitation



The development and validation of a platform for monitoring and control of PWB using low cost wireless ambulatory devices (patent hold by authors) that provide biofeedback and recording of patient rehabilitation activity.

The experimental platform may be used for different fractures of the lower limb, and also in complicated hip or knee joint replacement, reconstruction of knee ligaments and joint infections.



Department of Applied Electronics

**The Faculty of Electronics, Telecommunications and
Information Technology**

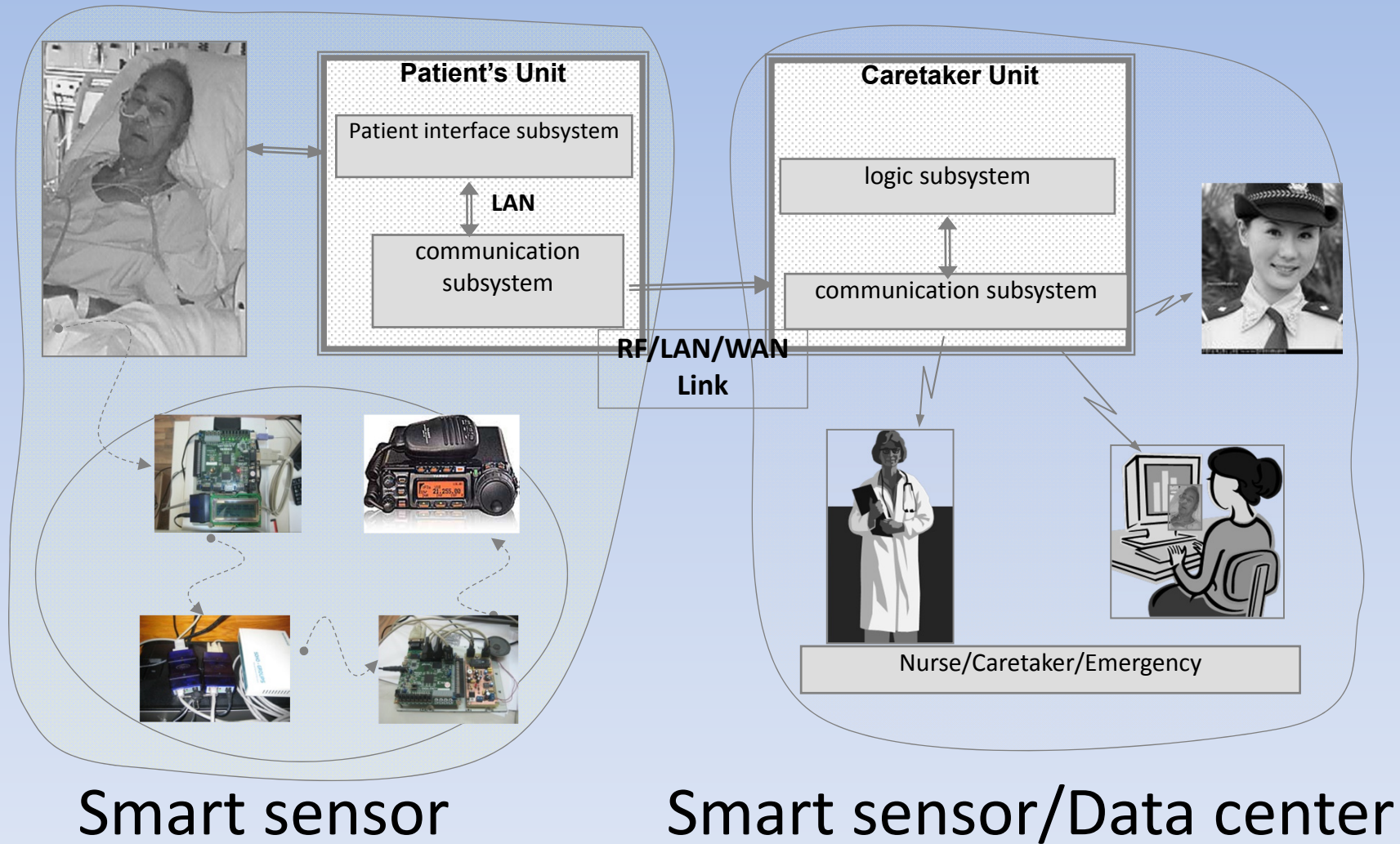
**THEORETICAL AND EXPERIMENTAL
CONTRIBUTIONS TO
IMPLEMENTATION OF INTELLIGENT
EMBEDDED SYSTEMS**

Prof.PhD.Eng. Dorin PETREUȘ

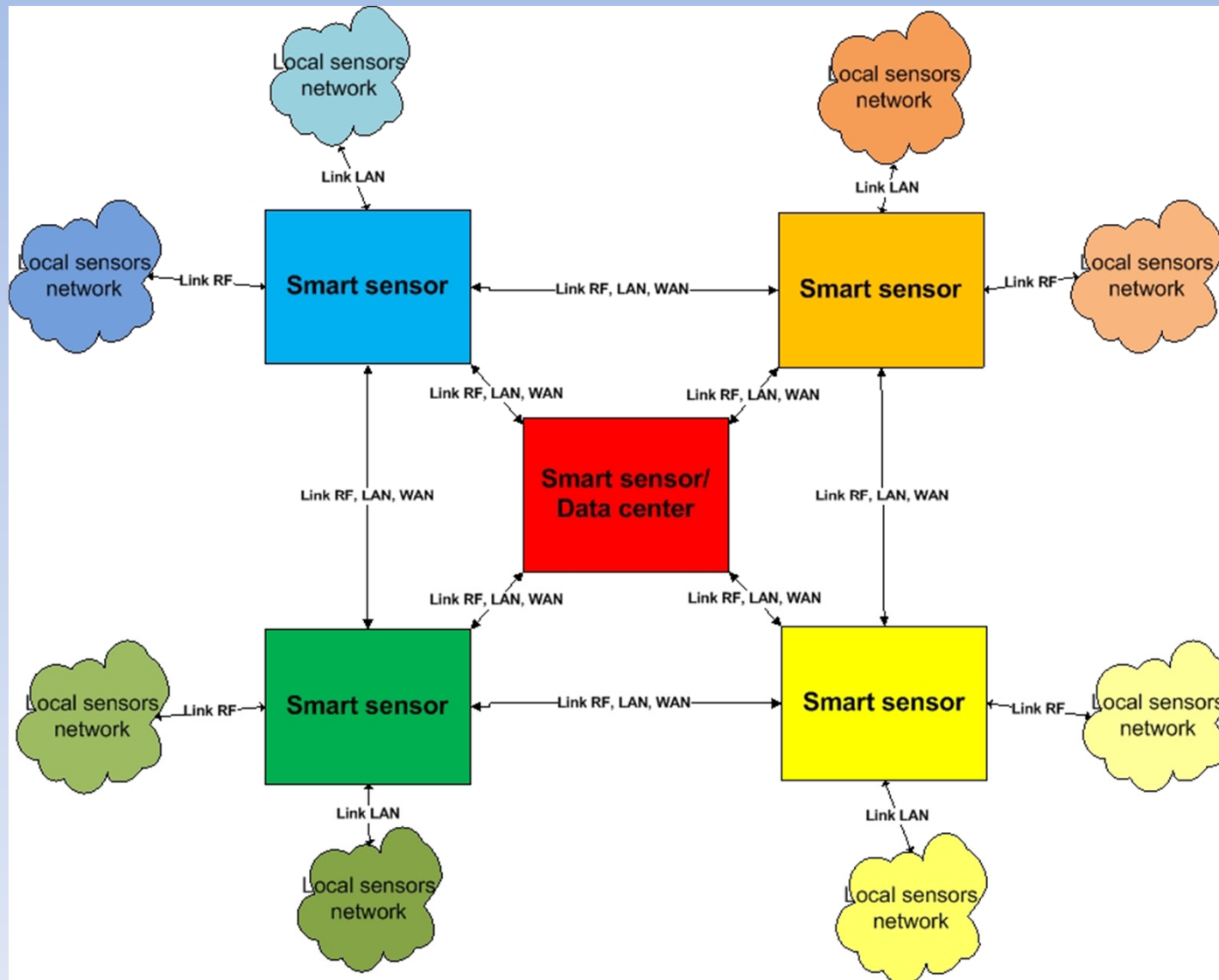
As. PhD. Eng. Claudiu LUNG

dorin.petreus@ael.utcluj.ro

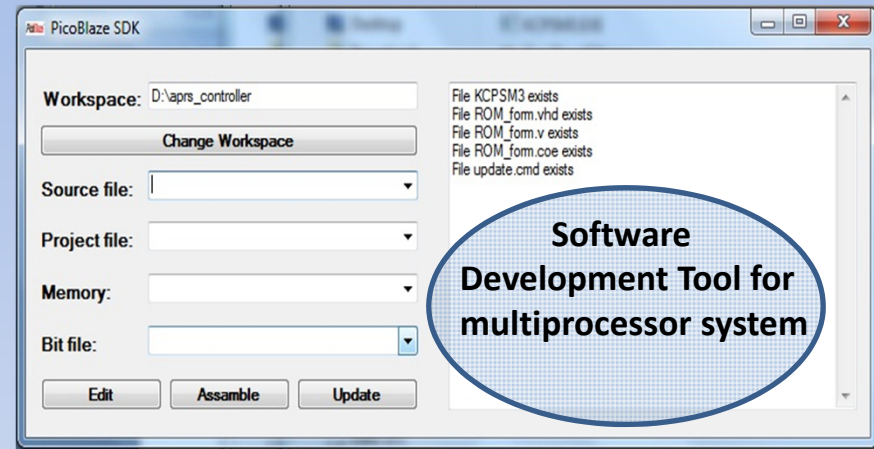
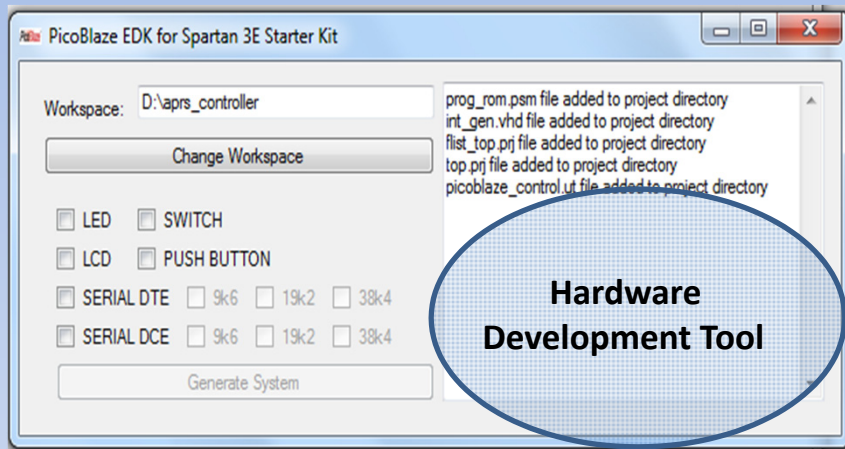
STRUCTURE OF THE SYSTEM



Smart sensors network



Experimental results



Manufacturing Engineering for Medical Applications at TUC-N, Cluj-Napoca / Romania

Department of Manufacturing Engineering (DME)

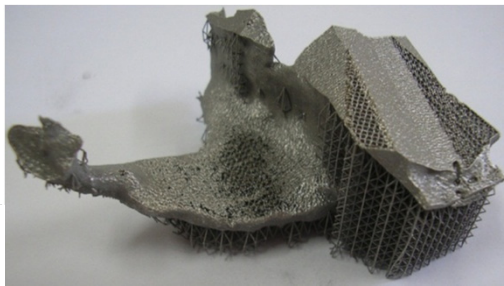
Professor Nicolae BALC, Director of Department
Technical University of Cluj-Napoca (TUC-N)

Nicolae.Balc@tcm.utcluj.ro

Ongoing research projects:

- **“BIOMAPIM” PCCE ID 101– National Grant,**
 - **Director : Professor Petru BERCE**
- **FP7 – “AdM-ERA” – Nr. 295016 (2011-2014),**
 - **Director : Professor Nicolae BALC**

Manufacturing implants by SLS and SLM, at DME – TUC-N

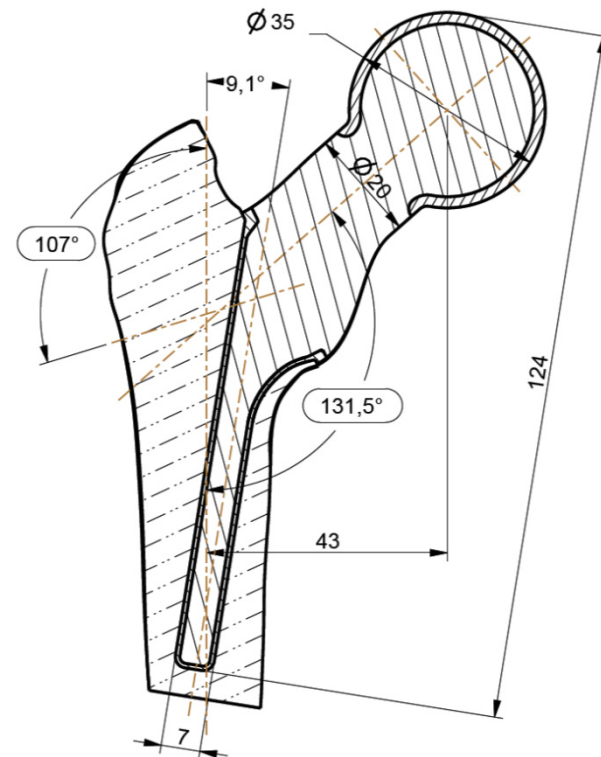
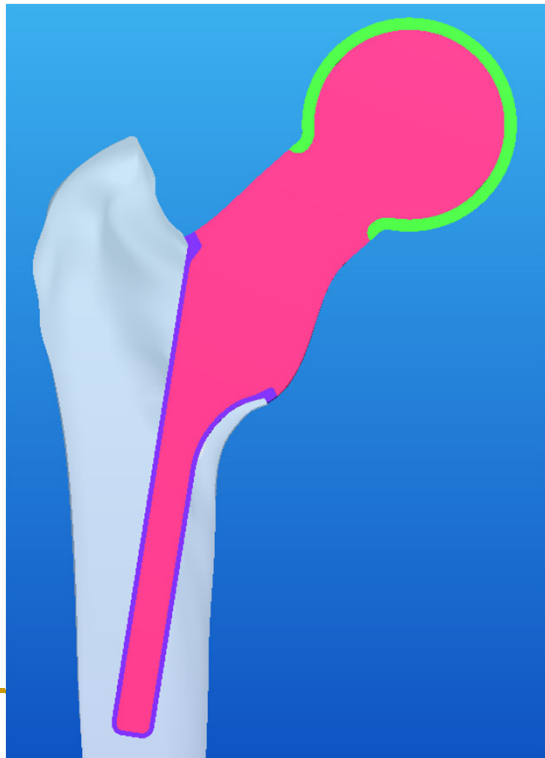


- 35 surgical operations made at Cluj-Napoca, using customized implants made at DME



Engineering design and manufacture, multistructured endo-protheses

- Solution with redesigned insert, multistructured endoprothesis



Cardiovascular Biomechanics

Dan Rafiroiu

Dan.Rafiroiu@et.utcluj.ro

Competences

- ✓ Physiological modelling,
- ✓ Multiscale & multiphysics modelling,
- ✓ Cardiovascular devices' design,
- ✓ CFD-FSI

Achievements (Projects)

- ✓ Local funding
- ✓ European funding

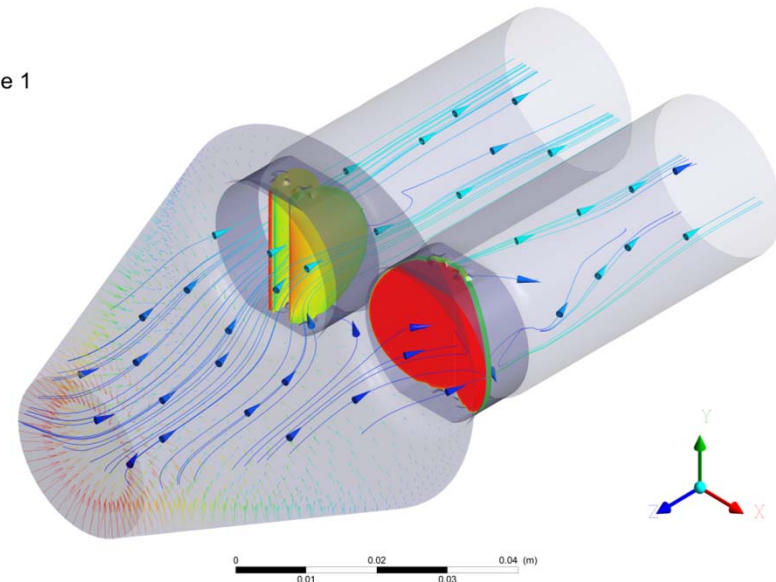
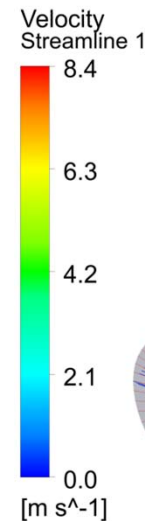
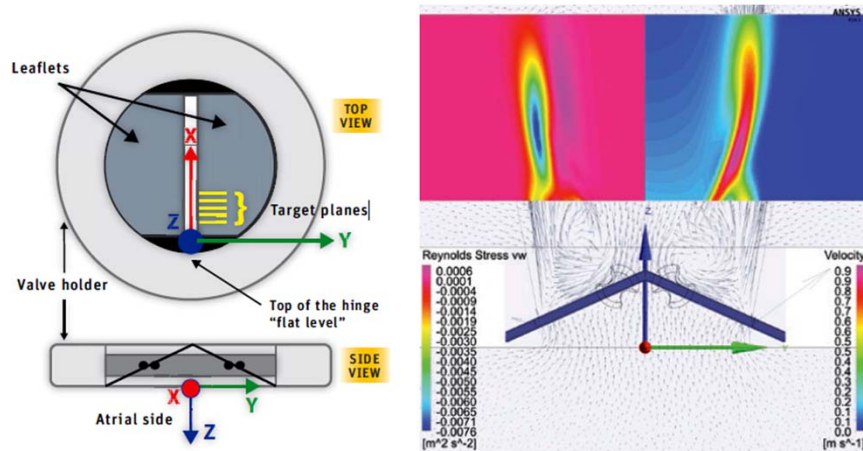


MeDDiCA

Medical Devices Design in Cardiovascular Applications

www.meddica.eu

dan.rafiroiu@et.utcluj.ro



CFD simulation for velocity distributions of leakage jet of bileaflet mechanical heart valve. Then the calculated Reynolds stress values are validated experimentally (PIV) and used to assess the hemolysis index of the prostheses.

Representation of flow field inside lumped parameter to 3-D coupled model of left heart and arterial system at peak systole (heart muscle contraction). This FSI model accounts for the movement of both the ventricular walls and the leaflets to investigate valve–valve interaction.