MEDICAL ENGINEERING RESEARCH GROUP

Contact details

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Acronym	**ME**
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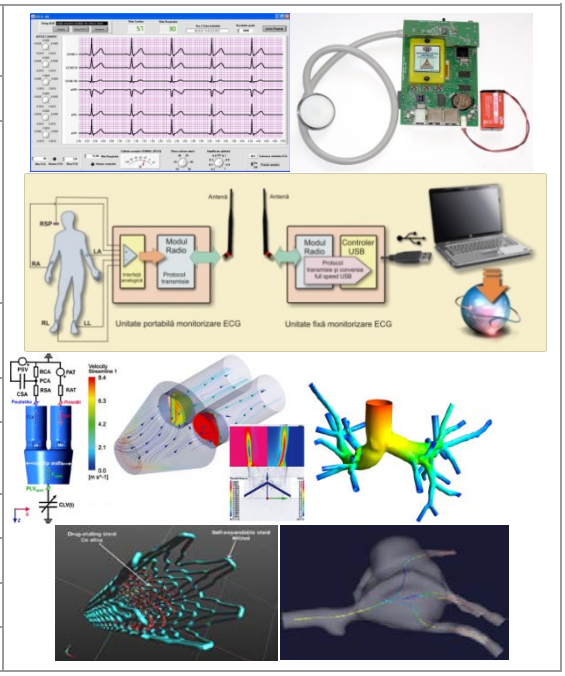

Areas of expertise

Laboratory of **Biomedical instrumentation, Applied medical electronics, Clinical engineering, DSP**
Laboratory of **Medical Physics, Physiological modelling, Reverse engineering of cardiovascular devices, Medical Image Analysis**

Team

Prof. Dr. Eng. Radu Vasile Ciupa , Prof. Dr. Eng. Nicolae Marius Roman, Assoc. Prof. Dr. Eng. Mihai Munteanu, Assist. Dr. Eng. Anca Nicu, Assoc. Prof. Med. Elena Gligor, Senior Researcher Dr. Eng. Mircea V. Pusca, Senior Researcher Dr. Eng. Stefan Gergely, Dr. Eng. Vasile Pompas, Prof. Dr. Eng. Dan Rafiroiu, Assoc. Prof. Dr. Eng. Simona Vlad, Assoc. Prof. Dr. Eng. Math. Dan Doru Micu, Assoc. Prof. Dr. Med. Adrian Iancu, Assoc. Prof. Dr. Eng. Corina Giurgea
Phd. students: Eng. Ec. Adriana Maria Ciupe, Eng. Ciprian Mugurel Fort, Eng. Angela Lungu, Eng. Dorel Pop Kun

Representative projects

"Neural magnetic stimulation", PNII-IDEI, (2007-2010)
"Management of the increase of urban mobility and methods for sustainable solutions implementation designed to satisfy long term social and economic demands in road traffic", CEEX, (2006-2008)
"Sensors and equipment for the quality control of various food supplies", PN II, (2007-2013)
"Research and implementation of a physiotherapy equipment using the energy of light in visible spectrum", (2007)
SPINSTIM, **"Functional stimulation of the spinal cord"**, Romanian-Austrian bilateral contract, (2009-2011)
MeDDiCA, "Medical Devices Design in Cardiovascular Applications", European FP7 project, www.meddica.eu (2009-2013)
"Software applications and experimental investigations of the cavitation phenomenon in mechanical heart valves", PNII-Idei, (2005-2008)
"On the Nerve Cells' active behavior. Electrical Circuit and Representation and Numerical Simulation", (2007)

Significant results

The most representative publications of the past 5 years:

1. Cretu, Mihaela,Darabant Adrian,Ciupa Radu V., "Magnetic Stimulation of the Spinal Cord: Evaluating the Characteristics of an Appropriate Stimulator", *Artificial Organs*, Vol.39, Issue 10, Pp. 841-848, Oct 2015
2. Darabant, Laura, Cretu Mihaela,Rafiroiu Dan, et al., "Evaluating the Efficiency of Stimulators used in Magnetic Stimulation of the Spinal Cord", 2015 *9th International Symposium on Advanced Topics In Electrical Engineering (ATEE)*, Pp.275-280, 2015
3. Cretu, Mihaela, Ciupa, Radu V., "Magnetic Coil Design for Evaluating the Response of the Spinal Cord during Magnetic Stimulation", 2014 *International Conference And Exposition On Electrical And Power Engineering* (EPE), Iasi, Pp. 237-240, 2014

4. Cretu, Mihaela, Ciupa, Radu V., Cretu Traian, “Assessment of the Electric Field Generated by Multilayered Coils during MS”, *8th International Symposium on Advanced Topics in Electrical Engineering (ATEE), Bucharest, Romania*, May 23-25, 2013
5. M.N. Roman and S. Gergely, “Modern Methods Used in the Complex Analysis of the Phonocardiography Signal”, "Applied Biological Engineering - Principles and Practice", book edited by Ganesh R. Naik, pub. March 23, 2012
6. Iancu, D. Rafiroiu, “Treatment of Carotid In-Stent Stenosis: To Stent or Not to Stent’’, in *J. Endovascular Therapy*, vol. 19, 2012, pp. 325–328
7. L. Darabant, M. Cretu, R. V. Ciupa, D. D. Micu, D. Stet, “Assessment of the Electric Field Induced in the Human Tissue during Magnetic Stimulation of the Spinal Cord”, *in COMPEL (The international journal for computation and mathematics in electrical and electronic engineering)*, vol.31, no.4, 2012, pp. 1164-1172
8. Nicu, L. Darabant, R. V. Ciupa, B. Micu, “Remarks on optimal design of magnetic stimulating coils used in magnetotherapy”, in *Acta Electrotehnica*, vol. 53, no. 3, 2012, pp.242-245
9. Nicu, A. Taut, R. V. Ciupa, “A PSpice study regarding the design of the equivalent electric circuit used in functional magnetic stimulation”, in *Acta Electrotehnica*, no. 4, 2012
10. V. Surducan, E. Surducan, R. V. Ciupa, “Variable Power, Short Microwave Pulses Generation using a CW Magnetron”, in *Advances in Electrical and Computer Engineering*, vol. 11, no. 2, 2011, pp. 49-54
11. N.M. Roman; S. Gergely; F. Roman R.V.Ciupa, “Low-cost ECG Wireless with Embedded Fuzzy Diagnosis System”, in *Journal of Medical and Biological Engineering*, vol. 30, no. 4, 2010, 253-259
12. M.N. Roman, S. Gergely, F. Roman, “Employing TESPAR Method in Biomedical Signal Processing for Pathological Acoustic Analysis”, in *Proceedings of the 20th international EURASIP conference BIOSIGNAL 2010, Brno, Check Republic*, June 27-29 2010, pp. 75 – 80
13. M.N. Roman, S. Gergely, R.V.Ciupa, M.V. Pusca, “Short Range Link for Data Acquisition in Medical Equipment” in *XII Mediterranean Conference on Medical and Biological Engineering and Computing 2010* *IFMBE Proceedings*, vol. 29, part 3, 2010, pp. 471-474
14. S. Gergely, M. N. Roman, C. Fort, “Multirate Sampling in PCG Signal Correlation”, in *International Conference on Advancements of Medicine and Health Care through Technology* *IFMBE Proceedings*, vol. 36, part 3, 2011, 198-201
15. S. Gergely, M. N. Roman and R. V. Ciupa, “Portable Complex PCG Signal Analyzer”, in *International Conference on Advancements of Medicine and Health Care through Technology* *IFMBE Proceedings*, vol. 36, part 2, 2011, 140-143
16. P. Bechet, R. Mitran, M. Munteanu, “A non-contact method based on multiple signal classification algorithm to reduce the measurement time for accurately heart detection”, in *Review of Scientific Instruments*, vol. 84, no. 8
17. Petreus, D. Moga, A. Ursu, T. Patarau, M. Munteanu, “Photovoltaic System with Smart tracking of the Optimal Working Point”, in *Advances in Electrical and Computer Engineering*, vol. 10, no. 3, 2010
18. R.V. Ciupa, L. Darabant, M. Plesa, O. Cret, D.D. Micu, “Design of magnetic coils for repetitive stimulation. Revue roumaine des sciences techniques”, in *Serie Electrotechnique et Energetique*, no.3, 2010, pp.251-260
19. Rafiroiu, S. Vlad, L. Cret, R. V. Ciupa, “3D Modeling of the induced electric field of transcranial magnetic stimulation”, in *MediTech2009, Cluj-Napoca, Romania*, vol. 26, 2010, pp.333-338
20. J. Narracott, C. Zervide, V. Diaz, D. Rafiroiu, P. V. Lawford, D. R. Hose, “Analysis of a mechanical heart valve prosthesis and a native venous valve: Two distinct applications of FSI to biomedical applications”, in *IJNMBE*, vol. 26, 2009, pp. 421-434

Significant solutions:
1. High efficiency solution for medical telemetry ECG. Proved method in pathological PCG analysis. Efficient mathematical algorithms used in biomedical signal processing. Development of portable biomedical instrumentation, Virtual medical devices, Biomedical sensors
2. High accuracy reconstruction of the 3D geometry of vessels, cavities and cardiovascular devices;
Development of a multiscale CFD-FSI double-valve model of the left ventricle to study the valve-valve interaction;
Experimental and computational study of the hemolytic and cavitation effects of bileaflet mechanical heart valves;
Computational analysis of thrombus absorption efficiency for different commercial catheter designs;
Computational assessment of high frequency electromagnetic (cell phone) field effects on implanted carotid stents;
Products and technologies:
Low consumption battery powered DSP devices for ECG and PCG signal analysis

The offer addressed to the economic environment

Research & development	Datronix Computer Ltd., Cluj-Napoca, www.datronix.ro National Institute for Research and Development of Isotopic and Molecular Technologies www.itim-cj.ro Military Emergency Hospital Dr. Constantin Papilian, Cluj-Napoca, www.smucluj.ro County Emergency Hospital Bistrita-Nasaud, http://spital.bistrita.ro/
Consulting	Consulting in the areas of medical image processing, FDA regulations of cardiovascular devices,
Training	CFD-FSI analysis, Multiphysics and multiscale modelling, Computational methods for cardiovascular devices design, Computational methods for electromagnetic dosimetry