
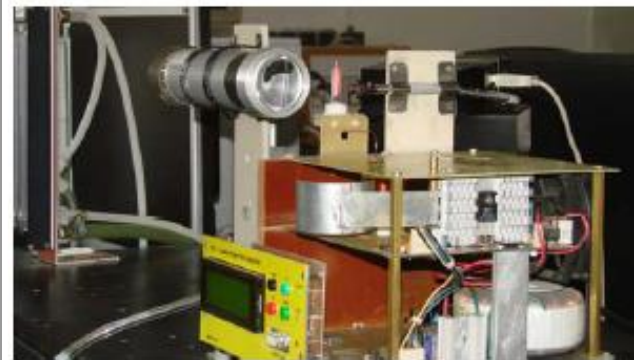


RENEWABLE ENERGIES GROUP

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Areas of expertise

Renewable Energy

- Develop new ways to improve energy harvesting and storing for microgrids.

Switched Mode Power Supplies(SMPS) and Power Electronics

- Study and develop new topologies in the field of SMPS.

Digital Control

- Study and develop new non-linear algorithms that can be used in the field of power supplies/grid tied inverters.

System Modelling and Simulations

- Develop macro-models for the switched mode power converters in order to improve simulation times.

Embedded Systems

- Develop systems with microcontrollers in C/C++ and assembly for different types of applications: low cost, time constrained, wireless, industrial and sensing.

Team

Prof. Dr. Eng. Dorin Petreuş, Assoc. Prof. Dr. Eng. Niculaie Palaghiţă, Assoc. Prof. Dr. Eng. Cristian Fărcaş, , Assoc. Prof. Dr. Eng. Alin Grama, Assist. Dr. Eng. Toma Pătărău, Assist. Dr. Eng. Radu Etz, Assist. Dr. Eng. Ionuţ Ciocan, Dr. Eng. Stefan Daraban. Phd students: Eng. Cristi Orian, Eng. Lazar Eniko, Eng. Dan Filip, Eng. Radu Joian

Representative projects

REMSIS, “Renewable energy management system used for small isolated communities”, <http://remsis.utcluj.ro/>, (2013-2016)

MICROCCP, “Miniaturized Equipment with Capacitively Coupled Plasma Microtorch and Analytical Technologies for Simultaneous Elemental Determination used in Environment and Foods control”, <http://www.chem.ubbcluj.ro/~edarvasi/Proiect/index.html> (2012-2015)

INNOWECS, “Innovative wind energy conversion micro-system with direct-driven electric generator for residential uses”, <http://innowecs.utcluj.ro/> (2012-2015)

ATM32, “Four cells galvanic bath”, PNII-IN-CI, (2014)

ATM41, “Medical equipment for magnetic therapy with low frequency pulsed magnetic field”, 20CI-PN2-IN-CI, (2012)

“Intelligent System for Battery Charging Based on Optimized Algorithms for Maximum Power Tracking in Solar Installations”, <http://solar.utcluj.ro/rezultate-en.html> (2007-2009)

FLUOROSPEC, “Optoelectronic Equipment and Innovative Method of High Precision and Sensitivity Based on Non-conventional Fluorescence Spectrometry for Testing and Control of Some Environmental Agents”, PNCDII,

Significant results

The most representative publications of the past 5 years:

1. Etz, R., Petreus, D., Frentiu, T., Patarau, T., Orian, C. “An Indirect Method and Equipment for Temperature Monitoring and Control”, *Advances in electrical and computer engineering*. AECE, Issue 4, 2015.
2. Dorin Petreus, Radu Etz, Toma Patarau, Cristian Orian – Microgrid concept based on distributed renewable generators for a greenhouse, *Acta Technica Napocensis*, vol. 56, no. 2 2015, pp. 31-36.
3. D. Petreus, S. Daraban, I. Ciocan, T. Patarau, C. Morel and M. Machmoum, “Low cost single stage micro-inverter with MPPT for grid connected applications”, in *Solar Energy*, vol. 92, 2013, pp. 241-255
4. A. M. Mihaltan, T. Frentiu, M. Ponta, D. Petreus, M. Frentiu, E. Darvasi and C. Marutoiu, “Arsenic and antimony determination in non- and biodegradable materials by hydride generation capacitively coupled plasma microtorch optical emission spectrometry”, in *Talanta*, vol. 109, 2013, pp. 84-90
5. A.R. Zsigmond, T. Frentiu, M. Ponta, M. Frentiu and D. Petreus, “Simple and robust method for lithium traces determination in drinking water by atomic emission using low-power capacitively coupled plasma microtorch and microspectrometer”, in *Food Chemistry*, vol. 141, no. 4, 2013, pp. 3621-3626
6. F. A. Hrebenciuc, D. Moga, D. Petreus, Z. Barabas, R. Moga. “Combined Analytical and Numerical Approach to Study Coil Arrays for Contactless Charging of Batteries in Active Transponders”, in *Electronics and Electrical Engineering - Kaunas: Technologija*, vol. 123, no.7, 2012, pp. 37–42
7. D. Petreus, T. Patarau, S. Daraban, C. Morel, B. Morley, “A novel maximum power point tracker based on analog and digital control loops”, in *Solar Energy*, vol. 85, 2011, pp. 588-600
8. C. Morel, D. Petreus, A. Rusu, “Application of the Filippov Method for the Stability Analysis of a Photovoltaic System”, in *Advances in Electrical and Computer Engineering*, vol.11, no. 4, 2011, pp. 93-98
9. C. Morel, R. Vlad, J. Y. Morel, D. Petreus, “Generating chaotic attractors on a surface”, in *Mathematics and Computers in Simulations*, vol. 81, no. 11, 2011, pp. 2549-2563
10. T. Frentiu, D. Petreus, M. Senila, A. I. Mihaltan, E. Darvasi, M. Ponta, E. Plaian, E.A. Cordos, “Low power capacitively coupled plasma microtorch for simultaneous multielemental determination by atomic emission using microspectrometers”, in *Microchemical Journal*, vol. 97, no. 2, 2011, pp. 188-195

Significant solutions:

Power supplies with power factor correction, grid tied inverters, UPS, low/high power battery chargers from photovoltaic panels, maximum power point tracking algorithms, power optimizers for improving energy harvesting, bidirectional converters, battery equalizers, digital control applied in switched mode power supplies (DSPs, FPGA), class E amplifier for plasma generator, hybrid storage system using supercapacitors and battery packs, battery inverters, low power induction generators, energy management algorithms used in renewable energy microgrids, algorithms for sizing microgrids with renewable energies.

Products and technologies:

1. Design and implementation of switched mode power supplies/inverters; **2.** Embedded programming for DSPs (dsPIC and TMS328F28/F24) and microcontrollers (Microchip, TI, Atmega, 8051) with industrial applications; **3.** Design and implementation of systems for energy harvesting (photovoltaics, wind energy, geothermal and biomass); **4.** Power optimizers (Distributed maximum power point tracking systems)/microinverters for energy harvesting; **5.** Design and implementation of battery/supercapacitor chargers; **6.** Implementation of analog/digital control; **7.** Implementation of electronic systems to be used for chemical/medical experiments (plasma generator, magneto therapy, electrotherapy).

Patents: International

D. Petreus, M. Neag, B. Morley – “Improved MPPT-Control for PWM-based DC-DC converters with average current control”, international no. WO 2012/010613 A1, January 26, 2012.

Patents: National

1. Low power plasma generator at a low atmospheric pressure - OSIM Bucharest: A/100/2010-30 July 2010 (pending);
2. - Medical equipment for magnetic therapy with low frequency pulsed magnetic field: OSIM Bucharest: A/10009/2010/ 13 July 2010 (pending);
3. Low frequency pulsed magnetotherapy device: OSIM Bucharest: A/10030/2012, 19.10. 2012 (pending)
4. Electrostimulator with digital control for hydrotherapy: OSIM Bucharest: A/00372 , 19.05.2014 (pending)
5. Method and electronic temperature control device for a metallic filament through indirect measurement: OSIM Bucharest: A/00732/2014, 02.10.2014 (pending)

The offer addressed to the economic environment

Research & development	Supporting local industry to be more competitively on the market by using applied research.
Consulting	Consultancy and applied research for the industrial or academic environment, according to the skills of the laboratory members: high efficient power supplies, digital control, embedded programming, system modeling and simulation and renewable energy.
Training	Specialized courses according to the skills of the laboratory members: high efficient power supplies, digital control, embedded programming, system modeling and simulation and renewable energy.