

Department of Electrical Engineering

RESEARCH CENTER ON:



**INTELLIGENT CONTROL OF
ENERGY CONVERSION
AND STORAGE**



**WE INTEGRATE
HIGH
&
LOW
POWER LEVELS
IN
SMART
AND
COMPLETE SYSTEMS**



RESEARCH DOMAINS

- **Electric machines and their control;**
- **Electric machines design, testing and monitoring;**
- **Digital control in drives and industrial processes;**
- **Power electronics for renewable energies and automotive applications;**
- **Electro-technologies and lighting**

RESEARCH DOMAINS/STAFF



Electric machines and their control :

**Acad. Ion BOLDEA - IEEE Life Fellow,
Prof. Lucian TUTELEA,**

Lecturer Ana POPA, Assist. Adrian MARTIN.

Electric machines design, testing and monitoring:

Prof. Marius BIRIESCU, Assist. Martian MOȚ

Digital control in drives and industrial processes:

**Prof. Sorin MUȘUROI, Assoc. Prof. Alin ARGEȘEANU,
Assoc. Prof. Ciprian SORÂNDARU,**

Assoc. Prof. Cristian LASCU, Assist. Marcus SVOBODA, Lecturer Codruța ANCUȚI.

Power electronics for renewable energies and
automotive applications:

Prof. Nicolae MUNTEAN,

Assoc. Prof. CORNEA, Assist. Dan HULEA, Assist. Danuț VITAN.

Electro-technologies and lighting :

**Assoc. Prof. Alexandru HEDEȘ, Assoc. Prof. Dan NICOARĂ,
Assist. Andreea DEATCU**



TEAM

**1 Member of the ROMANIAN ACCADEMY;
1 IEEE LIFE FELOW, 2 IEEE SENIOR MEMBERS;
2 Members of the ROMANIAN ACCADEMY OF
TECHNICAL SCIENCES.**

**8 Professors, 4 Associate Professors,
4 Lecturers, 3 Assistant Professors;
8 Ph. D. Students.**

TEAM



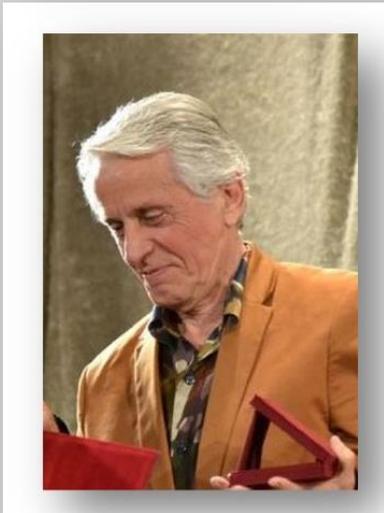
2015 – NIKOLA TESLA AWARD Acad. Ion Gheorghe Boldea



**“For contributions to
the design and control of
rotating and linear
electric machines for
industry applications”**

https://www.ieee.org/documents/tesla_rl.pdf

TEAM



-IEEE - IAS Distinguished Lecturer from 2008 (USA, Brasil, UE South Coreea);

-Annual intensive courses in USA, Denmark, since 1997.

https://www.ieee.org/documents/tesla_rl.pdf



PUBLICATIONS

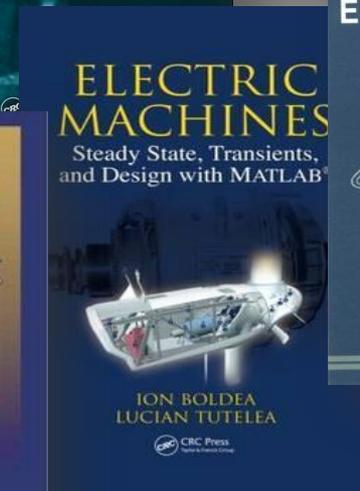
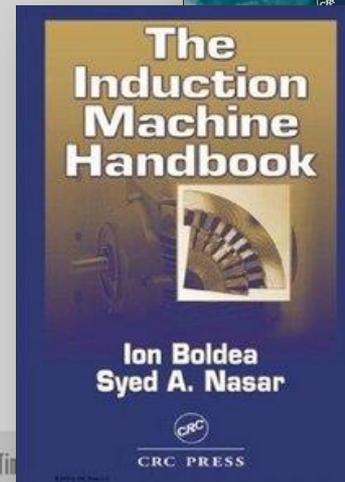
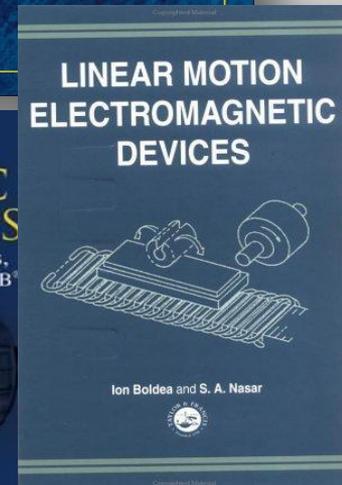
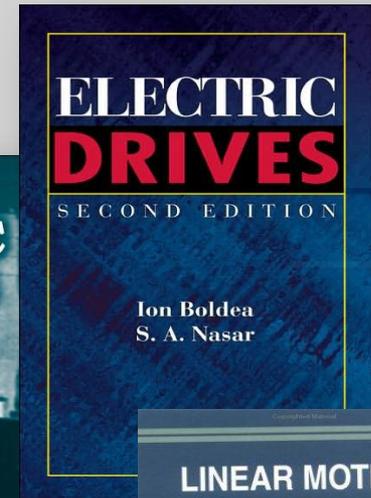
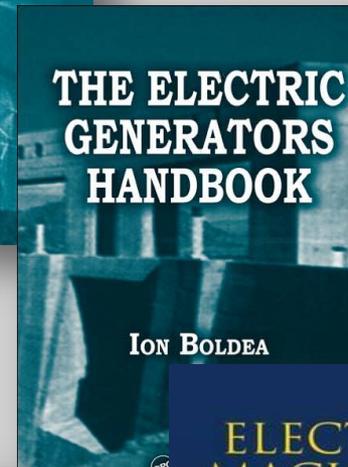
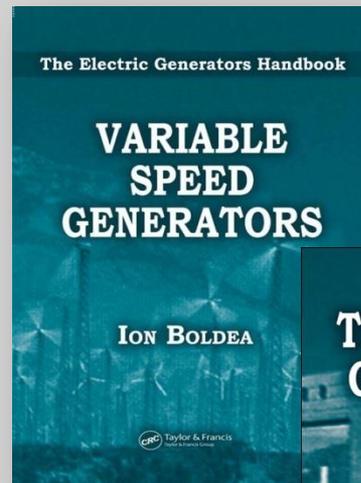


BOOKS:

20+ in USA, UK;

**ISI Journals/Conf. papers
above 70 / above 200.**

**ISI citations(H. 36):
above 3000 for papers;
above 2000 for books.**





INTERNATIONAL COOPERATION



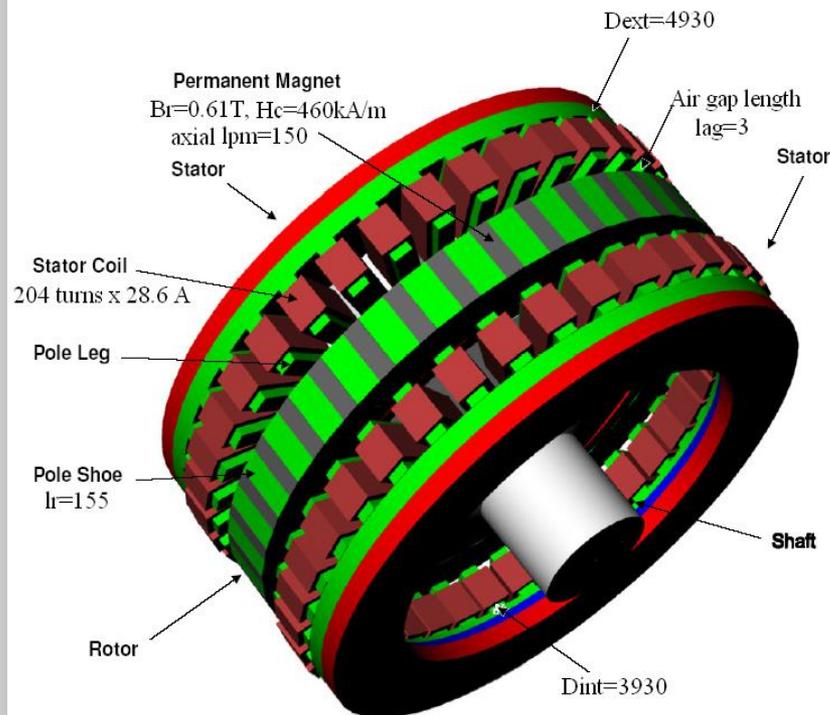
NEW FACILITIES (starting from 2008)



RECENT RESEARCH SUBJECTS



DIRECT DRIVE WINDGEN specs : Rated Power 6MW,
700V(rms)/phase, 629A(rms)/phase, power factor=0.49, 7 phases X 4 stators, 11.3 rpm

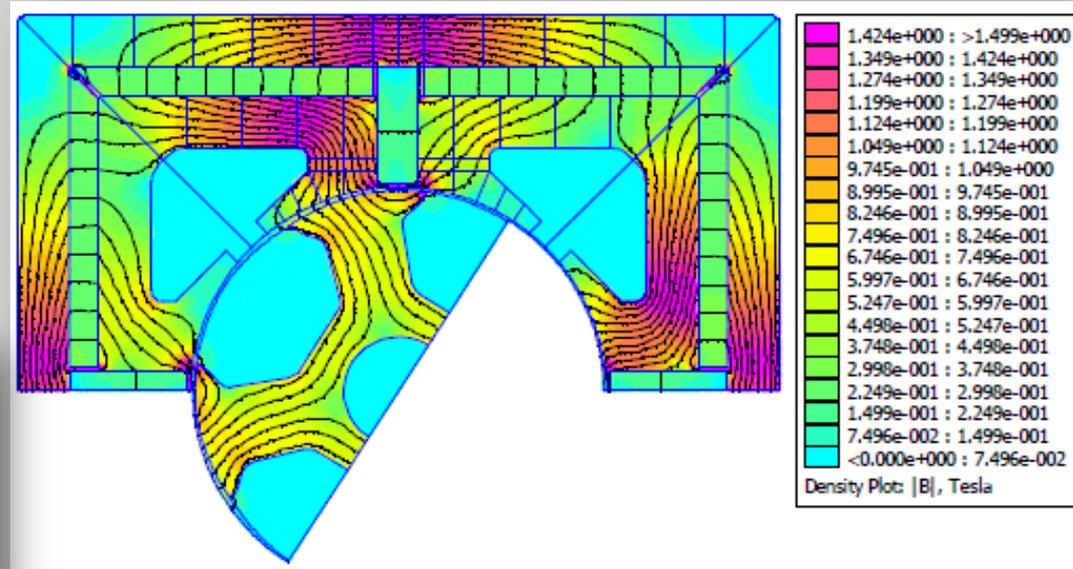
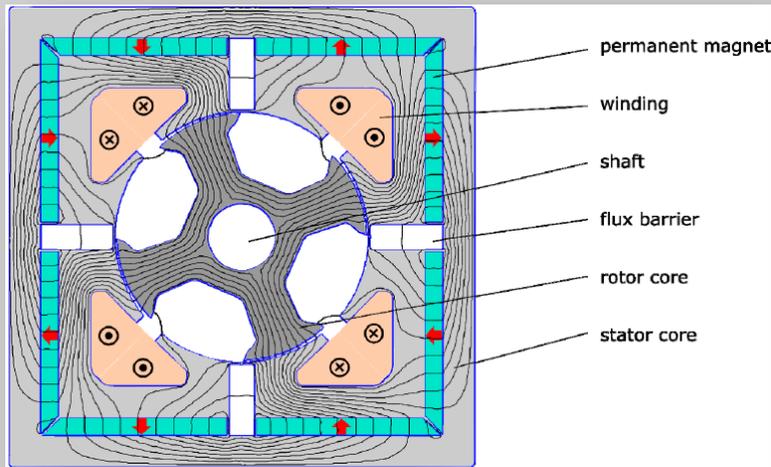


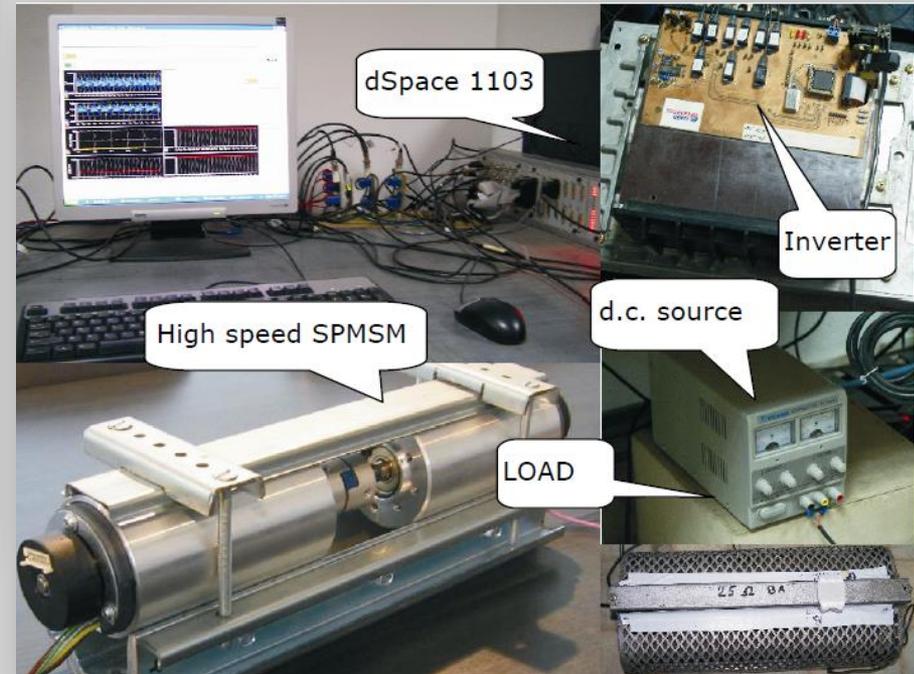
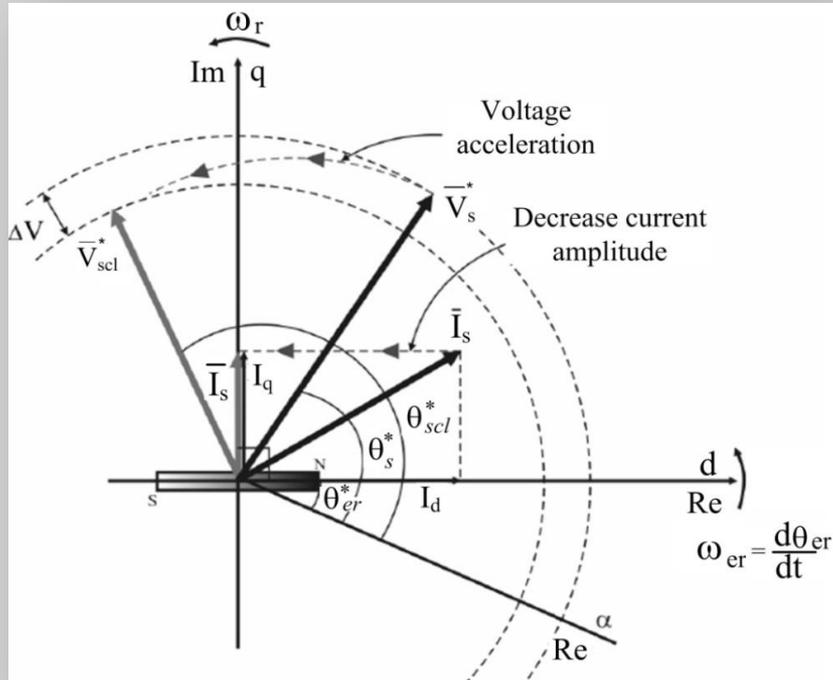
Rotor tooth: 176 pieces, 155 x 39.5 x 500
 PM pole: 176 pieces, 155 x (48.5, 30.65) x 500
 Stator pole: 154 pieces, 116 x 45.4 x 500

Torque per 4 stators (2 modules) is 5.49 MNm
 mmf per coil=5829A turns (rms)
 Rated copper losses about 500kW
 Forecast electric efficiency: 92.3%

Copper mass: 4 x 1.86 tons
 Stator iron mass: 4 x 5.18 tons
 Rotor iron mass: 2 x 4.12 tons
 Rotor PM mass: 2 x 4.02 tons
 Total mass: 44.43 tons

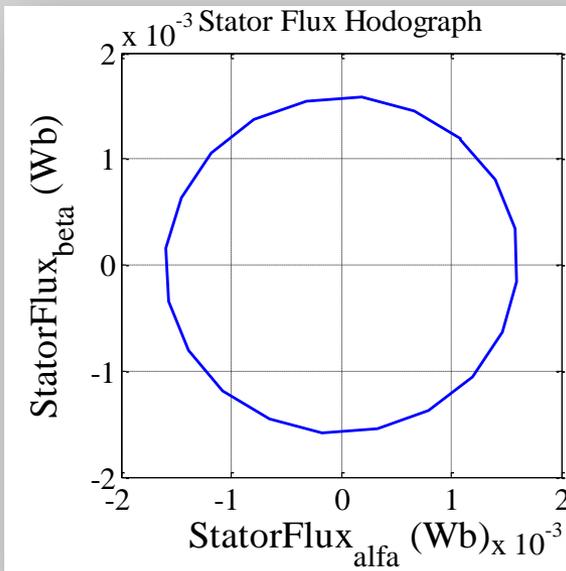
FEM Assisted Optimal Design of Electric Machines



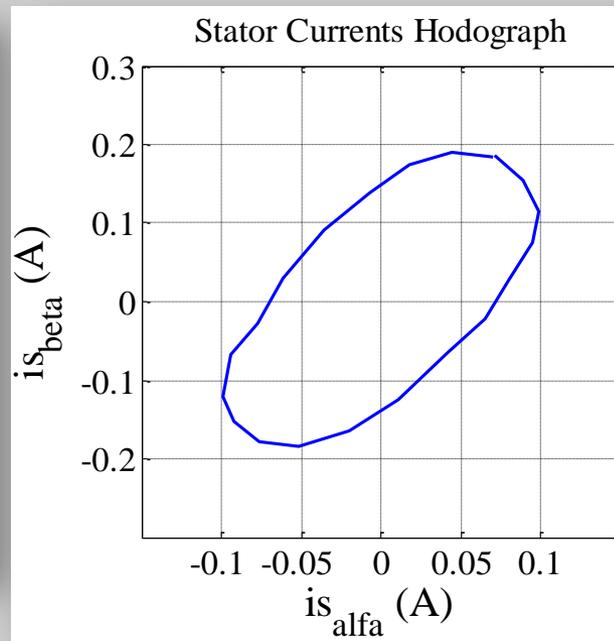


Active Flux or Torque-Producing Flux Concept

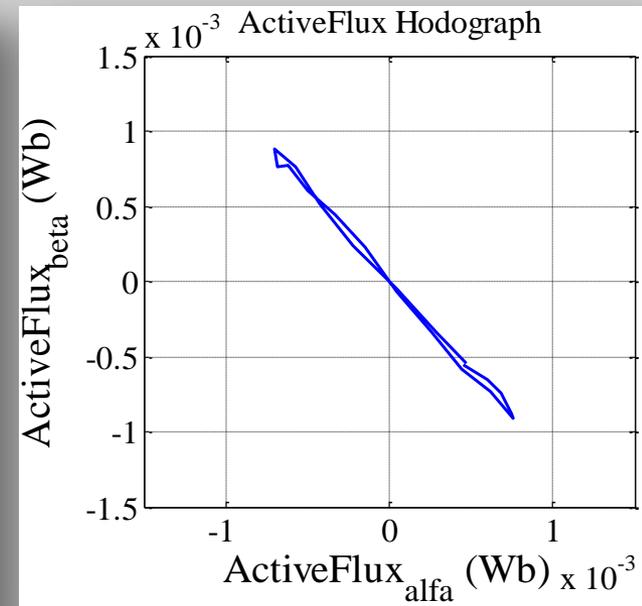
[More details...](#)



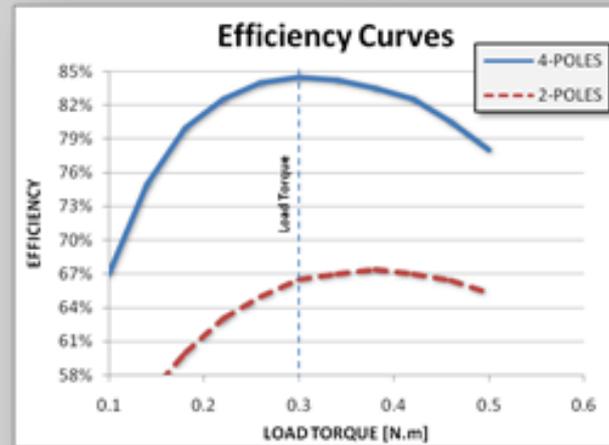
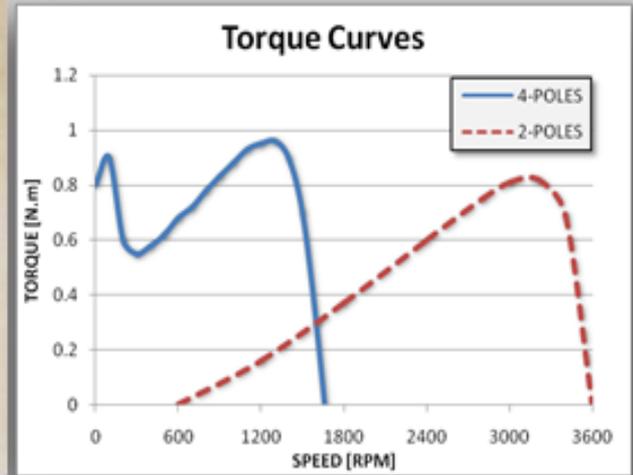
**Stator flux
Hodograph**



**Stator Currents
Hodograph**



**Active Flux
Hodograph**



Compressors

RECENT RESEARCH SUBJECTS

EE VERT EU – FP7 – 2009 – 2012

Information

Project Co-ordinator

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Technical Manager
Advanced Electrical Engineering
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EE-VERT is supported
by EUCAR the European
Council for Automotive R&D



www.eucar.be



Consortium

www.ee-vert.net



Co-ordinator

MIRA Ltd (UK)



Partners

Volvo Technology AB (SE)



Centro Ricerche Fiat SCPA (IT)



Robert Bosch GmbH (DE)



Lear Corporation Holding Spain SL (ES)



Engineering Center Steyr
GmbH & Co KG (AT)



FH Joanneum Gesellschaft mbH (AT)



Universitatea Politehnica
din Timișoara (RO)



S.C. Beespeed Automatizari S.R.L. (RO)



FIAT and Volvo

A European Framework 7 project
co-funded by the European Commission

Grant reference SCS7-GA-2008-218598



RECENT RESEARCH SUBJECTS

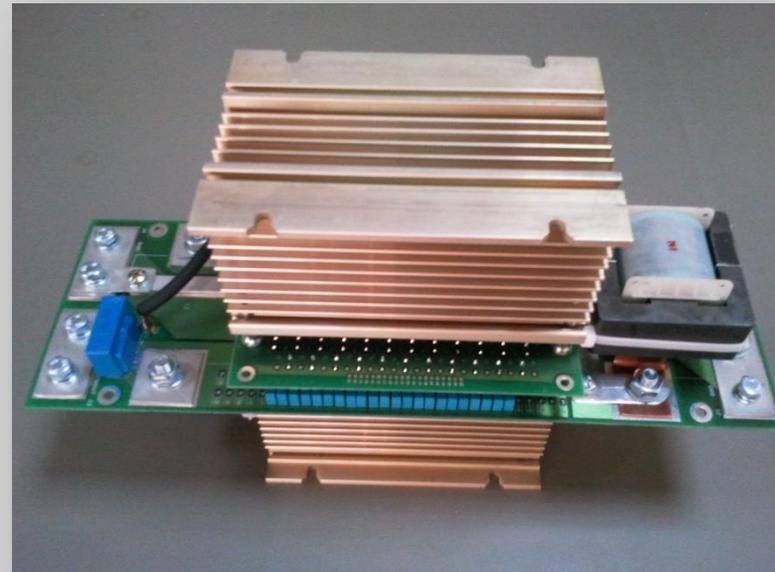
EE VERT EU – FP7 – 2009 – 2012

EE-VERT
Energy Efficient Vehicles for Road Transport



**Modified BOSCH
Alternator**

**Hybrid Buck DC-DC Converter for
42/14V Dual Voltage
Automotive Power System**



High Power Hydro-Generators, Optimal Design and Testing Procedures

2007-2010

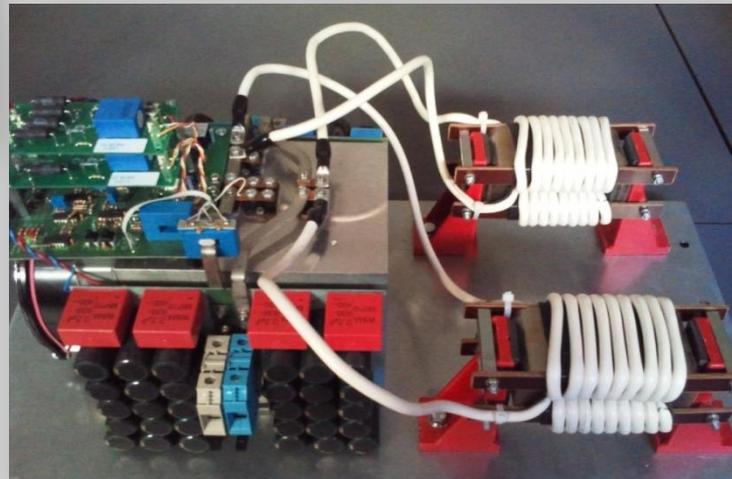




RECENT RESEARCH SUBJECTS



**Improvement of
the Structures
and Efficiency of
Small Horizontal
Axis Wind
Generators
2009-2011**



**New Types of DC-DC Converters
for Power Conversion and Energy
Storage**



Design of Permanent Magnet Assisted Synchronous Reluctance Motor

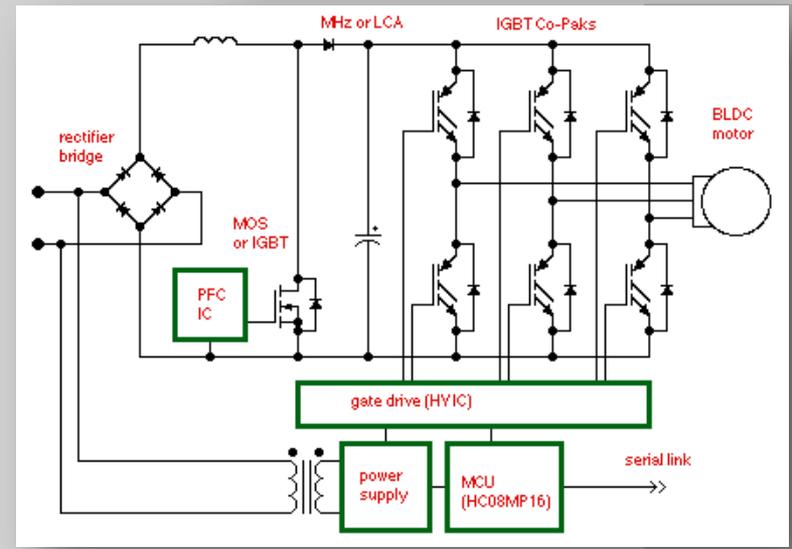
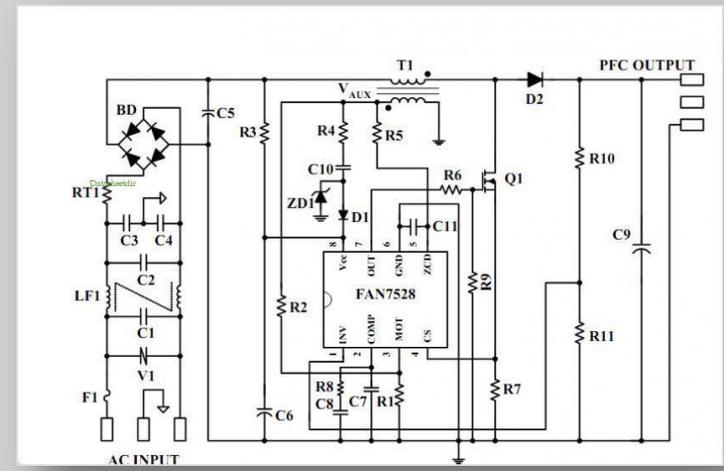
(2011-2012)





Analysis and Evaluation of Current Topologies and Solutions for the Single Phase/Three Phase Power Factor Correction (PFC) for Grid Tied Inverters

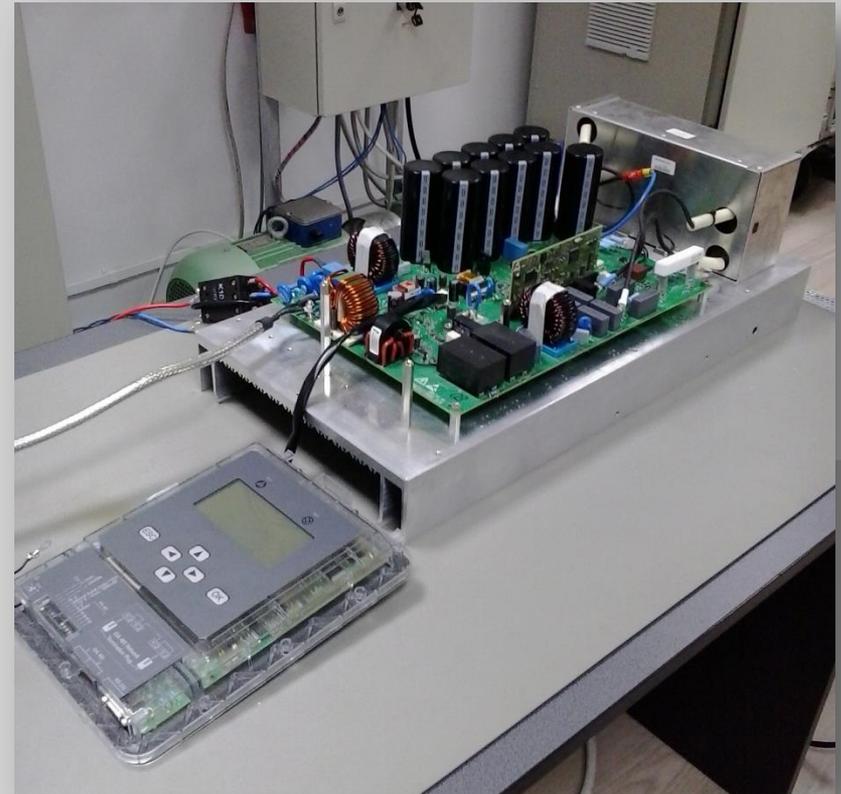
(2012-2014)



DIEHL
Controls

**Study in Power Electronics
for Solar Inverters**

(2012-2014)



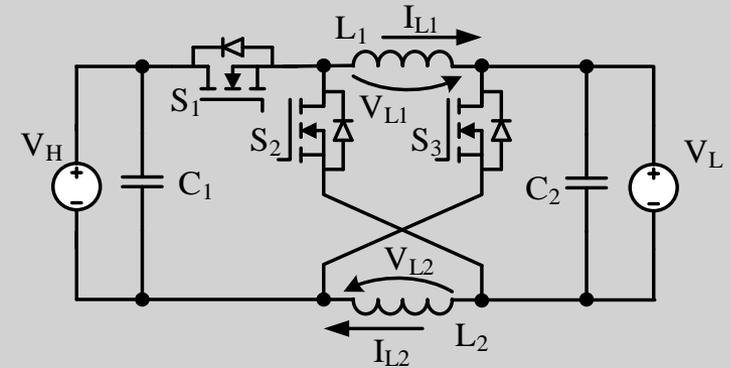


Microgrid Integrated Renewable Energy Hybrid System (“MICROREN”)

(Starting from 2012)



New Hybrid DC-DC Converters and Their Control for Renewable Energy and Automotive Conversion & Storage Systems





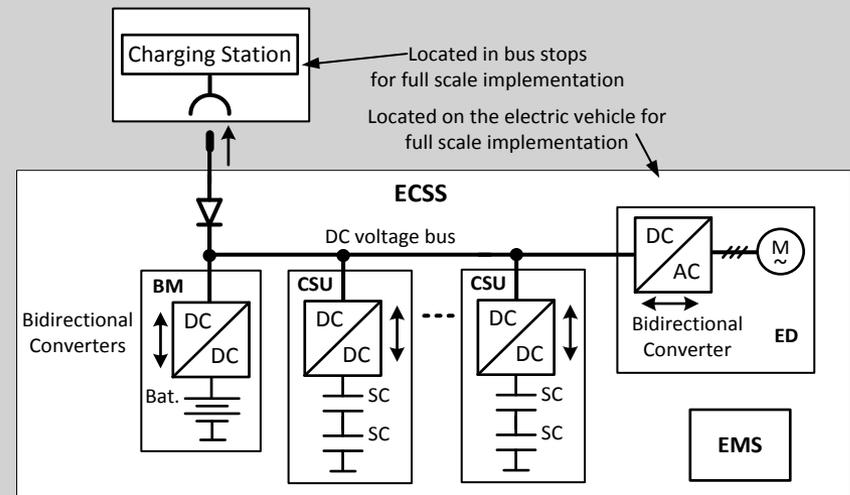
**Intelligent Buildings
(with Integrated Micro-Grids)
Adaptable to the Effects of
Climate Change
CIA_CLIM**

(Starting from 2018)



Energy Conversion System for an Electric City Bus/Microbus, with Supercapacitor Energy Storage and Superhigh Power Density Drive **ECON-BUS**

(Starting from 2020)





PUBLICATIONS

JOURNAL OF ELECTRICAL ENGINEERING



www.jee.ro

**(INSPEC, COSMOS, EBSCO), from 2000, internet only-
now 4 issues/year, 60 papers/issue.**





CONFERENCES

ACEMP/OPTIM/

International conference

**Aegean Conference Electrical
Machines and Power Electronics**

**Optimization of Electrical & Electronic
Equipment**

Bi-annual from 1994.

Putting in parallel:

- Experience and knowledge;
 - Ph. D. common interest research themes;
- Development of experimental models and prototypes;
- Human (young) resources.
- Technological facilities;
- Development of experimental models and prototypes;
- Industrial testing and implementation;
- Spare parts.



Cooperation opportunities

How it can work?

- Consulting activities;
- Educational cooperation (dedicated Bachelor, Master and Ph. D. Thesis subjects, internships etc.);
- UPT will participate with research expertise (project based) with selected faculty and graduate students as interns;
- UPT will also be open to participate in EU R&D Projects – if so desired.

Cooperation opportunities



A new project:

MODA-PEMC

(Multiphysics Optimal
Design Algorithms-Power
Electronics and Motion
Control)



A new research center, **in common with Romanian Academy**, sustained by industry;

Scope:

- Intensive courses on dedicated subjects (case studies and hand-on experimenting in the lab);
- Consulting and (optimal) design activities in the field of electrical engineering (electric machines and drives, power electronics, advance control systems etc.)

Usefull links

https://apps.webofknowledge.com/CitationReport.do?product=WOS&searchmode=CitationReport&SID=Q1ssvsZX3DnX24dzepn&page=1&cr_pqid=1&viewType=summary&colName=WOS

https://www.amazon.com/s?ie=UTF8&page=1&rh=n%3A283155%2Cp_27%3AIon%20Boldea

https://www.researchgate.net/profile/N_Muntean/contributions

<https://en.wikipedia.org/wiki/Timi%C8%99oara>

Contact: ion.boldea@upt.ro nicolae.muntean@upt.ro