



CEIUPM

Centro de Electrónica Industrial

NewsLetter

of CENTRO DE ELECTRÓNICA INDUSTRIAL (CEI)



POLITÉCNICA

July–December 2011

"We are what we repeatedly do. Excellence then, is not an act, but a habit" Aristotle

nr. 4

The CEI was officially recognized as a "UPM Center" in October 2006. When we were discussing the key factors that would add value over the existing DIE (División de Ingeniería Electrónica), the leader of a well established International Center, one of our references along the years, told us "You already have a Center". The formal recognition is important, but the daily work and the activities carried out by a number of researchers and staff aligned towards some common objectives, sharing a joint strategy along the years, is what really produces results and adds value to the community. We pursued strong and stable links with industry, we focused on integrating persons with diverse origin and nationality, and generated some instruments that would help the task: the "Annual Meeting", the "Newsletter" or the "Monday seminars" are some examples.

All this was implemented by team work, but special recognition is due to those who take the lead to move from ideas to facts. Teresa, Oscar and Rafael, we all are thankful for your work. We have improved significantly during these four years, and you keep on board for continuing growth. Thanks!

FIFTH edition of our Annual Seminar, we are proud to announce this event. It is a reality, gaining momentum yearly. Last year 31 attendees from industry represented 18 companies. 23 attendees from universities other than UPM, together with 46 CEI members, created an authentic collaborative atmosphere to share results and envisage the future. Aiming at being open, in this edition the technical sessions include specific spots for industry and cooperating universities. We have also prepared a conversational discussion on "Entrepreneurship in Electronics", to stimulate new ideas and paths to produce value out of the daily research work.

"Energy" and "Sensing the world" are two megatrends that may benefit from our research on Electronics. We are enthusiastically working on sensor networks, reconfigurability, embedded control systems, energy efficiency, power quality, power management, on chip power conversion, RF amplifiers, modeling, control and optimization of power architectures, wide bandgap devices and photovoltaic inverters. We are also eager to learn about graphene, spintronics, or any emerging technology. We count on you for continuously focus our joint research. Thanks!.

Monday Seminars

be aware of CEI-UPM results every two weeks

Following our dissemination activity (particularly that concerning research activities), which is open to all our members and partners. During the last semester these seminars were held every fortnight on Mondays. The program of the seminars has been as follows:

	M	T	W	T	F	Sa	Su	
JUN	6						Z. Pavlović	
		4					D. Meneses	
JULY			18				J. Valverde	
			12				S. Vesti	
SEPT				26			C.A. López	
OCT					10		D. He	
NOV						7	V. Šviković	
						21	E. Lezcano	
DEC							12	G. Catalanotto

The seminars are open to the public and they take one hour, including presentation and Q&A. They run in an informal way, so people are encouraged to participate and to suggest ideas to the researchers. In most of the cases, they are related to ongoing work.

Coming next....

	M	T	W	T	F	Sa	Su
FEB	20						D. Cucak
MARCH		5					N. Hensgens
			19				G. Liang
APRIL				9			G. Mujica
					23		J.M. Molina

Specialized Seminars

Courses offered in the Master on Industrial Electronics

Three seminars with topics of current interest in the field of industrial electronics. These courses are given by expert in industrial electronics topics. The seminars of course 2011/12 are the following:

- Basic technologies for the management of cooperating objects and Sensor networks in smart cities by Pedro J. Marrón from Computer Science Department. Univ. Duisburg-Essen (Germany) Date: TBD
- Current injection in three-phase rectifiers by Predaj Pejovic from Univ. of Belgrado (Serbia) April 25-27, 2012
- Evolutionary design and evolvable hardware by Lukas Sekanina from Univ. Brno (Rep. Checa) May 9-11, 2012

Master Theses

- Optimum design of an envelope tracking buck converter for RF PA using Gan HEMTs by Dejana Cucak
Thesis Supervisors: O. García & M. Vasic Date: 06/10/2011
- Synchronous Buck converter with output impedance correction circuit by Vladimir Svikovic
Thesis Supervisors: J.A. Oliver & P. Alou Date: 06/10/2011
- Criterios de optimización y diseño de un rectificador trifásico para aplicaciones aeronáuticas by Marcelo Silva
Thesis Supervisors: J.A. Oliver Date: 06/10/2011
- Desarrollo de una estructura alimentada en corriente para modelado y simulación de convertidores CC-CC no-lineales a nivel de sistema by Pablo San Román
Thesis Supervisors: J.A. Oliver Date: 06/10/2011

NEWS BRIEFS

- CEI-UPM participated in the activities of *Semana de la Ciencia*, coordinated by UPM. Three groups of high-school students visited us, and we hope they enjoyed with us (as we did with them). The young potential-future-researchers were given some hints on how a research center works, what is electronics and how close it is to their daily lives. For 2011, the visit will take place on November 14th, 2011.
- José A. Cobos elected Member at Large of the IEEE-PELS Administrative Committee.
- David Meneses presented his view on Corporate Social Responsibility in the School, from the "Research" perspective.
- A new Steering Committee was appointed December 2011: Director, José A. Cobos, Vicedirector, Oscar García and Secretary, Félix Moreno.
- Predocctoral stay for 3 months



José A. Cobos

O. García

F. Moreno

David Meneses in Aalborg University (Denmark).

Welcome... to the new CEI-UPM members who joined us during this period



S. Zhao (China)



H. Pisani (Venezuela)



J. Mora



D. Alejo

They are full-time researchers and Master students.

We also welcome Jihoon Yang (from University of Hangyang, Corea del Sur) who came for a 9 month post-doctoral stay, funded by the EM BEAM Program (Erasmus Mundus).

Books

- J. Portilla, A. de Castro, T. Riesgo, *Plataforma modular e interfaces de transductores para redes de sensores inalámbricas*, Ed. Académica Española, ISBN 978-3-8443-4288-8, 2011
- A. de Castro, T. Riesgo, O. García, *Control digital basado en FPGA para convertidores conmutados: Aplicación a convertidores CA/CC y CC/CC*, Ed. Académica Española, ISBN 978-3845496542, 2011

Journals

- R. Salvador, F. Moreno, T. Riesgo, and L. Sekanina, *Evolutionary Approach to Improve Wavelet Transforms for Image Compression in Embedded Systems*, *EURASIP Journal on Advances in Signal Processing*, 10.1155/2011/97380, pp. 1-20, ID 973806, 2011
- Y. Esteves Krasteva, J. Portilla, E. de la Torre and T. Riesgo, *Embedded Run-time Reconfigurable Nodes for Wireless Sensor Networks Applications*, *IEEE Sensors Journal*, 10.1109/JSEN. 2011.2104948, pp. 1800-1810, vol.11, nº 9, September, 2011
- M. Carmen González, P. Alou, O. García, J.A. Oliver, R. Prieto, J.A. Cobos, H- Visario, *Multiphase Converter Based on Transformer Coupling*, *IEEE Transactions on Power Electronics*, 10.1109/TPEL. 2011.2117442, pp. 2956-2968, vol. 26, nº 10, October, 2011



Dejana Cucak received the best poster Award in *IEEE Energy Conversion Congress and Exposition (ECCE)*. Phoenix (Arizona).

Farewell... to M^a del Carmen Arias, Pablo San Román, he is now working in INDRA, Eduardo Lezcano and Rubén Salvador, he is enrolled as Assistant Professor position at the EUITT-UPM.

IDEAS meetings. "Innovative Discussions of Experiences, Analysis and Solutions"

Do you have a design problem?... Did you solve it?... How did other people solve it? Come and tell us! This new format (5 min. presenting a problem / 25 min. of expert discussion) of interaction among researchers help to advance more quickly.

The detailed calendar of meetings is coming soon

The fifth Annual Meeting of the CEI-UPM will take place in the ETSII-UPM on March 22nd and 23rd, 2012. As in previous editions, the main objective this year is to present the activities of the CEI and its partners. Our Annual Meeting is an interesting networking space, a place to learn and to meet your colleagues and partners. This year we expect to continue increasing the number of attendees even more.

THURSDAY AFTERNOON (March 22nd)

Opening session

Overview of CEI and Annual Meeting
Strategic Research

Conversational Discussion

Entrepreneurship in Electronics

Visiting the CEI Lab and POSTER SESSION

FRIDAY MORNING (March 23rd)

Technical Session s

CEI Session
University Session
Industry Session

Wrap-up Coctel

5 Annual Meeting

March 22nd -23rd, 2012

More information on www.cei.upm.es



by O. GARCÍA

XFEL project: A step to the future

Would you like to see the atomic structure of a bone? Or would you like to film a chemical reaction? Or would you like to see the performance of materials in structures smaller than 100nm?

These type of experiments will be possible in the near future thanks to the European XFEL. The X-Ray Free Electron Laser is a 3km long facility that is being built near Hamburg. Twelve countries, lead by Germany, are collaborating to create this unique best-in-the-world scientific site. Hopefully, it will be ready in 2015. Spain is participating with 2% of the total budget, mainly through In-Kind Contributions.

To produce an X-ray beam, bunches of electrons are accelerated in resonators and then driven into a slalom-type path created by undulators, to emit a high quality X-ray radiation whose wavelength can be as small as 0.05nm. The control of the electrons beam, in both resonators and undulators, is carried out by super-conductive magnets.

UPM-CEI is participating in this outstanding project being responsible of the power supplies of the cold magnets of the facility. This is a special power supply that should be very accurate in controlling its high output current, especially when the magnet is in super-conductive mode and no power is delivered to it. A mixed control mode varying both duty cycle and frequency has been adopted. The power supply is remote controlled and special attention has been paid to obtain a high reliability, introducing redundancy and some protections.

We are very proud of adding our knowledge to this initiative that may lead to achieve important physics discoveries in the future.

Conferences

SAAEI Badajoz (Spain), July 2011

- P. Varela, D. Meneses, O. García, J.A. Oliver, P. Alou, J.A. Cobos, *Control en modo corriente y tensión eficaz con lazo de offset para inversor monofásico embarcado en aviones adecuado para funcionamiento en paralelo y conexión trifásica*
- P. Cheng, M. Vasic, O. García, J.A. Oliver, P. Alou, J.A. Cobos, *Design methodology in multiphase buck converter based on minimum time control for high efficiency RF amplifiers*
- M. Silva, N. Hensgens, J.A. Oliver, P. Alou, O. García, J.A. Cobos, *EMI filter design of a three-phase buck-type rectifier for aircraft applications*
- D. Cucak, M. Vasic, O. García, J.A. Oliver, P. Alou, J.A. Cobos, *High efficiency envelope tracking buck converter for RFLPA using GaN HEMTs*
- P. San Román, J.A. Oliver, P. Alou, O. García, J.A. Cobos, R. Prieto, *Non-linear gain – look-up table based approach for modeling a family of DC to DC converters based on transient response analysis*
- J.M. Molina, O. García, R. Asensi, P. Alou, J.A. Oliver, J.A. Cobos, *Red adaptativa de conmutación suave para convertidor trifásico en puente activo completo para aplicaciones de vehículos eléctricos*

ECCE Phoenix, Arizona (USA), September 2011

- D. Cucak, M. Vasic, O. García, J. A. Oliver, P. Alou, J. A. Cobos, *Optimum Design of an Envelope Tracking Buck Converter for RF PA using GaN HEMTs*
- D. Díaz, O. García, J.A. Oliver, P. Alou, F. Moreno, A. de Castro, B. Duret, J.A. Cobos, F. Canales, *Digital Control Implementation to Reduce the Cost and Improve the Performance of the Control Stage of an Industrial Switched-Mode Power Supply*
- D. Meneses, O. García, P. Alou, J. A. Oliver, R. Prieto, J. A. Cobos, *Single-Stage Grid-Connected Forward Microinverter with Boundary Mode Control*
- M. Vasic, O. Garcia, J. A. Oliver, P. Alou, J. A. Cobos, *Serial or Parallel Linear-Assisted Switching Converter as Envelope Amplifier: Optimization and Comparison*
- O. García, J.A. Oliver, D. Díaz, P. Alou, A.B. Duret and J.A. Cobos, *Teaching digital control of switch mode power supplies (Póster)*
- P. Varela, D. Meneses, O. Garcia, J. A. Oliver, P. Alou, J. A. Cobos, *Current Mode with RMS Voltage and Offset Control Loops for a Single-Phase Aircraft Inverter Suitable for Parallel and 3-Phase Operation Modes*
- P.M. Cheng, M. Vasić, P. Alou, J.A. Oliver, O. Garcia, and J.A. Cobos, *Design of envelope amplifier based on interleaved multiphase buck converter with minimum time control for RF application*
- M. Silva, N. Hensgens, J.A. Oliver, P. Alou, O. García, J. A. Cobos, *New Considerations in the Input Filter Design of a Three-Phase Buck-Type PWM Rectifier for Aircraft Applications*

Other

- T. Cervero, A. Otero, S. Lopez, E. de la Torre, R. Sarmiento, T. Riesgo, G. Callicó, *A Novel Scalable Deblocking-Filter Architecture for H.264/AVC and SVC Video Codecs, International Conference on Multimedia and Expo Barcelona (ICME)*, July, Barcelona (Spain)
- A. Otero, T. Cervero, E. de la Torre, S. López, G. Callicó, T. Riesgo, R. Sarmiento, *Run-time Scalable Architecture for Deblocking Filtering in H.264/AVC-SVC Video Codecs, International Conference on Field Programmable Logic and Applications (FPL)*, September, Crete (Greece)
- O. García, M. Vasic, P. Alou, J.A. Oliver, D. Díaz, P. Cheng, J. A. Cobos, *Series combination of a switched dc-dc converter and a linear regulator for high frequency RF envelope amplifier, Simposium Nacional de la Unión Científica Internacional de Radio (URSI)*, September, Madrid (Spain)
- T. Cervero, A. Otero, E. de la Torre, S. López, G. Callicó, T. Riesgo, R. Sarmiento, *Framework adaptable y reconfigurable dinámicamente para procesamiento de vídeo: aplicación a la etapa de filtrado adaptativo en sistemas de compresión de vídeo H.264/AVC y SVC, Jornadas de Computación Reconfigurable y Arquitecturas (JCRA)*, September, Tenerife (Spain)
- S. Vesti, J.A. Oliver, T. Suntio, R. Prieto, J.A. Cobos, *Stability and Transient Performance Assessment in a COTS-Module-Based Distributed DC/DC System, International Telecommunications Energy Conf. (INTELEC)*, October, Amsterdam (Netherlands)
- T. Riesgo, E. de la Torre, Y. Torroja, J. Portilla, F. Moreno, *De la reconfigurabilidad a las redes de sensores (y viceversa), II Jornadas de Computación Empotrada*, October, Granada (Spain)

IECON Melbourne (Australia), December 2011

- L. Wei, J. Portilla, F. Moreno, T. Riesgo, G. Liang, *Improving target localization accuracy of wireless visual sensor networks*
- F. Moreno, D. Aledo, *The DLM. An alternative to the DCT*
- V. Roselló, J. Portilla, T. Riesgo, *Ultra Low Power FPGA-Based Architecture for Wake-up Radio in Wireless Sensor Networks*

DCIS Albufeira (Portugal), November 2011

- A. Otero, R. Salvador, J. Mora, E. de la Torre, T. Riesgo, L. Sekanina, *2D Reconfigurable Systolic Core Architecture for Evolvable Systems*
- V. Roselló, J. Portilla, T. Riesgo, *Wake up Radio Architecture for Wireless Sensor Networks Using an Ultra Low Power FPGA*

ReConFig Cancún (Mexico), December 2011

- W. He, E. de la Torre, T. Riesgo, *A Precharge-Absorbed DPL Logic for Reducing Early Propagation Effects on FPGA Implementations*
- R. Salvador, A. Otero, J. Mora, E. de la Torre, L. Sekanina, T. Riesgo, *Fault Tolerance Analysis and Self-Healing Strategy of Autonomous, Evolvable Hardware Systems*

Next appointment



Research Projects

Integrated DC/DC Converters

- New!** Fuentes de alimentación con rápida respuesta dinámica para gestión de la energía (FAST) funded by **Mº Ciencia e Innovación**, from 01/01/2011 to 31/12/2013
- Técnicas de control avanzadas para convertidores CC/CC de muy rápida respuesta dinámica funded by **Comunidad de Madrid**, from 01/01/2011 to 31/12/2011

Embedded Control Systems

- Enclavamiento Electrónico de Nueva Generación (ENCE-NG) funded by **ELIOP SEINALIA S.L. (CDTI)**, from 01/04/2011 to 30/11/2013

Modeling & Simulation of power architectures, circuits and components

- Consulting services for developing IC power module components for Simplorer (Developing_IC_2011) funded by **ANSYS**, from 04/01/2011 to 31/12/2011
- Modelos rápidos equivalentes para gestión de redes electrónicas de energía (MORE_GREEN) funded by **Mº Ciencia e Innovación**, from 01/01/2011 to 31/12/2013
- PExpert and SMPS Library (PExpert-SMPS) funded by **ANSYS**, from 01/05/2007 to 01/05/2017
- Soporte al desarrollo de componentes inductivos y sistemas electrónicos de potencia (PREMO_09_11) funded by **PREMO**, from 01/11/2009 to 31/12/2011

Power Quality

- New!** Líderes en energías renovables oceánicas (OCEAN LÍDER) funded by **AREVA (CENIT-E)**, from 2009 to 2012
- Gestión automatizada de los datos de registradores de REE, funded by **REE**, from 01/10/2011 to 01/10/2012
- Modelos avanzados para el estudio de la calidad de onda de enlaces en corriente continua con convertidores en fuente de tensión, funded by **REE**, from 01/10/2011 to 01/04/2013 --NEW
- Harmonic Modeling of Three Phase Rectifiers: Continuous Mode (HAMOTRE-CM) funded by **Électricité de France**, from 01/02/2011 to 01/03/2012
- Introduction to a Harmonic Equivalent for Domestic Loads-Programmng funded by, **Électricité de France**, from 01/02/2011 to 12/12/2011

Optimization of Power Architectures

- New!** Estudio y definición de la funcionalidad de las fuentes de alimentación para la alimentación de imanes superconductores (FCIE) funded by **CIEMAT**, from 01/12/2010 to 30/07/2011
- Fuentes de alimentación para los imanes superconductores del XFEL europeo (XFEL) funded by **Mº Ciencia e Innovación**, from 01/12/2010 to 30/11/2013
- PhD work in virtual optimized EMC filter design for power electronic converters under consideration of real components and interconnects (ABB-MEC) funded by **ABB Switzerland Ltd.**, from 01/03/2010 to 28/02/2013
- Sistema de gestión de energía para alimentación de cargas de continua regenerativas desde un generador trifásico (HVDC BOOM) funded by **INDRA (CENIT)**, from 01/07/2010 to 31/03/2012
- Tecnologías para la movilidad urbana sostenible y accesible (TECMUSA) funded by **Mº Ciencia e Innovación**, from 01/10/2009 to 30/09/2011
- Magnesium new technological opportunities (MAGNO) funded by **FAGOR (CENIT)**, from 01/11/2008 to 31/10/2011
- Optimización de la cadena de alimentación para una aplicación radar de barrido electrónico (CARE) funded by **INDRA SISTEMAS, S.A.**, from 01/09/2011 to 31/12/2012
- Power Delivery, distribution and Design Modeling Research (PD3T_2) funded by **INTEL Corp.**, from 01/09/2009 to 31/08/2011
- Sistemas de gestión y regulación de energía eléctrica (ÍCARO) funded by **INDRA (CENIT)**, from 01/10/2008 to 30/09/2011

Reconfigurable Embedded Systems

- New!** Dynamically Reconfigurable Embedded Platforms for Networked Context-Aware Multimedia Systems (DREAMS) funded by **Mº Ciencia e Innovación**, from 01/01/2012 to 31/12/2013
- Open Source FPGA Accelerator & Hardware-Software Codesign Toolset for CUDA Kernels (FASTCUDA) funded by **European Commission FP7-SME-2011 (Capacities)**, from 01/11/2011 to 31/10/2013
- Reconfigurabilidad dinámica para escalabilidad en redes orientadas a aplicaciones multimedia (DR.SIMON) funded by **Mº Ciencia e Innovación**, from 01/01/2009 to 31/12/2011
- Reconfigurabilidad Interoperable (RECINTO) funded by **Comunidad de Madrid**, from 01/01/2011 to 31/12/2011
- Reconfigurable Ultra-Autonomous Novel Robots (RUNNER) funded by **Comisión Europea / CDTI / ISIS**, from 01/12/2010 to 30/11/2013

RF Amplifiers

- Amplificadores de envolvente de banda ancha para etapas EER/ET y fabricación de dispositivos de nitruro de galio (GAN) (AEGAN) funded by **Mº Ciencia e Innovación**, from 01/01/2010 to 31/12/2012
- Advanced Wide band gap semiconductor devices for rational use of energy (RUE) funded by **Mº Ciencia e Innovación**, from 01/11/2009 to 31/10/2014

Sensor Networks

- New!** Sistema de Iluminación Inteligente LUIX (TECALUM) funded by **INNFACTO - Mº Ciencia e Innovación**, from 01/11/2011 to 30/11/2014
- ICT tools greening food processing businesses (GIST) funded by **European Commission CIP ECO INNOVATION** from 12/09/2011 to 11/09/2014
- Plataforma tecnológica inteligente para la producción sostenible en industrias agroalimentarias (2010/11) (SUSTENTIC) funded by **Mº Industria, Turismo y Comercio (Programa Avanza I+D)**, from 01/01/2010 to 31/12/2011
- Secure, Mobile visual sensor networks ArchiTexture (SMART) funded by **Artemis/MICyT**, from 01/05/2009 to 30/04/2012
- Tecnologías eficientes e inteligentes orientadas a la salud y al confort en ambientes interiores (TECNOCAI) funded by **MTP (CENIT)**, from 01/10/2009 to 31/12/2012
- WSN Development, Planning and Commissioning & Maintenance ToolSet ((WSN DPCM) funded by) funded by **Artemis/MICyT**, from 01/10/2011 to 30/09/2014