CAS Outreach Initiative 2017: IEEE CASS Latin America DL Program

Coordinator of the initiative:
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Chair of the IEEE CASS Peru Chapter

Brief description of the proposal

The IEEE CASS Chapters of Latin America are proposing to set up a Latin America DL Program. It is an experience to increase the presence of CASS in several countries of Latin America.

The speakers were invited to do talks on the state-of-the-art subjects related to Circuits and Systems. I received proposals from Chapter Chairs to receive DL speakers from academia and industry.

Description of how the planned activity benefited the Society

The Latin America DL Program stimulated new memberships to the IEEE CASS, while promoting the IEEE CASS within the local engineering community. The IEEE CASS Latin America Chapters done a joint organization enforcing the need of bringing together researchers, professionals and students in a variety of topics in the field, creating an opportunity to exchange information and experience about forefront research topics on Circuits and Systems.

In all the activities developed, the students of the technical student chapters worked in the organization and were disseminators of the conferences that were offered. The students who were members of a student chapter called other students who were not and in this way the number of student members of the CAS increased.

In the same way, in all the activities, different universities of the country that received the lecturer, pfrecido their support in facilities and equipment observing that the teachers of the area of electronic, electrical and computer engineering participated in the organization and the talks themselves.

Mobility of DL in region 9

DL/Institution	From	To	Lecture	Participants;Duration
Dr. Elkim Roa/ Universidad Industrial de Santander; Colombia.	CAS-Colombia	CAS-Uruguay	Microcontrollers RISC-V for ?ALWAYS-ON DOMAIN? - SIFIVE, GOOGLE, U.CAMBRIDGE and UIS	40 participants from Costa Rica, Argentina and Uruguay;1 hour
Dr. Elkim Roa/ Universidad Industrial de Santander; Colombia.	CAS-Colombia	CAS-Uruguay	**Workshop:** VLSI Synthesis and the RISC-V processor	40 participants from Costa Rica, Argentina and Uruguay; 3 days Note: this workshop was held during the same week of the conference
Dr. Carlos Silva-Cardenas/ Pontificia Universidad Catolica del Peru	CAS-Peru	CAS-Colombia	Energy harvesting	32 participants from several Colombian universities; 1.5 hours
Dr. Carlos Silva-Cardenas/ Pontificia Universidad Catolica del Peru	CAS-Peru	CAS-Colombia	Meeting with steering committee of CAS-Colombia	4 participants; 1.5 hours Note: This meeting was held after the conference
Dr. Alfredo Arnaud/Universidad Catolica del Uruguay	CAS-Uruguay	CAS-Peru	RFID y Io Ten la agricultura	62 participants from several peruvian universities; 1.5 hours
Dr. Alfonso Chacón/TEC	CAS-Costa Rica	CAS-Uruguay	Ultra low power processing microarchitectures based on RISC-V	20 participants from several national universities; 1.5hours
Dr. Ricardo Reis/Universidad Federal do Rio Grande do Sul	CAS-Brazil	CAS-Chile	Low Power Challenges in IoT and IoE	25 participants from several chilean universities; 1.5 hours
Dr. Carlos Silva-Cardenas/ Pontificia Universidad Catolica del Peru	CAS-Peru	CAS-Chile	Energy Harvesting	25 participants from several chilean universities; 1.5 hours

DL RESUME :

Elkim Roa

He is an Engineer from the Industrial University of Santander, Colombia, Master in Engineering from the University of São Paulo - Brazil, and Dr. In Engineering from the Purdue University in the United States. He has experience in VLSI design in the semiconductor industry. He is currently a Professor at the Universidad Industrial de Santander where he leads the Onchipuis enterprise (http://www.onchipuis.io/) that has developed the first chips with the open architecture RISC-V.

(http://www.eetimes.com/author.asp?section_id=36&doc_id=1330445)

Lecture: "MICROCONTROLLERS RISC-V FOR? ALWAYS-ON DOMAIN? - SIFIVE, GOOGLE, U.CAMBRIDGE and UIS."

Summary: In this presentation the architecture of the RISC-V processor will be reviewed, especially considering aspects of very low consumption and? Always-on domain? , this is the minimum set of HW for the processor to work.

Workshop: "VLSI SYNTHESIS AND THE RISC-V PROCESSOR"

Summary: This workshop will review the digital design flow for VLSI, using the Cadence tools and taking as an example the synthesis to the layout of a RISC-V processor.

ALFREDO ARNAUD

Dr.Arnaud received his PhD, and MSc from UdelaR, Montevideo?Uruguay, in 2004 and 2000. respectively. Since 2004 he joined Electrical Engineering Department (DIE) at Universidad Católica del Uruguay, where he started microDIE research group. Dr.Arnaud holds two patents and as an academic he published more than 70 papers in international journals and scientific meetings, and participated in 20 funded R&D projects. He is the co-founder of two technology companies: BQN in 2004 (http://www.bqn.com.uy) dedicated to HW & SW development for RFID devices & traceability within de agribusiness industry, POS, medical instrumentation, among others, and Chipmate in 2009 (http://www.chipmateic.com) a spin-off of the microDIE aimed at the design of ASICs for medical devices and others. For the industry, Dr. Arnaud participated in design and consultancy in the field of microelectronics for implantable medical devices in five different occasions for companies in Uruguay, Brazil, Canada, and India. Dr. Arnaud also participated in the development of embedded electronics like portable POS equipment, a USB dynamic scale for medical applications, and a portable RFID reader according to ISO11784/11785 standard

Lecture: **RFID & IoT in the agribusiness industry**

New technologies like Radio Frequency Identification (RFID) or the Internet of Things (IoT) communication protocols and hardware embodiments, are rapidly changing production systems within the agribusiness industry. The main technologies and a survey of the state of the art will be presented first. Then, recent developments in UCU or BQN-Uruguay will be presented, like an ISO11784/85 compliant RFID reader connected to a cloud-based cattle information system, a RTU to process acoustic signals for illegal logging detection, or a LoRa based oestrus detection platform for dairy farms. Starting with these examples, the main emerging technologies for the IoT are discussed (LoRa, Sigfox, RPMA, NB-IoT among others) that will allow to address the opportunity and the need for low-range low-power devices in the agribusiness industry.

CARLOS SILVA-CARDENAS

He is a PhD from the Universidad Autonoma de Barcelona. Electronic Engineer by UNI. Principal Professor of the Pontifical Catholic University of Peru. Founder Director of the Microelectronics Research Group. He directs the master program of engineering of the Telecommunications in his university.

Silva-Cardenas has more than 70 publications. He is author of one book and 3 book chapters. He has been general chair of the congresses and conferences: IEEE LASCAS2013, IBERCHIP2013 and 2007, LATS2007, IEEE INTERCON2000 and 2009, IEEE ANDESCON2016, IEEE INTERCON2017 and others. He has been Program chair of a dozen congresses, conferences and symposiums and member of fourty program committees. Silva-Cardenas is the author of the design of the first Peruvian digital integrated circuit that achieved its manufacture in 5 micron CMOS technology.

He is the chair-founder of the CAS technical chapter of the IEEE-Peru Section having obtained significant awards as Technical Chapter of the year 2010 and in 3 opportunities Technical Chapter of the region 9. He was also President of Peru Section for the period 2009-2010 and BoG-CASS member for the period 2013-2014. Member of 2011-2015 IEEE Prize Papers/Scholarship Awards Committee

LECTURE: Energy Harvesting

In a world where technologically "everyone will be connected against everyone" there is little talk about ways to obtain and deliver energy to the devices and equipment that will make up the future scenario called INTERNET OF THINGS and BIG DATA. One of the most auspicious alternatives is to "harvest" the "wasted" energy existing around us and that through a conversion treatment to electric power will replace the traditional ways of "powering" equipment and devices.
In this talk you will see what energy harvesting consists of but we will see that Energy harvesting is the process of capturing minute amounts of energy from one or more natural sources, accumulating it and saving it for later use. In addition you will see the different processes of energy conversion towards electrical energy and its possible applications.

ALFONSO CHACON

Alfonso Chacón Rodríguez is an electronic engineer, graduated from the Technological Institute of Costa Rica. He holds a Master's Degree in English Literature from the University of Costa Rica, and a Doctorate in Engineering from the National University of Mar del Plata, Argentina. Currently, he is Coordinator of the Postgraduate Studies System of the Technological Institute of Costa Rica, and an active researcher of that institution with several scientific publications in the area of VLSI.

LECTURE: Ultra low power processing microarchitectures based on RISC-V

The development of increasingly intelligent implantable medical applications to solve different types of ailments in a personalized way must face multiple challenges: how to combine a high-risk scenario with restricted energy access, with applications that require complex processing architectures? This talk explores recent approaches to the definition of flexible processing systems for implantable medical devices, where possible solutions to the problems of high dependability, modularity, security against external attacks, ultra low energy consumption and tiny size are explored. A preliminary proposal on one of these systems is also presented, based on the open ISA of RISC-V.

RICARDO REIS

Electrical Engineering from the Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, Brazil, in 1978. Ph. D. degree from the Polytechnic Institute of Grenoble (INPG), France, January 1983. Professor at UFRGS since 1979. Former member of the Microelectronics Committee of National Council for Scientific and Technological Development (CNPq). Former member of the Computer Science Committee of National Council for Scientific and Technological Development (CNPq), for two terms.

More than 500 hundred papers in journals and conferences proceedings (like IEEE Design & Test, ACM TODAES, IEEE JSSC, ISCAS, SBCCI, PATMOS, VLSI-SoC, DAC, DATE, ICCD, CICC, ASP-DAC, LATW). Silver Core award from IFIP (International Federation for Information Processing). Professor and Advisor at the Microelectronics and Computer Science Graduate Programs at UFRGS. Former head of the Microelectronics Graduate Program and Computer Science Graduate Program at UFRGS. General Chair or Program Chair of several conferences like the IFIP/IEEE VLSI-SoC, IEEE ISVLSI, IEEE LASCAS, Symposium on Integrated Circuits and Systems Design (SBCCI) and Congress of the Brazilian Microelectronics Society (SBMIcro). IEEE CASS Chapter Rio Grande do Sul Chair (since 2007). Member of the Steering Committee of the following conferences: IFIP/IEEE VLSI-SoC, ICECS, LASCAS, NEWCAS, IEEE CASS Summer School, IEEE ISVLSI, SBCCI, IBERCHIP, and PATMOS. His primary research interests include Physical Design Automation and Methodologies, CAD tools, Circuits Tolerant to Radiation, VLSI Design Methodologies and Microelectronics Education.

LECTURE: Low Power Challenges in IoT and IoE

Abstract:
The increasing number of devices connected to the internet is providing the concept of Internet of Things, that together with Internet of Health, Internet of People and Internet of Something is constructing the Internet of Everything (IoE). There is also an overlapping between IoT and CPS (Cyber Physical Systems) that have as components not only electronic ones, but also mechanical components, optical components, organic components, chemical components, etc. A keyword in IoT is optimization, mainly power optimization. Power optimization must be done in all levels of design abstraction, and at physical level is related to the number of transistors. Also, many systems are critical ones, like in Internet of Heath, where reliability is a major issue. Most of the circuits designed nowadays use much more transistors than it is needed. The increasing leakage power and routing issues are an important reason to optimize the number of transistors, as leakage power is related to the number of transistors. Also, the replacement of a set of basic gates by a complex gate reduces the number of connections to be implemented using metal layers as well the number of vias. The reduction of the number of connections to be implemented using metal layers helps to improve routing and also helps to improve reliability. To cope with this goal, it is needed to provide tools to automatically generate the layout of any transistor network.