Keynote Speakers

Ambient Intelligence Towards Smart Cities

Dr. Francisco Falcone, Universidad Publica de Navarra, Pamplona, Spain

Abstract: Achieving sustainability is one of the major challenges that mankind is facing actually, in which a great deal of population is located in cities. The main goal of Smart Cities is to optimize the consumption of resources (energy, water), minimize pollution and improve the overall living experience of its inhabitants. This requires the implementation of “conscious” environments, in which by means of the retrieval of updated information, actions upon different subsystems, such as lighting, transportation or water supply can be taken. Moreover, the interaction of users with public administrations as well as with other groups is a driver for the adoption of dynamic and converged communication networks. Within this ecosystem, wireless networks play a key role in providing real time data as well as increased connectivity among users. In this presentation, the challenges and opportunities provided by the different type of wireless systems will be given. The increasing use of these systems will enable the existence of true ambient intelligence environments and hence the advent of Smart Cities.

Biography: Francisco Falcone (M05, SM09) received his Telecommunications Engineering Degree (1999) and PhD in Communications Engineering (2005), both at the Universidad Pública de Navarra (UPNA) in Spain. From 1999 to 2000 he worked as Microwave Commissioning Engineer at Siemens-Italtel. From 2000 to 2008 he worked as Radio Network Engineer in Telefónica

Móviles. In 2009 he co-founded Tafco Metawireless, a spin off devoted to complex EM analysis. From 2003 to 2009 he was also Assistant Lecturer at UPNA, becoming Associate Professor in 2009. Since 2012 he is Head of the Electrical and Electronic Engineering Dept at UPNA. His research area is artificial electromagnetic media, complex electromagnetic scenarios and wireless system analysis. He has over 300 contributions in journal and conference publications. He has been recipient of the CST Best Paper Award in 2003 and 2005, Best PhD in 2006 awarded by the Colegio Oficial de Ingenieros de Telecomunicación, Doctorate award 2004-2006 awarded by UPNA, Juan Lopez de Peñalver Young Researcher Award 2010 awarded by the Royal Academy of Engineering of Spain and Premio Talgo 2012 for Technological Innovation.

From Personal Robots to Cloud Robotics

Dr. Jordi Albo, La Salle University, Barcelona, Spain

Abstract: The talk focuses on the design of personal robotic platforms that are robotic companions and how these platforms are interconnected to a cloud robotic system and internet in general. We will see from a technical point of view the robotic system of the PATRICIA project based on evolving a commercial product like PLEO to become part of a cloud robotics system. Also two additional robotic platforms will be shown, one for children with Traumatic Brain Injure based on a mobile device, and another one to help caregivers to deal with elderly people with dementia in other to reduce their anxiousity and stress.\r\n\r\n

Biography: In the last years my research and work at La Salle University has been related to improve the learning process through LEGO Robotics and other platforms. As Associate Professor from La Salle I am: 1) Teaching Technology for Education in the Master for High Schools Teachers, 2)Teaching Robotics to undergrads, and 3) The coordinator of the Robotic workshops to secondary and high school students that visit the university every year. At the same time I have been participating and leading different projects that involve education-robotics-children with autism, TBI (for which I received the Spanish Alan Turing Award), and Leukemia. As a personal challenge I have design LEGO Robotics Curricula for some schools, Montserrat School as the best reference. My Bc, MSc and PhD were done in La Salle in EE background.

On Tracking and Rejecting Periodical Signals

Dr. Ramon Costa-Castelló, Universitat Politècnica de Catalunya, Barcelona, Spain

Abstract: Most control systems are related with tracking/rejecting constant (or piecewise constant signals), in practice many systems are subject to periodical references or disturbances. Although this is a well-known problem, the emergence of renewable energies has made this problem to be of great relevance to he scientific community. The Internal Model Principle (IMP) offers a nice framework to define the architecture of a control system

to address this problem for linear systems; unfortunately this principle does not describe how to tune the controller. Repetitive and resonant controls are two different philosophies to implemented IMP ideas. During the last decade many proposals have been formulate to tune this type of controller for specific applications. Despite all this work there are still some issues whose understanding must be improved, some of them are: how to improve the robustness against variations in signal frequency, how to minimize the effect of interharmonic amplification due to waterbed effect, how can these techniques can be extended to systems where periodicity is not with respect to time but wit respect to other variables of the system... In this talk a brief introduction to the most relevant applications related with tracking/rejecting periodical signals, fundamental concepts behind repetitive and resonant control will also be provided, and finally open problems in this field will be discussed.

Biography: Ramon Costa-Castelló was born in Lleida, CATALUNYA, SPAIN in 1970, obtained the master degree in computer science in 1993 from the Facultat d'Informàtica de Barcelona (FIB) from the Universitat Politècnica de Catalunya (UPC), in 2001 he obtained the PhD degree in computer science from the Advanced Automation and Robotics (AAR) program from the Cibernetics Institute (Institut de Cibernètica, IC) at UPC. Currently, he is an Associate Professor at the Automatic Control department (Department of Enginyeria de Sistemes Automàtica i Informàtica Industrial, ESAII) and the Control and Organization Institute (Institut d'Organització i Control de Sistemes Industrials, IOC) both from UPC. Currently, his teaching activity is related with the Industrial Engineering degree from the School of Industrial Engineering of Barcelona (Escola Tècnica Superior d'Enginyeria Industrial de Barcelona, ETSEIB) and the Master in Automation and Robotics (MAR) from the ESAII department. At this moment he is teaching:

Computer Control, Advanced Control and Real Time Systems from the ETSEIB and Robust Control from the MAR. His research is mainly focused on the development of digital control techniques for tracking/rejection periodic signals (repetitive control, resonant control), with application to power electronic converters (active filters, rectifiers) and mechatronic plants. In parallel with this activity he works on the development of virtual/remote laboratories and interactive applications applied to teaching of automatic control. He is the author of a number of magazines and conference papers. He is a Senior Member from the Institute of Electrical and Electronics Engineers (IEEE), member of the Comité Español de Automática (CEA) and member of IFAC (EDCOM, TC 9.4 Committee). https://sites.google.com/site/ramoncostacastello/

Towards general-purpose autonomous mobile robotic manipulators

Dr.-Ing. José de Gea Fernández, German Research Center for Artificial Intelligence, Bremen, Germany

Abstract: Human manipulation capabilities are one of the most fabulous achievements of evolution, and allegedly, the very first reason for the appearance of intelligence. However, it is unclear what percentage of human\\\'s manipulation skills have robots reached so far. We believe that most components to enable dexterous manipulation using kinematically complex robots in uncertain environments already exist. However, what is not clear yet, is how to integrate them in a coherent software control architecture which not only sums up single contributions but enhances and extends current capabilities of robots. Firstly, this presentation will give a short review of locomotion and manipulation control techniques being used over the last 10 years at our robotics research center. Building on top of those experiences, we will discuss the current challenges faced in integrating several key

components which should bring into existence a new generation of general-purpose autonomous mobile manipulators capable of being deployed in real-world environments which have not been previously prepared for them.

Biography: José de Gea Fernández received his M.Sc. in Electronics Engineering (2002) from the Technical University of Catalunya (UPC), Spain and his PhD in Robotics (2011) from the University of Bremen, Germany. Between 2003 and 2009 he was a Researcher at the Robotics Group of the University of Bremen. Since 2009 he is working at the Robotics Innovation Center of DFKI (German Research Center for Artificial Intelligence) in Bremen. There, from 2011 to 2013 he acted as Deputy Head of the Department for "Mobility and Manipulation". Currently, he is Senior Researcher and co-leader of the Team "Intelligent Kinematics". He has co-authored over 30 scientific publications and has been involved in different German national (BMBF, DFG, BMWi, DLR) and European projects (EU, ESA) in several areas within his research in robotic manipulation. He led the DFKI team in the German project SemProm which specified the software / hardware characteristics and designed the control strategies for the robot AILA. He also led the DFKI contributions in the EU Project Robofoot and is currently project leader of the project BesMan (Behaviors for Mobile Manipulation), funded by BMWi (German Federal Ministry of Economics and Technology) and DLR (German Space Agency). His research area is on mobile manipulation, which involves performing complex manipulation actions in unstructured and dynamically changing environments. This research area aims at getting

robot manipulators out of typical industrial, pre-determined and enclosed environments and deploy them in real-world scenarios and unforeseen situations.

FPGA-based controllers for power electronics and drive applications

Prof. Eric Monmasson, University of Cergy-Pontoise,, Cergy-Pontoise, France

Abstract: 1 Introduction. –State-of-the-art of the digital controllers. –Contribution of FPGAs for power electronics and AC Drive Applications, why FPGAs? (Contributions in terms of Control Performances and Contributions in terms of System Integration). – Design methodology. 2 FPGA-based Current control and PWM strategies. – Linear current control. – Non-linear current control. 3 Predictive current controlFPGA-based sensorless control. – High frequency signal injection. – Extended Kalman filter. – Aircraft industrial examples. 4 New trends on algorithms and architectures. – System-on-Chip (SoC) and Multiple-System-on-Chip (MSoC) (r)evolution. – RT simulation. – On-line parameter identification. 5 Conclusions and perspectives

Biography: Eric Monmasson (M'96-SM'06) received the Ing. and Ph.D. degrees from the Ecole Nationale Supérieure d'Ingénieurs d'Electrotechnique d'Electronique d'Informatique et d'Hydraulique de Toulouse (ENSEEIHT), Toulouse, France, in 1989 and 1993, respectively. Eric Monmasson is currently a full professor at the University of Cergy-Pontoise, Cergy-Pontoise, France. He is also with the Systèmes et Applications des

Technologies de l'Information et de l'Energie laboratory (SATIE, UMR CNRS8029). His current research interests include the advanced control of electrical motors and generators and the use of FPGAs for energy control systems. He was the chair of the technical committee on Electronic Systems-on-Chip of the IEEE Industrial Electronics Society (2008-2011). He is also a member of the steering committee of the European Power Electronics Association and the chair of the number one technical committee of the International Association for Mathematics and Computers in Simulation (IMACS). He was the general chair of ELECTRIMACS 2011 Conference. He is an associate editor of IEEE Transactions on Industrial Electronics and IEEE Transactions on Industrial Informatics. He is the author or coauthor of 3 books and more than 150 scientific papers.

HVDC Integration of large Wind Power Plants

Dr Ramon Blasco-Gimenez, Universitat Politècnica de Valencia, Valencia, Spain

Abstract: HVDC links and HVDC grids are seen as the key technology to reinforce European transmission grids for the integration of large wind power plants and, moreover, for the integration of the fragmented European electricity markets. The transmission system operators (ENTSO-E) and the International Electrotechnical Commission have clearly identified this importance and have set new codes to ensure a good integration with the existing AC transmission system. Several important issues, such as black-start operation, fault protection and ancillary services such as cooperation in AC grid frequency support, do require the coordination between WPP and HVDC converters and important advantages can be obtained from such coordination. This speech will cover the technical issues faced for the widespread use of multiterminal HVDC links for the connection of large Wind Power Plants and how WPP-HVDC coordinated control strategies can help to solve them.

Biography: Dr Ramon Blasco-Gimenez obtained his BEng. degree from the Technical University of Valencia, Spain, in 1992, and his Ph.D. degree in Electrical and Electronic Engineering from the University of Nottingham, U.K., in 1996.

From 1992 to 1995, he was a Research Assistant in the Department of Electrical and Electronic Engineering, University of Nottingham. He is currently an Associate Professor at the Dept. of Systems Engineering and Control of the Technical University of Valencia, where he teaches advanced control techniques and control of drives.

He has been a consultant to utilities on integration of wind farms in weak grids and to large wind farm operators on risk based operation and maintenance of off-shore wind farms. His research interests include control of motor drives, wind power generation, off-shore wind farms and large scale grid integration of renewable energy and has published more than 90 journal and conference papers in the aforementioned topics.

Dr Blasco-Gimenez has been a co-recipient of the 2005 IEEE Transactions on Industrial Electronics Best Paper Award. He is a Senior Member of the IEEE, member of the IEEE Electronics Society Technical Committee in Renewable Energy, a registered professional engineer in Spain, Chartered Engineer (U.K.) and member of the Institute of Engineering and Technology.

RF Energy Harvesting and Inductive Power Transfer

Prof. Paul Mitcheson, Imperial College, London, United Kingdom

Abstract: n this talk I will discuss two methods of powering devices \r\nusing wireless power - Harvesting RF energy and inductive power \r\ntransfer. Both technologies are receiving increased interest from the \r\nacademic community and industry due to their enormous potential: \r\napplications include powering wireless sensors, medical devices and \r\ncharging electric vehicles. RF energy harvesting is typically capable \r\nof providing only a few microwatts, but inductive power transfer can \r\noperate at the kW level. I will discuss the current state of the art \r\nand cover the work we are conducting at Imperial College on these two \r\ntechnologies.

Biography: Paul D. Mitcheson received the M.Eng. degree in electrical and electronic engineering and the Ph.D. degree from Imperial College London, U.K., in 2001 and 2005, respectively. He became a Lecturer (Assistant Professor) at Imperial College in 2006 and is currently a Senior Lecturer (Associate Professor) in the Control and Power Research Group, Electrical and Electronic Engineering Department at Imperial College London. He has research interests in energy harvesting devices, in particular the power processing requirements for harvester powered systems, including RF energy harvesting. He has a parallel line of work, which also concerns getting power to "hard to reach" places, investigating inductive power transfer.

Research Challenges in Microgrid Technologies

Juan C. Vasquez, Aalborg University, Aalborg, Denmark

Abstract: A microgrid could be defined as a part of the grid with elements like distributed energy sources, power electronics converters, energy storage devices and controllable local loads that could operate autonomously islanded but also interacting with the main power network in a controlled, coordinated way. Following the introduction of distributed control of these elements, cooperative control and hierarchical control schemes for coordination of the power electronics converters in order to control the power flow and to enhance the power quality will be elaborated. The focus will be on the analysis, modelling, and control design of power electronics based microgrids as well as power electronics control and communications. Further, the interconnection of microgrid clusters will be emphasized as an important step towards utilization of the Smartgrid concept.

Biography: eceived the B.S. degree in Electronics Engineering from Autonomous

University of Manizales, Colombia in 2004 where he has been teaching courses on digital circuits, servo systems and flexible manufacturing systems. In 2009, he received his Ph.D degree from the Technical University of Catalonia, Barcelona, Spain in 2009 at the Department of Automatic Control Systems and Computer Engineering, from Technical University of Catalonia, Barcelona, Spain, where he worked as Post-doc and also teaching courses based on renewable energy systems. Currently, he is an Assistant Professor at

Aalborg University, Denmark, where he is the co-leader of the microgrid research programme. He has been involved in a number if real microgrid site projects around the world. His research interests include modeling, simulation, networked control systems and optimization applied to distributed generation in AC/DC microgrids.

A Perspective of the Networks of the Future and Smart Cities

Luis M. Correia, IST/INOV-INESC - University of Lisbon, Lisbon, Portugal

Abstract: A parallel in the evolution between mobile and wireless communications and other areas (computers and cars) will be presented, in an attempt to identify possible directions for systems future evolution. A look into already existing technologies will enable to establish a perspective for future user interface devices and services (e.g., information access, Internet of Things, and geo-location). Then, potential services are identified, after which research challenges for mobile and wireless communications networks are addressed (e.g., network virtualisation, cloud networking, and networks of information). Smart Cities are taken as an integration example, as well as a perspective of application to other key sectors (e.g., health, transport, and energy). The link with other areas, and impact on regulation, standardisation, and policy matters are presented at the end.

Biography: Luis M. Correia was born in Portugal, on 1958. He received the Ph.D. in Electrical and Computer Engineering from IST (University of Lisbon) in

1991, where he is currently a Professor in Telecommunications, with his work focused in Wireless/Mobile Communications in the areas of propagation, channel characterisation, radio networks, traffic, and applications, with the research activities developed in the INOV-INESC institute. He has acted as a consultant for Portuguese mobile communications operators and the telecommunications regulator, besides other public and private entities. Besides being responsible for research projects at the national level, he has been active in 28 ones within the European frameworks of RACE, ACTS, IST, ICT and COST (where he also served as evaluator and auditor), having coordinated 3 of them, and taken leadership responsibilities at various levels in many others. He has supervised more than 150 M.Sc. and Ph.D. students, having authored more than 350 papers in international and national journals and conferences, for which he has served also as a reviewer, editor, and board member, and edited 6 books. He has been part of 26 Ph.D. juries at the international level. He was part of the COST Domain Committee on ICT. He was the Chairman of the Technical Programme Committee of several major conferences, and is part of several Steering Boards. He is part of the Expert Advisory Group and of the Steering Board of the European Net!Works platform, and was the Chairman of its Working Group on Applications.

Architectures and technologies for small-cell based communication systems

Alessandro Cidronali, University of Florence, Florence, Italy

Abstract: The need for ubiquitous coverage and a high degree of spectral efficiency it requires operators and base-station manufacturers to deploy greater numbers of small cells to increase network capacity: this is drive force that motivates the topics subject of this talk. The effective development of wireless transceiver for pico- and femto-cell based

communications, it requires that a number of topics have to be considered following an holist system level approach. This napproach considers the front end characteristics from the base band to the transmitter as a whole, thus determining the correct set of trade-offs and system architectures to meet the correct air access specifications. This talk discusses the mixed signal system level analysis of an FDD LTE transceiver for medium power envelope tracking applications. In particular it considers the various trade-offs between the several parameter which dominate a transceiver for this applications, namely the ENOB, duplexer isolation, shaping table depth, amplitude and delay errors. The presented approach permits to estimate the performance in terms of sensitivity, efficiency and linearity. The talk also consider how to model the key components, power amplifier included, starting from the characterization of the actual components.

Biography: Alessandro Cidronali (M89, SM 10) is an Associate Professor of Electronics at the Department of Information Engineering, University of Florence, where he teaches courses on electron devices and integrated microwave circuits. From 1999 to 2003, he was a Visiting Researcher with the Motorola Physics Science Research Laboratory. From 2002 to 2005, he was a Guest Researcher with the Non-Linear Device Characterization Group, at the National Institute of Standards and Technology (NIST). Under the frame of the IST-EU FP6 Network TARGET (IST-1-507893-NOE), he served as workpackage leader for the transmitters modeling/architectures for wireless broadband access work packages. His research activities cover the study of analysis and

synthesis methods for nonlinear microwave circuits, the design of broadband monolithic microwave integrated circuits (MMICs) and the development of modeling for microwave devices and circuits. Prof. Cidronali was recipient of the Best Paper Award presented at the 61st ARFTG Conference. From 2004 to 2006, he was an associate editor for the IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES. Prof. Cidronali is a member of the IEEE TC-20 Wireless Technologies MTT Technical Committee.

Taming the Information Overload of the Sensor Web

Noel OConnor, Dublin City University, Dublin, Ireland

Abstract: This talk is motivated by the fact that the next major evolution of the web, that is in fact already occurring, is towards the so called 'Sensor Web'. The growing prevalence of sensors in virtually all aspects of modern life means that new forms of information are increasingly finding their way from the physical world in which we live to the digital world we experience online. The once humble mobile phone is now a sophisticated multi-modality sensing platform capable of capturing audio, visual, location and motion information and making this available online in real-time. Advances in chemistry and material science mean that the next generation of smart clothing capable of unobtrusively digitally sensing our physiology as we go about our daily lives are almost within reach. Increasingly we are witnessing instrumentation of the physical world, whether CCTV for security/surveillance, in-situ sensing for environmental monitoring or instrumented sporting/leisure spaces, where again this data is finding its way into the online world. Of course, the Sensor Web brings many difficult research challenges, due in part to the nature of the sensed data – it is dynamic and highly unpredictable, for example. However, by far the biggest challenge presented is an exacerbation of the well-known information overload problem. The web

already contains vast volumes of information and adding new non-traditional sources of data makes it harder than ever before to get the right information, to the right user, at the right time. In this talk, I will show how my group is investigating new ways of taming the information overload problem brought by the Sensor Web. The approach taken is to extract useful information from the raw data via content analysis of multiple complementary sensor modalities. We believe that to make true progress a multi-disciplinary approach to content analysis is required, leveraging complementary expertise in areas such as image processing and computer vision, audio analysis, machine learning, information retrieval and data visualization. I will show examples of how we are addressing such challenges in a number of different application domains such as connected health, environmental monitoring and sports performance analysis.

Biography: Noel E. O'Connor is an Associate Professor in the School of Electronic Engineering at DCU and a Funded Investigator (FI) in INSIGHT, Ireland's national research centre for data analytics, where he is responsible for aspects of the centre's work on Media Analytics. His early research was in the field of video compression, specifically object-based compression in the context of MPEG-4, which subsequently led to an interest in video object segmentation and tracking as well as other aspects of computer vision. With the advent of MPEG-7, he became interested in audio-visual (AV) analysis for content-based information retrieval as well as low-power configurable hardware for AV processing, a key-enabler for next generation context-aware multimedia sensors. The focus of his current research is in multi-modal content analysis leveraging

mutually complementary sensor data sources, for applications in sports and health, digital media, ambient assisted living and environmental monitoring. Since 1999 Prof. O'Connor has published over 180 peer-reviewed publications, filed 6 patents and spun off a campus company. He has graduated 16 Ph.D students and 3 Masters students. He is an Area Editor for Signal Processing: Image Communication (Elsevier) and an Associate Editor for the Journal of Image and Video Processing (Springer). He was awarded the DCU President's Research Award for Science and Engineering in 2010. Also in 2010, he was awarded Enterprise Ireland's National Commercialization Award for ICT. He is a member of the IEEE, ACM, Engineers Ireland and the IET.

Capacitive Sensor Systems, emerging technologies

Prof. Gerard C.M. Meijer, Delft University of Technology, Delft, The Netherlands

Abstract: A systematic approach towards the design of low-cost high-performance capacitive-sensor systems is presented. The basis problems and their solutions of both physical and electrical signal processing are discussed. Examples of architectures, implementations and performance of low-power interface circuits are presented. Especially for wireless applications, minimization of energy consumption per measurement is an important issue. Various types of interfaces have been benchmarked using a figure of merit for energy consumption and performance. Presented case studies include capacitive sensors for position detectors, characterization of material properties, liquid-level detectors and personnel detectors. Special attention is paid to electrode grounding for cases that the sensor system is used in an external environment.

Biography: Gerard Meijer received his M.Sc. and Ph.D. degrees in Electrical Engineering from the Delft University of Technology, Delft, The Netherlands, in 1972 and 1982, respectively. Since 1972 he has been a member of the Research and teaching staff of Delft University of Technology, where he is a professor, engaged in research and teaching on Analogue Electronics and Electronic Instrumentation. Since 1984, he has been consultant for industrial companies and research institutes. In 1996 he co-founded the company SensArt, where he is consultant in the field of sensor systems. In 1999 the Dutch Technology Foundation STW awarded him with the honoree degree "Simon StevinMeester" and in 2001 he was awarded the Anthony van Leeuwenhoek chair at TUDelft. In addition to many journal and conference papers, Meijer is also author and editor of books in the field of sensor systems, published by Wiley, Springer, IOP and Kluwer.

Energy harvesting: device, circuit and system co-design and on-chip integration

Prof. Eduard Alarcon, UPC BarcelonaTech, Barcelona, Spain

Abstract: The concept of harvesting ambient energy as an alternative power source for supplying integrated circuits aiming more miniaturized and distributed applications has been gaining momentum in the past years. A functional energy harvesting system, both in terms of available power and compatibility with system integration, requires concurrently addressing the energy transducing devices together with power management circuits. This tutorial will address the topic of power management circuits specific for harvesters, particularly emphasizing tight joint characterization, modeling and circuit co-design of the energy transducing devices and the power management frontend integrated circuits.

Biography: Eduard Alarcon received the M. Sc. (National award) and Ph.D. degrees (honors) in Electrical Engineering from the Technical University of Catalunya (UPC BarcelonaTech), Spain, in 1995 and 2000, respectively. Since 1995 he has been with the Department of Electronic Engineering at UPC, where he became Associate Professor in 2000. From August 2003 to January 2004, July-August 2006 and July-August 2010 he was a Visiting Professor at the CoPEC center, University ofColorado at Boulder, US, and during January-June 2011 he was Visiting Professor at the School of ICT/Integrated Devices and Circuits, Royal Institute of Technology (KTH), Stockholm, Sweden. During the period 2006-2009 he was Associate Dean of International Affairs at the School of Telecommunications Engineering, UPC. He has co-authored more than 250 scientific publications, 4 books, 4 book chapters and 4 patents, and has been involved in different National, European and US (DARPA, NSF) R&D projects within his research interests including the areas of on-chip energy management circuits, energy harvesting and wireless energy transfer, and nanotechnology-enabled wireless communications. He is the PI of the Guardian Angels EU FET flagship project at UPC and through N3CAT center he is part of the graphene flagship. He has given 25 invited or plenary lectures and tutorials in Europe, America and Asia, was appointed by the IEEE CAS society as distinguished lecturer for 2009-2010 and lectures yearly MEAD courses at EPFL. He has participated in Evaluation Boards for research proposals both in Europe (Chist-ERA, Belgium, Ireland, Italy) America (Canada) and Asia (Korea). He is elected member of the IEEE CAS Board of Governors

(2010-2013) and member of the IEEE CAS long term strategy committee. He was recipient of the Myril B. Reed Best Paper Award at the 1998 IEEE Midwest Symposium on Circuits and Systems. He was the invited co-editor of a special issue of the Analog Integrated Circuits and Signal Processing journal devoted to current-mode circuit techniques, a special issue of the International Journal on Circuit Theory and Applications, and invited associate editor for a IEEE TPELS special issue on PwrSOC. He co-organized special sessions related to on-chip power management at IEEE ISCAS03, IEEE ISCAS06 and NOLTA 2012, and lectured tutorials at IEEE ISCAS09, ESSCIRC 2011, IEEE VLSI-DAT 2012 and APCCAS 2012. He was the 2007 Chair of the IEEE Circuits and Systems Society Technical Committee on Power Circuits. He was the technical program co-chair of the 2007 European Conference on Circuit Theory and Design - ECCTD07 and of LASCAS 2013, Special Sessions co-chair at IEEE ISCAS 2013, tutorial co-chair at ICM 2010, Demo Chair of BodyNets 2012, track co-chair of IEEE ISCAS 2007, IEEE MWSCAS07, IEEE ISCAS 2008, ECCTD?09, IEEE MWSCAS09, IEEE ICECS'2009, ESSCIRC 2010, PwrSOC 2010, IEEE MWSCAS12 and TPC member for IEEE WISES 2009, WISES 2010, IEEE COMPEL 2010, IEEE ICECS 2010, IEEE PRIME 2011, ASQED 2011, ICECS 2011, INFOCOM 2011, MoNaCom 2012, LASCAS 2012, PwrSOC 2012, ASQED 2012, IEEE PRIME 2012, IEEE iThings 2012 and CDIO 2013. He served as an Associate Editor of the IEEE Transactions on Circuits and Systems - II: Express briefs (2006-2007) and Associate Editor of the Transactions on Circuits and Systems ? I: Regular papers (2006-2012) and currently serves as Associate Editor Elsevier?s Nano Communication Networks journal (2009-), Journal of Low Power Electronics (JOLPE) (2011-) and in the Senior Editorial Board of the IEEE Journal on IEEE Journal on Emerging and Selected Topics in Circuits and Systems (2010).

Power Supply for Wireless Sensor or Actuator Nodes

Leonhard Reindl, Institute of Microsystems Technology (IMTEK), University of Freiburg, Freiburg, Germany

Abstract: Portable wireless sensor or actuator systems, like portable phones, remote control, or ID cards play an ever growing role in our industrialized environment. Those systems and many more were enabled due to the steady decreasing power consumption of high integrated ICs. Most such systems are powered by batteries or inductive coupling. In this presentation several concepts for an alternative power supply of wireless sensor or actuator systems are discussed in detail. Batteries, although today mostly used, suffer from a limited storage capacity, which induce a labour and sometimes cost-intensive periodic maintenance, and a problematic ecological impact. The operating range of inductive coupling systems is due to the near field limited to the aperture of the coupling coil. UHF systems operate in the far field and reach higher distances. Their operating range is limited by the distance where the voltage at the feeding point of the antenna becomes too low to drive the rectifier circuit. Larger read out ranges become feasible by omitting the rectifier stage. In this case we need either a passive frequency modulating device to shift the read out signal to a side band, or a resonator with a high quality factor, like a SAW or BAW device, to store the energy until all environmental echoes are feed away. For many applications, both indoor and outdoor, energy harvesting system become feasible which convert ambient power densities like light, RF fields, special or temporal thermal gradients, or mechanical vibrations into electrica supply power of the wireless system. All those systems strongly suffer from a lack of energy. Thus new concepts for lowering the power consumption of awireless sensor or actuator system by keeping their features remain extreme important. Herby, a new wake up receiver is presented which operates on a current requirement as low as 3 micro A.

Biography: Leonhard Reindl received his Diploma in Physics from Technical University of Munich, Germany, in 1985 and his Dr. sc. techn. from University of Technology Vienna, Austria, in 1997. In April 1985 Dr. Reindl joined the surface acoustic wave group of the Siemens Corporate Technology Division, Munich, Germany. At Siemens Dr. Reindl contributed to the development of SAW convolvers, dispersive, tapped, and reflective delay lines. His primary interest was in the development and application of SAW ID-tag and wireless passive SAW sensor systems. In April 1999 Dr. Reindl joined the Institute of Electrical Information Technology, Clausthal University of Technology, where he became professor of communications and microwave techniques. In May 2003 he accepted a full professor position as the chair for Electrical Instrumentation at the Institute for Microsystems Technology (IMTEK) at the University of Freiburg, Germany. Dr. Reindl is member of the IEEE, of the TPC of the IEEE Frequency Control Symposium, the Ultrasonics Symposium, the Eurosensors, and of the German biannual Symposium Sensoren und Messsysteme. He has been elected member of the AdCom of the IEEE UFFC society in 2005 to 2007 and from 2009 to 2011. He served also for the European ESRIF committee. He holds more than 30 patents on SAW devices and wireless passive sensors and has authored or co-authored more than 150 papers in this field.