Singapore Circuits and Systems (CAS) Workshop 2018

An inspiring sharing from Circuits & Systems Society Executive Committee Members and Industry Speakers

Date: 9 March @ 11am to 5.15pm
Venue: Executive Seminar Room (Executive Seminar Room (S2.2-B2-53))
Co-Organized by
Circuits and Systems Society, Singapore Chapter,
IEEE Young Professionals and
NTU EEE Graduate Students Club

Dear Students/Colleagues/Friends:

We are pleased to conduct a Circuits and Systems (CAS) Workshop on 9 Mar 2018 at Executive Seminar Room (S2.2-B2-53), Nanyang Technological University. Our speakers include

- Prof. Yong Lian, President, CAS Society
- Prof. Manuel Delgado-Restituto, Vice President Publications, CAS Society
- Prof. Eduard Alarcon, Vice President Technical Activities, CAS Society
- Prof. Chang Wen Chen, Vice President Admin, CAS Society
- Prof. Amara Amara, President-Elect, CAS Society
- Prof. Franco Maboberti, Past-President, CAS Society
- Prof. Myung Sunwoo, VP Conferences, CAS Society
- Prof Arindam Basu, Assoc Professor, NTU
- Dr Wang Yi (Continental, Singapore)
- Industry Speaker – to be confirmed

Please register the free event before 5 Mar 2018
https://wis.ntu.edu.sg/pls/webexe/REGISTER_NTU.REGISTER?EVENT_ID=OA18021311560650

Tentative Program*

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<td>“Future of Circuits and Systems Society” – by Prof. Yong Lian, President, CAS Society</td>
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<td>11.40 – 12.10</td>
<td>“Dynamic Range Considerations for Neural Recording Channels” – by Prof. Manuel Delgado-Restituto, Vice President Publications, CAS Society</td>
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<td>15.20 – 15.40</td>
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<td>“Why We Do Research?” – by Prof. Franco Maboberti, Past-President, CAS Society</td>
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<td>– by Prof. Myung Sunwoo, Vice President Conferences, CAS Society</td>
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*The program may be changed
About the Speakers

Yong Lian (M’90–SM’99–F’09) received the B.Sc. degree from the College of Economics and Management, Shanghai Jiao Tong University, Shanghai, China, in 1984, and the Ph.D. degree from the Department of Electrical Engineering in National University of Singapore (NUS), Singapore, in 1994. He spent nine years in industry and joined NUS in 1996, where he served as the Deputy Department Chair for Research, Area Director for IC and Embedded Systems in the ECE Department, member of University Tenure and Promotion Committee, and member of Senate Delegacy. He was appointed as the first Provost’s Chair Professor in the Department of Electrical and Computer Engineering of NUS in 2011. Currently, he is a Professor in York University in Canada.

Dr. Lian's research interests include biomedical circuits and systems and signal processing. He has received many awards including IEEE Circuits and Systems Society’s Guillemin-Cauer Award (1996), IEEE Communications Society Multimedia Communications Best Paper Award (2008), Institution of Engineers Singapore Prestigious Engineering Achievement Award (2011), Hua Yuan Association/Tan Kah Kee International Society Outstanding Contribution Award (2013), and Design Contest Award in 20th International Symposium on Low Power Electronics and Design (ISLPED2015). As an educator, Dr. Lian received the University Annual Teaching Excellent Award in two consecutive academic years from 2008 to 2010 and many other teaching awards from the Faculty of Engineering of NUS. Under his guidance, his students received many awards including the Best Student Paper Award in ICME 2007, winner of 47th DAC/ISSCC Student Design Contest in 2010, Best Design Award in A-SSCC 2013 Student Design Contest.

Dr. Lian is the President of the IEEE Circuits and Systems (CAS) Society, Member of IEEE Fellow Committee, Steering Committee Member of the IEEE Transactions on Biomedical Circuits and Systems. He was the Editor-in-Chief of the IEEE Transactions on Circuits and Systems Part II: Express Briefs for two terms from 2010 to 2013. He served as the VP for Publications and VP for Region 10 of the IEEE CAS Society, and many other roles in IEEE. He is the Founder of the IEEE Biomedical Circuits and Systems Conference (BioCAS) and the Asia Pacific Conference on Postgraduate Research in Microelectronics and Electronics (PrimeAsia). He is a Fellow of the Academy of Engineering Singapore.

Manuel Delgado-Restituto (IEEE M’96–SM’12) received the M.S. degree in physics and the Ph.D. degree (with honors) in physics-electronics from the University of Seville, Seville, Spain, in 1988 and 1996, respectively. He is a Senior Research Scientist of the Institute of Microelectronics of Seville (IMSE-CNMCSCIC), Spain, where he currently heads a research group on low-power medical microelectronics and works in the design of silicon microsystems to understanding biological neural systems, the development of neural prostheses and brain-machine interfaces, the implementation of wireless Body Area Network transceivers and the realization of RFID transponders with biomedical sensing capabilities.

Dr. Delgado-Restituto has coauthored two books; more than 20 chapters in contributed books, including original tutorials on chaotic integrated circuits, design of data converters, and chips for bioengineering and neuroscience; and some 150 articles in peer-review specialized publications.

Dr. Delgado-Restituto served as an Associate Editor for the IEEE TRANSACTIONS on CIRCUITS AND SYSTEMS—II: EXPRESS BRIEFS (2006–2007) and for the IEEE TRANSACTIONS on CIRCUITS AND SYSTEMS—I: REGULAR PAPERS (2008–2011). He served as Deputy Editor-in-Chief (2011–2013) and as Editor-in-Chief (2014–2015) for the IEEE JOURNAL on EMERGING AND SELECTED TOPICS IN CIRCUITS AND SYSTEMS. Currently, he is Vice President for Publications of IEEE CAS (2016–). He is in the committee of different international conferences and has served as technical program chair in different international IEEE conferences.
Eduard Alarcón 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 Electronics Engineering at the School of Telecommunications 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 of Colorado 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 400 scientific publications, 7 books, 8 book chapters and 12 patents, and has been involved in different National, European (H2020 FET-Open, Flag-ERA) and US (DARPA, NSF) R&D projects within his research interests including the areas of on-chip energy management and RF circuits, energy harvesting and wireless energy transfer, nanosatellites, and nanotechnology-enabled wireless communications. He has received the Google Faculty Research Award (2013), Samsung Advanced Institute of Technology Global Research Program gift (2012), and Intel Honor Programme Fellowship (2014). He has given 30 invited, keynote and plenary lectures and tutorials in Europe, America, Asia and Oceania, was appointed by the IEEE CAS society as distinguished lecturer for 2009-2010 and lectures yearly MEAD courses at EPFL. He is elected member of the IEEE CAS Board of Governors (2010-2013), member of the IEEE CAS long term strategy committee, Vice President Finance of IEEE CAS (2015) and Vice President for Technical Activities of IEEE CAS (2016-2017, and 2017-2018). 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, 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, ES大概17, Barcelona and IEEE ISCAS 2020, Seville. He was the General co-chair of the 2014 international CDIO conference, 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. 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 founding Editorial Board of the IEEE Journal on IEEE Journal on Emerging topics in Circuits and Systems, of which he is currently Editor-in-Chief (2018).

Chang Wen Chen is currently Dean of School of Science and Engineering at the Chinese University of Hong Kong, Shenzhen. He is also an Empire Innovation Professor of Computer Science and Engineering at the University at Buffalo, State University of New York since 2008. He has been Allen Henry Endow Chair Professor at the Florida Institute of Technology from July 2003 to December 2007. He was on the faculty of Electrical and Computer Engineering at the University of Rochester from 1992 to 1996 and on the faculty of Electrical and Computer Engineering at the University of Missouri-Columbia from 1996 to 2003. He has been the Editor-in-Chief for IEEE Trans. Multimedia from January 2014 to December 2016. He has also served as the Editor-in-Chief for IEEE Trans. Circuits and Systems for Video Technology from January 2006 to December 2009. He has been an Editor for several other major IEEE Transactions and Journals, including the Proceedings of IEEE, IEEE Journal of Selected Areas in Communications, and IEEE Journal of Journal on Emerging and Selected Topics in Circuits and Systems. He has served as Conference Chair for several major IEEE, ACM and SPIE conferences related to multimedia video communications and signal processing. His research is supported by NSF, DARPA, Air Force, NASA, Whitaker Foundation, Microsoft, Intel, Kodak, Huawei, and Technicolor.

He received his BS from University of Science and Technology of China in 1983, MSEE from University of Southern California in 1986, and Ph.D. from University of Illinois at Urbana-Champaign in 1992. He and his students have received nine (9) Best Paper Awards or Best Student Paper Awards over the past two decades. He has also received several research and professional achievement awards, including the Sigma Xi Excellence in Graduate Research Mentoring Award in 2003, Alexander von Humboldt Research Award in 2009, the University at Buffalo Exceptional Scholar – Sustained Achievement Award in 2012, and the State University of New York System Chancellor’s Award for Excellence in Scholarship and Creative Activities in 2016. He is an IEEE Fellow since 2004 and an SPIE Fellow since 2007.

Amara Amara obtained a Ph.D. in computer science in 1989 and a Master in 1984 in microelectronics and computer science from Paris VI University. In 1988, he joined IBM research and development laboratory at Corbell-Essones as a visiting researcher where he was involved in SRAM memory design with advanced CMOS technologies. In 1992, he joined ISEP (Paris Institute for Electronics) in charge of the microelectronics laboratory. He was then appointed in 2006 Deputy Managing Director of ISEP in charge of Research and International Cooperation up to Marsh 2017.
His research interests are mainly focusing on Low Power circuit design techniques and on Design and Technology Interaction for advanced technologies (SOL, DGates FD SOI, Ultra Thin Body SOI, 3D Integration etc.).

He was President of the French IEEE Section from 2014 to 2016. From 2000 to 2004, he was Chairman of the IEEE-CAS French Chapter (Recipient of the 2004 Best Chapter of the Year Award). From 2008 to 2013 he was member of the BoG of CASS. From 2014 to 2017 he was Vice President for Conferences and member of the ExCom, currently he is CASS President-Elect 2018-2019 and President from 2020 to 2021.

He joined Terre des hommes Foundation, an international NGO, on June 2017 as ICT4D Strategist (ICT for Development) where he is in charge of establishing an international ICT4D team to spread up ICT for Development within Tdh worldwide.

**Franco Maloberti** received the Laurea degree in physics (summa cum laude) from the University of Parma, Parma, Italy, in 1968, and the Doctorate Honoris Causa in electronics from the Instituto Nacional de Astrofísica, Optica y Electronica (Inaoe), Puebla, Mexico, in 1996. He was a Visiting Professor at The Swiss Federal Institute of Technology (ETH-PEL), Zurich, Switzerland and at the EPFL, Lausanne, Switzerland. He was the TI/Kilby Chair Professor at the A&M University, Texas and the Distinguished Microelectronic Chair Professor at the University of Texas at Dallas. Presently he is Professor of Microelectronics and Head of the Micro Integrated Systems Group, University of Pavia, Italy. His professional expertise is in the design, analysis, and characterization of integrated circuits and analog digital applications, mainly in the areas of switched-capacitor circuits, data converters, interfaces for telecommunication and sensor systems, and CAD for analog and mixed A/D design. He has written more than 500 published papers on journals or conference proceedings, four books, and holds 34 patents. Dr. Maloberti was the recipient of the XII Pedriani Prize for his technical and scientific contributions to national industrial production, in 1992. He was co-recipient of the 1996 Institute of Electrical Engineers Fleming Premium, the best Paper award, ESSCIRC-2007, and the best paper award, IEEJ Analog Workshop-2007 and 2010. He was the President of the IEEE Sensor Council from 2002 to 2003 and Vice-President, Region 8, of the IEEE CAS Society from 1995 to 1997 and an Associate Editor of IEEE TCAS-II. He was serving as VP-Publications of the IEEE CAS Society 2007-2008. He was distinguished lecturer of the IEEE Solid State Circuits Society 2009-2010 and distinguished lecturer of the Circuits and Systems Society 2012-2013. He received the 1999 IEEE CAS Society Meritorious Service Award, the 2000 CAS Society Golden Jubilee Medal, and the 2000 IEEE Millennium Medal. He received the IEEE CAS Society 2013 Mac Van Valkenburg Award. He is an IEEE Fellow. In 2009 he received the title of Honorary Professor of the University of Macau and he is currently the chairman of the Academic Committee of the Microelectronics Key-Lab of Macau. He is President elect of the IEEE Circuits and Systems Society.

**Myung Hoon Sunwoo** received the B.S. degree in Electronics Engineering from Sogang University in 1980, the M.S. degree in Electrical and Electronics Engineering from Korea Advanced Institute of Science and Technology (KAIST) in 1982, and the Ph.D. degree from the University of Texas at Austin in 1990 in Electrical and Computer Engineering. He worked for the Electronics and Telecommunications Research Institute (ETRI) in Daejeon, Korea from 1982 to 1985, and for the Digital Signal Processor Operations, Motorola, in Austin, Texas, U.S.A. from 1990 to 1992. Since 1992, he has been with the School of Electrical and Computer Engineering, Ajou University in Suwon, Korea, where he is currently a Professor. In 2000, he was a visiting professor at the University of California, Davis, CA, U.S.A.

He served as the General Chair of International Symposium on Circuits and Systems (ISCAS) 2012, Seoul Korea, the successful event held in Korea and will serve as the General Co-chair of ISCAS 2021, Daegu Korea. He has been a Technical Committee member for numerous conferences and societies. He has been involved in various CASS activities over two decades including a member of CASS BoG (Board of Governors) elected twice from 2011 to 2016. In addition, he served as the General Chair of ISCAS 2012, Seoul, the fruitful event, which transferred 230K USD surplus to CASS. He initiated to establish the new chapter in Daegu, Korea, which succeeded ISCAS 2021 bidding, where he will serve as the General Co-chair. He was a Distinguished Lecturer of the IEEE CASS from 2009 to 2010. He has been the Chair of the IEEE CASS Seoul Chapter since 2004.

Currently, he is the Director of the micro Diagnostic Smart Devices (µDSD) Information and Telecommunication Research Center (ITRC) sponsored by the Ministry of Science and ICT of Korea and was the Director of National Research Laboratory sponsored by the Ministry of Science and Technology of Korea. The µDSD center consists of five universities, two university hospitals and seven companies to cover emerging interdisciplinary technical areas, such as chip design, sensors, deep learning, big data, pattern recognition, medical imaging, etc. His research interests include low power algorithms and architectures, medical devices, deep learning, and application-specific design.

He was the President of the IEIE Semiconductor Society from 2012 to 2013 and was the Chair of the SoC design technical committee of IEIE in 2008. He was an honorary ambassador of Korean Tourism Organization. He is currently IEEE CASS VP-Conferences and he has been a chair of IEEE CASS, Seoul Chapter since 2004 and an IEEE Fellow.
Dr. Yi Wang received the B.Eng. degree and the M.Eng. degree in School of Computer Technology and Science from Northwestern Polytechnical University, China in 2000 and 2003, and the Ph.D. degree in School of Computer Engineering from Nanyang Technological University, Singapore in 2008.

Dr. Wang is currently a specialist in automotive security & privacy, Security & Privacy Competence Center, Corporate Systems and Technology, Continental Teves AG & Co. oHG (Frankfurt, Germany) from July 2016. Currently, she is leading the research topics at APAC on embedded automotive security including automotive Ethernet security, Intrusion Detection System/Anomaly Detection System (IDS/ADS) for in-vehicle network, side channel attacks/countermeasures for ECUs, she works as a security specialist consultant for Continental business units and automotive OEMs (China, Japan and German). She is also leading the regulations and standardizations of Cybersecurity in APAC (Singapore, China, Japan, Korea), understanding the upcoming standard: ISO/SAE 21434 Road Vehicles – Cybersecurity Engineering and involving the upcoming regulations UNECE WP29.

Dr. Wang is also active in society activities with more than 40 international top journal (IEEE transactions and ACM transactions)/conference papers. She is a senior IEEE member. She is served as a Committee Member of the Singapore Chapter of the IEEE Circuit and System. She has been served as a Technical Program Committee member for ASP-DAC 2016 and ASP-DAC 2018 (security track). She has been a program committee member of various reputable conferences, such as FPT-2013, FPT-2014, WESS-2014, UIC-2010, UIC-2011, UIC-2012, UIC-2013, etc., and a reviewer for many conferences/journals, such as TVLSI, TCAS-I, TCAS-II, TRET, JSA, MICPRO, CSSP, CHES, FPT, WESS, ISCAS, ASP-DAC, VLSI, Latnicrypt, ICCIA, UIC, TSP, etc.
About the Talks

Dynamic Range Considerations for Neural Recording Channels
By Prof. Manuel Delgado-Restituto

Abstract: Neural readout microelectronic interfaces are essential in implanted central nerve system prostheses aimed for brain-machine interfaces, the amelioration of disease effects, or the development of robotic mechanisms for the restitution/rehabilitation of abilities lost after injury or disease. Neural signals which can be recorded and used as biomarkers of the brain activity include local field potentials (LFPs) and action potentials (APs). They exhibit small amplitude (typically, below 1mV for LFPs and 100µV for APs) and narrow band characteristics (0.5-200Hz for LFPs and 200Hz-7kHz for APs). A priori, these signals can be easily digitized with low-to-medium resolution ADCs, thus paving the way for neural prostheses with small area and power consumptions. However, along with the biomarkers, strong in band artifacts, which can be much larger than the signals of interest, may contaminate the recording or even preclude it altogether if the front-end saturates. Different causes can be the origin of artifacts; for instance, they can be motion related or generated by electrical stimulations close to the recording sites. Coping with these large artifacts would demand for high dynamic range (of about 75dB) front-ends and data converters with large effective resolutions (beyond 13-14 bits). However, recent proposals for ADC resolution reduction techniques have demonstrated that modest ADCs can still be used for neural recording even in the presence of artifacts. This work reviews these proposals and also presents state-of-the-art techniques for the suppression of differential and common-mode artifacts from neural recordings.

Panel Discussion: “Lifestyle Transformation through Circuits and Systems”
Panelists: Prof. Yong Lian, Prof. Eduard Alarcon, Prof. Chang Wen Chen, and Prof. Amara Amara
Moderator: Prof. Arindam Basu

Abstract: The panelists will share their views on Lifestyle Transformation through Circuits and Systems. Opportunities and challenges in the field of Circuits and Systems will be discussed. Questions are welcome to all the panelists.

Why we do research?
By Prof Franco Maboberti

Abstract: Research is the main activity in universities; the key motive for doing that is (or was) the curiosity and the excitement of unfolding the unknown. And, ... researchers suppose that the “government” in some form or another will meet the cost. This is true to some extent but for some areas research (like the Circuits and Systems) is also linked to problem-solving. In addition, research is the basis of high-education or, better the way of putting young generations close to high-qualified professions. Answers to the question reflect different opinions of researchers, social environment, industrial managers. Having all that viewpoints in mind is important for researchers, students, and educators in order to do the right things that ensure financial support, identify the proper scientific topics, gain advanced training of students and, more relevant, award enthusiasm and fun.

ICT-based Convergence Technologies Changing Paradigm of Health Care and Disease Diagnosis
By Prof. Myung Hoon Sunwoo

Abstract: Recently, convergence technologies including smart devices, deep learning, medical imaging, ontology, and big data change the paradigm of health care and disease diagnosis. These trends are becoming popular and will proliferate in the near future. This talk introduces Information & Communication Technology Research Center (ICT-RC), called Ultra-small-sized Diagnostic Smart Devices (uDSD) Center. This center consisting of hospitals, universities and companies, develops intelligent devices that enable
lesion detections, active data acquisition, and smart diagnosis. In practice, the uDSD center focuses on ultra-small/lowpower smart SoC designs for medical imaging, deep learning, ultrasonic detection, and low power consumption for intelligent diagnosis. Moreover, uDSD deals with the real-time diagnostic model using ontology and big data. In addition, it conducts joint research with companies to develop jaundice diagnosis using smart phones, smart capsule endoscopes and mobile molecular device platforms.