

Welcome Message from General Chair

Nicholas Vun

General Chair

International Symposium on Consumer Electronics ISCE 2011



On behalf of the organizing committee, it is my great honour and pleasure to welcome you to ISCE 2011, the 15th IEEE International Symposium on Consumer Electronics. For our overseas delegates, also welcome to the beautiful garden city of Singapore.

ISCE is of particular significance to us in two aspects this year. The very first ISCE, ISCE 1997 was started right here in Singapore, also organized by the CE Society Singapore Chapter. And for this year, ISCE has also reached the commendable 15th year milestone 'anniversary'. Under the guidance of Stefan Mozar, one of the founder of ISCE and current CE Soc VP Conferences, ISCE has grown substantially over these 15 years, and is now a premium annual CE conference that is only awarded to the IEEE CE Chapters of various countries, alternating annually between the eastern and western hemispheres, with strong support from the IEEE CE Society.

ISCE 2011 will have 24 sessions of presentations by delegates from the industry, academic as well as the research communities from over 20 countries. It will also feature three keynote presentations and a tutorial, all are of vast interest and of particular usefulness to the CE community. On Tuesday, we will have Dr Thomas Coughlin from Coughlin Associates presenting a keynote on Digital Storage for consumer applications. On Wednesday, Dr Izhak Baharav of Corning West Technology Center will present a keynote on the latests in the Capacitive Touch Screen technologies. On Thursday, Mr Elya Joffe, President Elect of IEEE Product Safety Engineering Society, will present his keynote topic on the potential conflicting requirements between EMC and Safety in CE product design. This will then be followed by his tutorial on the topic of Grounding for EMC design on Friday morning.

This year, an Engineering Leadership award will also be presented during the Tuesday's opening ceremony to a very worthy recipient, Mr Henn Tan, CEO and Chairman of Trek 2000 International Ltd. Trek 2000 is a Singapore company that is essentially the inventor of the ubiquitous USB flash memory based thumb drive, and hence held the worldwide trademark: ThumbDrive. During the ceremony, Trek 2000 will also give a technical presentation on its latest innovation, the FluCard technology.

I would like to express my enormous gratitude to the followings in making ISCE 2011 possible. I would like to first thank the School of Computer Engineering (SCE) of Nanyang Technological University, which has kindly provided the logistic support and resources that make ISCE 2011 possible. In particular, special thanks go to Linda Ang from SCE for providing her conference organization expertise to this conference. I also like to thank Institute for Infocomm Research, IEEE Singapore and IEEE CE Society for agreeing to be the sponsors of ISCE 2011. Last but not least, I would like to thank all the ISCE 2011 organizing committee members, who have put in enormous effort and their personal time in the planning and organization of this event. ISCE 2011 is only possible due to their combined effort in coordinating and executing the various tasks necessary to make the conference a resounding success.

I wish that you will find ISCE 2011 informative and enriching, and for our overseas guests, that your stay in Singapore an enjoyable and memorable one.

Welcome Message from Technical Program Chairs

Pramod Kumar Meher and Tan Su-Lim Forest
Technical Program Chairs
ISCE 2011



It gives us immense pleasure to welcome you all to the IEEE International Symposium on Consumer Electronics (ISCE 2011), and welcome all our overseas delegates to Singapore, the beautiful garden city in the Pacific Ocean. We feel a great satisfaction at this moment while writing this welcome message, and recall our journey starting from the formation of the program committee to the completion of final technical program.

One of the major tasks that we have had before constituting the technical program committee of ISCE 2011 was to identify a set of tracks that covers almost all areas of consumer electronics with minimum overlap, in order to streamline the review process and to let the authors know about where and how to position their work. It was not easy for us particularly because of the extremely wide scope of consumer electronics and due to the very close inter-relationships among different areas. After several rounds of lengthy discussions, we have managed to focus the scope of the conference to four main areas. Those are: (i) Basic Technologies for Consumer Electronics, (ii) Key Entertainment and Information Systems, (iii) Consumer Electronics for Health-care & Wellness, and (iv) Enabling Technologies. All these areas were finally split into twenty two tracks covering the most popular aspects and emerging areas of interest to the community of engineers and researchers of consumer electronics. We feel fortunate to have had the cooperation of highly motivated track chairs for all the tracks, and take this opportunity to thank all of them for their efforts in coordinating the review process on time.

We are happy that ISCE this year had a good number of paper submissions from over 20 different countries. The detailed list of papers submitted from different countries is given in the table next page. After completion of the reviews, we have accepted about 50% out of more than 200 submissions for oral presentation. The technical program of ISCE 2011 includes three keynote addresses by very eminent speakers along with twenty four lecture sessions and three poster sessions spanning the first three days of the conference. On the last day of ISCE 2011, we have a high-quality tutorial on “Grounding: The Grounds for EMC Design”, by Elya Joffe, President Elect of IEEE Product Safety Engineering Society, before the valediction.

We want to express our sincere gratitude to all the members of the organizing committee for working together and for their dedicated help in the last one year to make ISCE 2011 successful. We also thank our colleagues at the School of Computer Engineering of Nanyang Technological University and the Institute for Infocomm Research, Singapore for their active support. We would not have been able to form this technical program without the timely help of our program committee members who have carefully reviewed all the submissions in spite of their busy schedules. The last but not the least, we must express our sincere thanks to our webmaster Ang Ah Giat, Linda for her untiring service to make the whole review process smooth and successful.

We hope ISCE 2011 will be technically rewarding and highly memorable to you all, and wish all our overseas delegates a pleasant stay at Singapore, as well.

Distribution of submission of papers from different countries

First-author Country	Number of Papers
Taiwan	31
Korea	30
Japan	19
Singapore	15
Malaysia	15
India	9
France	5
China	4
Saudi Arabia	3
United Kingdom	3
USA	2
Germany	2
Other countries	8

Welcome to ISCE2011

Stephen D. Dukas

President

IEEE Consumer Electronics Society



On behalf of the IEEE Consumer Electronics Society, I welcome each participant to the 15th International Symposium on Consumer Electronics (ISCE 2011) in Singapore.

The ISCE is sponsored by the Consumer Electronics Society Chapters. The conference offers a venue for IEEE members, CE society members, and other engineers, scientists, and researchers to exchange ideas on technology innovation and professional networking. Consumer Electronics is an exciting sector for research and engineering developments. This field is rapidly developing and delivers new technologies, products, applications, services and architectures for consumer electronics and entertainment each year, visible not only to professionals, but to the global community.

The theme of the ISCE 2011 is focused on the latest research and technology innovations associated with rapidly developing consumer electronics segment. The topics will range from basic technologies for consumer electronics, entertainment and information systems, consumer electronics for health-care and wellness to enabling technologies.

The IEEE has chosen Consumer Electronics as one of the hot topics, once again, for 2011 in the public visibility campaign. Consumer Electronics converges and interfaces with many other fields, including communications, power grid and electronics that have enormous ramifications on humanity. It should not be forgotten that Consumer Electronics, such as, television, HDTV, 3DTV and cell phone, together with the Internet, Mobile and the Smart Grid, are contributing to level the field for both rich and poor countries. Consumer Electronics extends beyond the boundaries of any one country to create a diverse technical community reaching consumers around the world.

I want express my gratitude and thanks to Nicholas Vun, General Chair, Tan Su-Lim Forest and Pramod K. Meher, Program Chairs, and Ong Ee-Ping, Finance Chair of the ISCE 2011. I, also, want to give a special thanks to Stefan Mozar, Vice President of IEEE Consumer Electronics Society for his continued efforts and support for ISCE. As with every conference, I truly appreciate the contributions of all session chairs, authors and each reviewer. With every conference, we depend on numerous volunteers who expend countless hours to insure a successful conference and to them I express my heartfelt thanks. And finally, I would like to thank each participant for making this conference successful.

We encourage you to consider other CE conferences being held in 2011 and early 2012. The ICCE – Berlin 2011 to be held in Berlin, Germany. The International Games Innovation Conference (IGIC) 2011 will be held in Orange County, California, USA. The ICCE 2012 will be held in conjunction with the International CES in Las Vegas, USA. The CE Society is planning a new conference in Asia during 2012 to enable members to participate more actively with regional conferences.

Enjoy your participation, the conference sessions, and the many other activities at the ISCE conference in Singapore.

Welcome to ISCE2011

Stefan Mozar
VP Conferences
IEEE Consumer Electronics Society



It is a great pleasure to welcome you to this year's ISCE. It is befitting that for the 15th anniversary, the Symposium is being held in its birth place Singapore. The first ISCE, held in 1997, was a great success. This Asian symposium has grown to an international event, which has been held in twelve countries on four continents. Many countries have expressed interest in hosting the ISCE.

The ISCE is hosted by local CE Chapters; hence it is able to move from location to location. The growth and success of the ISCE is due to the commitment of CE professionals from around the world working together. The success of the ISCE has been achieved by the volunteer efforts, without the support of any major organisation.

The objective of the ISCE is to provide a forum where researchers in consumer electronics from academia and industry can meet and exchange ideas. It also provides an opportunity for regional researchers to participate in a world class symposium. To encourage excellence in research, best paper awards have been presented since 2004. An overall best paper prize is awarded, as well as a best student paper award.

I congratulate the Singapore team on preparing an excellent symposium. I also congratulate Nicholas Vun the general chair of this year's symposium, who was also the first ever ISCE chair (1997). Nicholas has been active in the ISCE ever since it first started. He has been the quiet achiever, always there offering advice and ready to do what had to be done. In recognition of his valuable contributions towards the ISCE, the IEEE CE Society is presenting him with an award. I hope to see the Singapore team organize the 25th anniversary ISCE.

I congratulate all delegates who have had their papers accepted, and I wish you all a very successful Symposium. Apart from presenting their work, there is ample opportunity to network and rekindle old friendships, and to make new friends.

The CE Society has been active in arranging new conferences, such as the ICCE-Berlin that will be held in conjunction with the IFA Consumer Electronics show. Next year we also will start a conference in Japan (GCCE), it will be held in conjunction with the CEATEC. In November of this year we will host the IGIC in the LA area. With the IGIC the CE Society is increasing its activities in the electronic games industry. Keep an eye on these exciting new developments.

Next year the ISCE will be held in the USA in Harrisburg, Pennsylvania. The 2012 chair Aldo Morales is in Singapore to invite you to participate and to tell you more about the ISCE2012. I hope to meet you in Harrisburg!