PROCEEDINGS

2017 International Conference on Electrical Engineering and Informatics (ICELTICs)

October 18-20, 2017 - Banda Aceh, Indonesia

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"Advancing Knowledge, Research, and Technology for Humanity"

iCELTICs
2017 International Conference on Electrical Engineering and Informatics

Technical Co-Sponsor:

IEEE
INDONESIA SECTION

iCELTICs
2017 International Conference on
Electrical Engineering and Informatics

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Conference Information

Conference Name	2017 International Conference on Electrical Engineering and Informatics (ICELTICs 2017)
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Dates	October 18th (Wednesday) – October 20th (Friday) 2017
Host and Organizer	Department of Electrical and Computer Engineering Department of Informatics IEEE Student Branch (STB1035) Syiah Kuala University, Indonesia
Co-organizer	School of Electrical and Electronics Engineering Universiti Sains Malaysia (USM), Malaysia Association of Higher Education in Informatics and Computer Sciences (APTIKOM), Indonesia Cooperation Agency of Public Universities in the Western Region of Indonesia (BKS-PTN Wilayah Barat), Indonesia
Technical co-sponsor	IEEE Indonesia Section
Venue	Academic Activity Center (AAC) Auditorium Prof. Dr. Dayan Dawood, Syiah Kuala University, Jalan Teuku Nyak Arief, Kota Pelajar Mahasiswa (Kopelma), Darussalam, Banda Aceh, 23111 Indonesia
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Secretariat	Lembaga Penelitian and Pengabdian Masyarakat (LPPM), Syiah Kuala University Phone +62 651 7555262 Fax. +62 651 7555261 Website http://iceltics.unsyiah.ac.id Email iceltics@unsyiah.ac.id

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Welcome Message from Rector of Syiah Kuala University —

Assalamualaikum Wa Rahmatullahi Wa Barakatuh,

In the Name of Allah, the Most Beneficent, the Most Merciful. May the peace, the mercy, and the blessings of Allah be upon you.

Dear colleagues, professors, lecturers, researchers, ICT professionals, ladies and gentlemen. On behalf of Syiah Kuala University, I would like to express my sincere gratitude and welcome you to the 2017 International Conference on Electrical Engineering and Informatics (ICELTICs 2017).This year, ICELTICs is supported and co-organized by APTIKOM, BKS-PTN Barat, and Universiti Sains Malaysia. This conference also is technically co-sponsored by the IEEE Indonesia Section with IEEE conference record number #42067.Thus, I would be glad to express my sincere appreciation for their collaboration and support to the conference. Moreover, I would greatly appreciateto welcoming Prof. Dr. Hitoshi Kiya from Japan and Prof. Dr. Ir. Mohd. Rizal Bin Arshad from Malaysia as our keynote speakers.

It is my hope that ICELTICs 2017 would be able to achieve its objective in providing an effective forum for academician, researchers, and practitioners to advancing knowledge, research, and technology for humanity. There has always been a gap between peoples and communities who can make effective use of technology and those who cannot. 'Humanity' (or being 'humane') can also in one usage refer to civil rights and social causes, or in other words to people treating each other with care, compassion, and dignity - respecting the common 'humanity' in the other person. Therefore means - despite what we may have been falsely led to believe! - that matters of 'human' rights have no relation to politics or any part of the so-called political spectrum: they do not belong to any political party or faction, nor to any individual or organization - they are part of our common nature, part of the collective 'humanity' spoken for by our very existence. All academicians, researchers, and practitioners should consider humanity things to make a peaceful world. With humanity, we change to the better environment and a better life. We believe knowledge, research and technology for all people, for minorities, people with disabilities, and to help anyone. No matter how much we can accomplish by ourselves, whether it be research or development, it is never sufficient in this world of knowledge. Therefore, the focal drive of this conference is to exchange ideas, and by participating in this exchange, it is hoped that all parties who may benefit from the conference can apply it in managing activities in their areas. It is pleasing to note that the agenda of this conference covers a wide range of interesting topics related to all theoretical and practical aspects, but not limited to Electrical and Electronics Engineering, Communications and Computer Systems, Informatics and Computer Sciences, and Information Systems.

Last but not the least, my deepest gratitude goes to the Advisory Board, Organizing Committee, Technical Program Committee (TPC) member,

institutions, companies,and volunteer who have directly and indirectly supported the well-running of this seminar. The committee has organized a vibrant scientific program and is working hard to present highly respected and internationally notorious speakers to lead it. Although we try our finest to be professional, on behalf Syiah Kuala University, please accept our sincere apologies should there be inconveniences that occur before, during, or after the event. I wish you a very productive conference with exciting and encouraging discussions and exchange of knowledge so that together we can anticipate a future of groundbreaking knowledge, research, and technology for humanities.

May God bless us all with good health to make this event a successful and enjoyable one!

Best Regards,

--
Prof. Dr. Ir. Samsul Rizal, M.Eng
Rector of Syiah Kuala University

Welcome Message from IEEE Indonesia Section Chair

Assalamualaikum Wa Rahmatullahi Wa Barakatuh,

Dear Distinguished Guests, Colleagues, researchers, professionals, ladies and gentlemen, a prosperous and warm greeting.

On behalf of IEEE Indonesia section, I would like to express my sincere gratitude and welcome you to the 2017 International Conference on Electrical Engineering and Informatics (ICELTICs 2017). ICELTICs is hosted and organized by Syiah Kuala University, co-organized by the Association of Higher Education in Informatics and Computer Sciences (APTIKOM), the Cooperation Agency of Public Universities in the Western Region of Indonesia (BKS PTN Barat) and Universiti Sains Malaysia (USM). ICELTICs 2017 is technically co-sponsored by the IEEE Indonesia Section.

The conference is aimed to bring researchers, academicians, scientists, students, engineers and practitioners together to participate and present their latest research finding, developments and applications related to Electrical and Electronics Engineering, Communications and Computer Systems, Informatics and Computer Sciences, and Information Systems. Accepted and presented papers will be published in the conference proceedings, and those that are within the scope of IEEE will be submitted to the IEEE Xplore digital library.

IEEE Indonesia Section has conducted many activities over 29 years in Indonesia. In terms of collaboration, IEEE Indonesia section has a good and mutual relationship with ICT organizations, Industries, universities as well as the government in Indonesia. IEEE Indonesia Section has contributed and sponsored about 60 different International conferences annually, and this conference is one of the conferences which were sponsored by IEEE Indonesia Section. I do hope in the near future, some high-quality conferences will be continued and strengthened, so the result will give more benefits and positive impacts to the human being, especially to Indonesian people. Cooperation with international conferences is only one activity among many other activities in IEEE Indonesia section. Some of our other activities are public lectures, intellectual gatherings and workshops, humanitarian and research grants, and many more. Please check our website at ieee.org and ieee.id for more complete information. We hope with many activities conducted by IEEE Indonesia Section, we can help our government to decrease the digital divide in Indonesia.

In this occasion, I would also like to say welcome to Banda Aceh, which serves beautiful heritages, culinary, culture, with warm, polite and friendly people, a vibrant culture and lifestyle. Finally, we do hope all of you will have enjoyable and valuable experience during this conference event. Please share your best knowledge in your area of research and professional activities.

Thank you,
--
Prof. Dr. Ir. Fitri Yuli Zulkifli
IEEE Indonesia Section Chair

Welcome Message from General Chair

Assalamualaikum Wa Rahmatullahi Wa Barakatuh,

On behalf of the organizing committees, I would like to welcome all of you to Banda Aceh, Indonesia for 2017 International Conference on Electrical Engineering and Informatics (ICELTICs 2017). ICELTICs is hosted and organized by Syiah Kuala University, which is the largest and the oldest public university in Aceh, Indonesia. This conference is co-organized by the Association of Higher Education in Informatics and Computer Sciences (APTIKOM), the Cooperation Agency of Public Universities in the Western Region of Indonesia (BKS PTN Barat) and Universiti Sains Malaysia (USM). ICELTICs 2017 is technically co-sponsored by the IEEE Indonesia Section. We would like to express our sincere appreciation for their support to the conference.

Under the theme of the conference "*Advancing Knowledge, Research, and Technology for Humanity*", this conference features a rich program, including Syiah Kuala University Innovation Expo 2017, two keynote speeches delivered by Prof. Dr. Hitoshi Kiya from Tokyo Metropolitan University (TMU) Japan and Prof. Ir. Dr. Mohd. Rizal Bin Arshad from Universiti Sains Malaysia, poster and exhibition session, and paper parallel session.

ICELTICs will provide an excellent forum for sharing knowledge, research, and technology among academicians, professionals, and governments. Topics of interests cover all theoretical and practical aspects, but not limited to Electrical and Electronics Engineering, Communications and Computer Systems, Informatics and Computer Sciences, and Information Systems. The primary goal of ICELTICs is to enhance the dialectical connectivity among researchers, practitioners, and academicians through discussion, exchange, and sharing the latest research and innovations in Electrical Engineering and Informatics.

ICELTICs 2017 has been approved by IEEE for Technical co-sponsorship with conference record number #42067. All accepted and presented papers are expected to be included in IEEE Xplore Digital Library. The conference has received 110 submitted papers, whereby 61 papers have been accepted by the committees for presentation and to be included within ICELTICs 2017 proceedings. These papers on various topics are divided into 11 paper parallel sessions in the conference. To all members of organizing committees, the reviewers, and the collaboration partners, we would like to thank all of them for their tremendous efforts to organize this conference successfully.

We look forward to having a successful conference, and we hope that all the attendees will have the benefit and enjoy this conference.

Best Regards,

--
Dr. Ramzi Adriman
General Chair

Keynote Speaker 1

Signal Processing-Friendly Encryption for Social Networking and Multimedia Cloud Computing

Prof. Dr. Hitoshi KIYA
Tokyo Metropolitan University, Japan
IEEE Fellow

Abstract:

This talk introduces secure and flexible multimedia processing schemes which are required in social networking and cloud computing environments. With the development of digital devices and social media, tons of signals have been generated and stored all over the world. These signals are often privacy sensitive data such as videos in surveillance systems, medical records, and face images, or commercially sensitive such as digital cinema movies. In addition, not only processing but also transmitting of signals on the public internet is necessary to actively use the information provided by them. In addition, in cloud computing and social networking environments, the signals have to be computed/manipulated somewhere in the internet.

However, most existing encryption schemes such as AES (Advanced Encryption Standard) do not support these conditions, so they are not useful in social networking and cloud computing environments. Because of such a situation, a lot of researchers have been challenging to develop new flexible encryption schemes, referred to as signal processing-friendly encryption or perceptual encryption. This talk first gives a general overview of various communications systems in terms of privacy protection, and shows the difference between social networking and other communications systems. We then focus on signal processing-friendly encryption and its application to social networking and cloud computing. In particular, Encryption-then-Compression (EtC) systems, which allow us to firstly encrypt images and then to directly compress the encrypted ones, are highlighted, although conventional systems are Compression-then-Encryption (CtE) ones. We also address the security evaluation against various attacks, and show some problems left for the future.

Keynote Speaker Profile

Dr. Hitoshi Kiya is a Professor of the Department of Information and Communication Systems. He also served as the chair of the Department of Information and Communication Systems, and as an associate dean of the Faculty of System Design. He received his B.E and M.E. degrees from Nagaoka University of Technology, Japan, in 1980 and 1982 respectively, and his Dr. Eng. degree from Tokyo Metropolitan University in 1987, all in electrical engineering. In 1982, he joined Tokyo Metropolitan University as an Assistant Professor, where he became a Full Professor in 2000. He is also a collaborative researcher at Tohoku University, Japan. From 1995 to 1996, he attended the University of Sydney, NSW, Australia as a Visiting Fellow.

Dr. Kiya is/was the Regional Director-at-Large for Region 10 of IEEE Signal Processing Society, the Japan Chapter Chair of IEEE Signal Processing Society, the President of IEICE Engineering Science (ES) Society, a Vice President of APSIPA, a BoG member of IEICE and APSIPA, and the Editor-in-Chief for IEICE ES Society Magazine and IEICE ES Society Publications. He is/was also an Associate Editor of eight journals, including IEEE Trans. on Signal Processing, IEEE Trans. on Image Processing, IEEE Trans. Information Forensics and Security and APSIPA Trans. on Signal and Information Processing. He was the chair of two technical committees and is/was a member of seven technical committees including IEICE Signal Processing TC, APSIPA Image, Video, and Multimedia TC, and IEEE Information Forensics and Security TC. He is/was also a member of the organizing committee and program committee of many international conferences, including ICASSP 2012, APSIPA 2009, ISCAS 2005, ICIP 2012 and China SIP 2013. In particular, He was a Technical Program Chair/Co-chair of ICASSP 2012, PCM 2010, APSIPA 2009 and ISPACS 2009, and is/was a General Co-chair of IEEE ISCAS 2019, ITC-CSCC 2010, IWAIT 2006 and APSIPA 2014.

His research interests are in the areas of signal processing theory and image processing including wavelets, image and video coding, image and video communications, compressed-domain video manipulation and security for multimedia. In these areas, he has published over 150 refereed journal papers, over 300 international conference papers and over 10 books. Dr. Kiya was the recipient of numerous awards, including IEEE Signal Processing Society certificate of Merit in 2012 and 2014, IWAIT Best Paper Award in 2014 and 2015, ITE Niwa-Takayanagi Award in 2012, Telecommunications Advancement Foundation Award in 2011, IEICE ES Society Contribution Award in 2010 and IEICE Best Paper Award in 2008. He is a Fellow of IEEE, IEICE and ITE and a member of EURASIP and APSIPA.

Keynote Speaker 2

Swarm Robotics - concepts and its potentials

Prof. Ir. Dr. Mohd. Rizal Bin Arshad,
Universiti Sains Malaysia (USM), Malaysia
IEEE Senior Member

Abstract:

The main aim of every research endeavor is ultimately to develop and produce output which will added benefit to human life. They can either by helping, simplifying, optimizing or even replacing human tasks. Robotic is one of the examples which have been widely used to assist human in solving different types of tasks. However, a traditional robotic system either manually control or autonomously control has many technical limitations such as high structural complexity, low level of fault tolerance and constrained by the limited task performing capabilities. As a result, many complex tasks are out-of-reach and in most cases failed to be executed especially in large and unstructured workspaces. To overcome these limitations, a new approach in robotic research called swarm robotics has been actively researched over the last few decades. A basic principle of the swarm robotics tasks development is to mimic robustness, scalability, and flexibility of some types of insects and animals. The research into swarm robotics has grown significantly since its infancy. The multi-agent robotics module tries to mimic the capability and the intelligence of biological insects and animals which possess interesting social behavior. Since the beginning of this research area, many valuable contributions from different aspects and scopes of the swarm robotics researches have been made. In swarm robotics, some tasks can be considered as fundamental tasks while other tasks are the one that correlated to the fundamental tasks. In this presentation, the tasks are categorized into two major types: low-level tasks and high-level tasks. The low-level tasks include aggregation, dispersion, self-assembly and self-reconfigurable, pattern formation and flocking, robot-environment interaction, task allocation and learning. The discussion scopes of the low-level tasks include definition and purpose, classification and methods. The high-level tasks include collective source searching, collective mapping, collective foraging, collective transport, collective manipulation and collective tracking. High-level tasks are discussed in terms of related skills and methods. A number of swarm robotics hardware and software platforms will also be highlighted to give an overview of the platforms which can be useful for swarm robotics behaviors and tasks researched. Some potential applications of swarm robotics will also be shared. At the end of this presentation, a number of challenges and the ways forward for swarm robotics research from the perspective of swarm robotics task are briefly suggested. The swarm robotics system can be conclusively said to be a currently developed technology for the future applications. One can imagine the wide range of applications if swarm robotics has reach its maturity in which all limitations and weaknesses are successfully eliminated in the future. Swarm robots can fulfill many applications that required a self-organization system.

Keynote Speaker Profile

Mohd. Rizal Arshad graduated from the University of Liverpool, in 1994 with a B.Eng. in the field of Medical Electronics and Instrumentation. He then pursued his MSc. in Electronic Control Engineering at the University of Salford, graduating in Dec. 1995. Following from this, in early 1996, he continued his study with a PhD degree in Electronic Engineering, with specialization in robotic vision system. After completing his PhD training, i.e. January 1999, he started working at the Universiti Sains Malaysia (USM), Malaysia as a full-time academic. He has supervised many postgraduate students at the MSc. and PhD. levels. He has also published actively in local and international publications.

He is currently a Full Professor and the Dean of the School of Electrical and Electronic Engineering, USM. He is also an Adjunct Professor at Universiti Malaysia Terengganu (UMT) for a period of two years (2016/2018). In 2011, he was awarded with the Chartered Engineer (C.Eng) status from the Engineering Council UK. While, in early 2016 he was elevated to the Fellow Member status with IMarEST – a professional society based in the UK. He is currently the President of the Malaysian Society for Automatic Control Engineers (MACE) and Chair of the Oceanic Engineering Society (OES) Malaysia Chapter. In early 2017, he was awarded with the Professional Engineer (P.Eng) status by the Board of Engineer, Malaysia (BEM).

Prof Rizal is well known as the pioneer of underwater system technology research efforts in Malaysia. His research projects are mainly in the area of underwater robotic platform development, new sensing device and mechanisms, and intelligent control algorithms. Prof Rizal is very interested in investigating the fusion of the natural world with the modern engineering pool of knowledge. The multi-disciplinary nature of the research scope is reflected in the groups' researchers whom came from different technical background. His research group website is available at http://urrg.eng.usm.my/