ICAST 2009

Catching up with Technology

2nd International Conference on Adaptive Science & Technology

The Most Research-Oriented ICT & Technology Conference Held in Ghana

14 – 16 December 2009
Protea Hotel, Accra, GHANA

Editors:
Amoakoh Gyasi-Agyei and Tokunbo Ogunfunmi

IEEE
Celebrating 125 Years
of Engineering the Future

ICAST

EdICTech

www.edictech.com

Message from Conference General Chair

Dear Honorable International Delegate,

On behalf of the **ICAST'09** organizing committee, I sincerely welcome you to ICAST'09. For those that are visiting Ghana for the first time, I welcome you to Ghana, erstwhile Gold Coast. Keep your eyes wide open while treading our streets as you may be stepping on golden stones. Although Ghana is relatively a safe place, I would like to appeal to you to be careful wherever you may go. We also appeal to delegates never to attempt to use ICAST as a stepping stone to do anything that is contrary to the country's laws. The organizers of this conference cannot afford to defend anyone who engages in any form of illegal and/or non-humanitarian activities. Also, the conference committee has no insurance cover for any delegate. Please kindly read through to the bottom of this document as you might have been assigned a voluntary role to chair one or more of the sessions. Thanks for your kind cooperation and assistance, as always

ICAST is a series of international conference that aims to promote research and development and entrepreneurship in Africa in IEEE-related fields such as information & communications technologies (ICT), computer networks, software engineering, telecommunications, electrical & electronic engineering, computer science, and allied areas. A main intent is to solicit help from experts around the world to build these industries in the African continent, and also provide an excellent and affordable opportunity for networking between African local professionals and their international peers. To those professionals living outside Africa, it's a form of humanitarian help; to those of us living in Africa, it's our obligation.

The ICAST conference was established through a brainstorming among some professionals in the African Diaspora led by Amoakoh Gyasi-Agyei in early 2006 with the first event held 10-12 December 2007 in Accra Ghana. With two ministerial addresses and participants from several countries the conference received a high esteem from its inception. We decided to trim down the scope of ICAST to only IEEE-related fields in order to warrant sponsorship from such a technological powerhouse professional institute. I am proud to announce that, indeed, the IEEE is a co-sponsor of ICAST 2009. Although the first two events of ICAST have taken place in Ghana, the intent is to organize it in any country in Region 8 where we shall find motivational team of locals to serve on the Local Organizing Committee. Please be encouraged to volunteer.

Just like ICAST 2007, ICAST 2009 is a unique conference in the sense that we are running it to international standards without funding from any outside source except the registration fees paid by delegates. Yet, we have been able to charge relatively less registration fees in order not to deviate from our original purpose of motivating professionals and para-professionals to get together to engage in stimulating dialog that promote advancement and technology adoption. ICAST series of conference has the ONLY mandate of cultivating R&D culture in the developing world to promote development. Please feel proud to be part of this semi-humanitarian drive. [Yes,

Ghana has several international technology companies. Rather than sponsoring activities like this conference that promote the technologies in which they do business, they paint walls, sponsor durbars, festivals and soccer and the like. The irony of it all is that these companies sponsor research and development activities in their countries of origin.]

Indeed, as the 2nd event, ICAST has achieved a remarkable growth and popularity globally within just three years; and this is attributed to the dedicated work of many international professionals that contributed their widow's mite to its organization. Once again, on behalf of the ICAST organizing committee, I express my heartfelt thanks to everyone that has, in one form or the other, contributed to ICAST 2009. In particular, I am short of words to express my gratitude to our Chair for the Technical Program Committee, Professor Tokunbo Ogunfunmi of Santa Clara University, USA, for his fantastic job of coordinating the reviews to international standards; to 2009 IEEE President John Vig for remitting some funds from his discretionary coffers to support ICAST 2009, and to MBA Rental Services Ltd for taking care of the local issues. We trust that you will make available to us the privilege to serve you again in future ICAST events, and that you will continue to support ICAST. Once again, welcome to The Republic of Ghana!

Please note that some of the special sessions may be cancelled if patronage isn't good enough. We do apologize for any inconvenience this may cause you.

The conference registration fee covers lunch for 14th, 15th and 16th December, dinner on 15th and 2 snacks per day for 14th to 16th Dec. You'll have to self-cater for any other times. Thank you for choosing to support ICAST 2009 and it is hoped that your involvement will be a memorable one for you. We hope to see you at 3rd ICAST 2010 to be organized in Abuja, Nigeria. Once again, thank you for attending ICAST 2009 in Ghana.

AKWAABA!
Thank you to all ICAST'09 contributors
Yeda mo nyinaa ase yie
Vielen Dank zu allen
Tack so mycket
Kiitosia

Dome, Accra, 9th Nov 2009

Kind regards,

Professor A. Gyasi-Agyei, PhD. SrMIEEE, CEng, MISOC
ICAST 2009 General Chair
Chair, IEEE Ghana Section
Dean, Faculty of Information Technology
Pentecost University College, Accra, Ghana

Message from the Technical Program Committee Chair

Welcome to Accra, Ghana for the **2nd International Conference on Adaptive Science and Technology (ICAST) 2009** being held at the Protea Hotel, East Legon, Accra, The Republic Ghana

ICAST is a refereed international conference bringing together researchers, academics, industry professionals, developers, policy makers, administrators & all interested in insightful dialog that promotes innovative & research-oriented strategies that advance our technologies. ICAST'09 is a venue for networking experts and practitioners from all over the world engaged in all areas in information & communications technologies (ICT), electrical & electronic engineering, computer science & engineering, and related areas. ICAST also provides an opportunity for companies and organizations to showcase their products & services, and for entrepreneurs to explore investment opportunities.

This year, we received about 128 regular paper submissions. In order to ensure a high quality conference, we have endeavored to accept only quality papers. Specifically, out of 125 submissions, 43 were accepted for regular presentation, 50 for poster presentations and 28 papers were rejected.

A tremendous effort went into a thorough review of all submitted papers to ensure a high quality conference. Special thanks go to the members of the TPC and some of the authors who volunteered as reviewers to quickly and efficiently review all of the papers. Our goal was to have about three reviews for each paper and we managed to obtain three reviews for most papers.

We have also prepared some tutorials for ICAST'09 and we hope you will take advantage of them to learn new areas and get updated on some important areas of technology. The tutorial programs are held on Sunday 13th December 2009 and Wednesday 16th December 2009.

There are three half-day tutorials are being featured : (1) "Principles of Speech Coding" by Prof. Tokunbo Ogunfunmi, Santa Clara University, California. (2) "Broadband Wireless Access over WiMax/IEEE 802.16" by Prof. A. Gyasi-Agyei of Pentecost University College's Faculty of Information Technology, Accra, Ghana. (3) "Information and Data Security : Overview, Challenges and Approaches", by M. David Padi, ICT Division, United Nations,

New York and one full-day tutorial as follows: (4) "Transient and Lightning Protection: Theory and Practice including Building and Surge Protection", by Prof. Chandima Gomes, University of Colombo, Sri Lanka.

We are also pleased to present two excellent talks as part of our plenary sessions for the ICAST 2009 program:

- "Adaptation as a System Attribute: Key principles for solving challenging engineering problems" by Prof. Tokunbo Ogunfunmi, Director, Signal Processing Research Lab., Santa Clara University, California, USA.
- "Environmental Protection: A brief Overview for a Developing Country," by Professor Duke Ophori, Chair of the Dept of Earth and Environmental Studies, College of Science and Mathematics, Montclair State Univ., NJ, USA.

Other important activities include Graduate Students' Workshop and panel sessions during lunch time on important timely topics with time for interactive discussions.

We wish to thank all of the members of the ICAST Technical Program Committee and all the authors for helping to create an exciting and interesting program for this year's conference. Ultimately, the quality of the conference is determined by the efforts of the authors and speakers; we appreciate their participation and look forward to learning about their research.

Our goal is to build ICAST up as the premier IEEE annual conference in IEEE Region 8 showcasing the latest advances in Information & Communications Technologies (ICT), electrical/electronic engineering technology and related areas. The next ICAST in 2010 will be held 13-15 December 2010 in Abuja, Nigeria and promises to continue to build upon the success of this and previous ICASTs. We hope you will begin planning to attend.

Meanwhile, we hope you will enjoy this and subsequent ICAST conferences as you "Catch up on Technology".

Professor Tokunbo Ogunfunmi
Director, Signal Processing Research Laboratory
Santa Clara University, USA
Chair, ICAST'09 Technical Program Committee (TPC)

Organising Committee

General Chair
Amoakoh Gyasi-Agyei, Faculty of Information Technology, Pentecost University College, Accra, Ghana

Technical Program Chair
Tokunbo Ogunfunmi, Dept of Electrical Engineering, Santa Clara University, USA

Publication Chair
Paul Ampadu, Dept of Electrical & Computer Engineering, University of Rochester, USA

Publicity Co-Chairs
Chandima Gomes, University of Colombo, Sri Lanka
David Padi, ICT Division, Department of Field Support, United Nations, USA
Tom Ndanu, University of Ghana, Legon, Ghana
Costas Stasopoulos, Electricity Authority of Cyprus, Cyprus
Tunde Y. Salihu, ICT Convergence Ltd, Lagos, Nigeria
M. Z. Abidin Ab Kadir, Dept. of Electrical and Electronics Engineering, UPM, Malaysia

Treasurer
Daniel Ocran, Education & ICT Technologies Ltd, Ghana

Local Activity Co-Chairs
Olivia A. T. F. Kwapong, Unversity of Ghana, Legon - Accra
Gamel Wiredu, School of Technology, GIMPA University, Accra, Ghana
Agnes Simpson Budu, University Of Ghana Legon, Ghana
Kenneth Kofi Fletcher, UMaT University, Ghana

Technical Programme Committee Members

Tokunbo Ogunfunmi, Dept of Electrical Engineering, Santa Clara University, USA
Paul Ampadu, Department of Electrical & Computer Engineering, University of Rochester, NY, USA
Amoakoh Gyasi-Agyei, Faculty of Information Technology, Pentecost University College, Ghana
Pilar Molina, University of Zaragoza, Spain
Tunde Y. Salihu, ICT Convergence Ltd, Lagos, Nigeria
Gamel Wiredu, School of Technology, GIMPA University, Accra, Ghana
David Padi, ICT Division, Department of Field Support, United Nations, USA
Tom Ndanu, University of Ghana, Legon, Ghana
Agnes Simpson Budu, University Of Ghana Legon, Ghana
Bekir Karlik, Halic University, Istanbul, Turkey
Olivia A. T. F. Kwapong, Institute of Adult Education, Unversity of Ghana, Legon - Accra
Harsha Sirisena, Dept of Electrical Engineering, University of Canterbury, New Zealand
Suresh H. Jangamshetti, Amruta Institute of Engineering & Management Sciences, India
Boon-Chong Seet, School of Engineering, Auckland University of Technoology, New Zealand
Costas Stasopoulos, Electricity Authority of Cyprus, Cyprus
Kenneth Kofi Fletcher, UMaT University, Ghana
Nico Beute, Faculty of Engineering, Cape Peninsula University of Technology, South Africa
Srinivas B. Mandalika, Int'l Institute of Information Technology, Hyderabad, INDIA
Mary Agyapong, Koforidua Polytechnic, Ghana
Yeboah Gyasi-Agyei, Faculty of Sciences, Engineering and Health, CQU University, Australia
Abdul-Rahman Ahmed, Fac. of Electrical and Computer Engineering, Kwame Nkrumah Univ. of Science and Technology, Ghana
Hong Zhou, Dept of Electrical, Electronics and Computer Engineering, University of Southern Queensland, Australia
Chandima Gomes, Department of Physics, University of Colombo, Sri Lanka
Farhad Rachidi, Head / EMC Research Group, Swiss Federal Institute of Technology, Lausanne, Switzerland.
Robert Jallan'go Akello, Department of Electrical and Electronic Engineering, University of Nairobi, Nairobi Kenya
Vernon Cooray, Division for Electricity, Uppsala University, Sweden
Rajeev Thottappillil, Department of Electrical Engineering, Stockholm, University, Sweden
Vladmir Rakov, Lightning research Group, University of Florida, USA
Mary Ann Cooper, Department of Emergency Medicine, University of Illinois, USA
Munir Ahmed, Technological Assistance for Rural Advancement, Dhaka, Bangladesh
Mohd Zainal Abidin Ab Kadir, Department of Electrical and Electronics Engineering, Putra University, Malaysia
Aida Opoku-Mensah, Director, ICT, Science and Technology Division (ISTD), UN Economic Commission for Africa, Addis Ababa, Ethiopia

Sponsors

Co-Sponsor

```
ERROR: stackunderflow
OFFENDING COMMAND: ~

STACK:
```