

Essay

Next-Generation Astronomy Facilities in Chile trigger extended international technological collaboration for frontier science



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By the end of this decade, a number of the most advanced next-generation telescope facilities will be operating in the crispy clear skies of northern Chile. Prominent among them is the ALMA (Atacama Large Millimeter Array) Project, currently in its final stage of construction by ESO (European Southern Observatory), NRAO-AURA (National Radio-astronomy Observatory operated by the Association of Universities for Research in Astronomy of the USA) and NAOJ (National Astronomy Observatory of Japan). As such this is a unique global effort in science that will not only profoundly change our knowledge of the early universe but might also show unsurpassed levels of interdisciplinary collaboration in frontier science.

ALMA is an instrument located at 5,000m in the Chajnantor plain of the Chilean Andes that, when completed in 2013, will consist of a giant array of 12m antennas with baselines up to 16km, and the Atacama Compact Array (ACA) with additional twelve 7m and four 12m antennas to greatly enhance ALMA's ability to image extended targets. Initially, it is sensitive to wavelengths in the range of 3mm - 400 μ m (84-720 GHz). The large dishes can be moved around in order to form arrays with different distributions of baseline lengths. More extended arrays will give high spatial resolution, more compact arrays will give better sensitivity for extended sources. The ACA will mostly stay in a fixed configuration to be used in imaging large scale structures that are not sampled by the main ALMA array. The site offers exceptional atmospheric transparency at the millimeter and submillimeter wavelengths. Early science experiments started on September 30, 2011, doing the interferometric observations with the initial 20 antennas already in place.

Also of great importance is the LSST (Large Synoptic Survey Telescope) Project (currently under design and planning by NOAO-AURA), which will bring a new frontier of technology requirements for data flow management at the end of this decade. In fact, the sensing, transmission, process, analysis, storage and archiving of tera- and peta-range volumes of data that these new facilities will need require a robust set of interdisciplinary skills and this seems the right moment to develop them.

Given these circumstances, the National Laboratory of High Performance Computing (NLHPC-Chile) at the Center of Mathematical Modeling of the University of Chile (CMM-UCHile), the National Research University Network (REUNA), ALMA and AURA recently organized (with the sponsorship of Chile's National Science & Technology Agency, CONICYT-CHILE) the second version of a special topical meeting in southern Chile's lake district, the *Pucón Symposium*,

offering a unique opportunity to address and discuss many of the relevant technical and business issues behind the emerging "*Advanced Mathematical Tools for Frontier Astronomy and other Massive Data-driven Sciences*". The main intention was to bring together key people from various engineering, technical and scientific disciplines from different R&D organizations across the globe with an established tradition of international collaboration, in a special academic and scenic environment, where they could analyze in depth their current activities and discuss in detail their possible future initiatives (See the first version of this meeting at http://www.ieice.org/eng/global_plaza/2009/15.html#1).

In this context, the Pucón Symposium 2011, turned out to be a most successful conference focused on the advanced mathematical and computational tools as well as the engineering and technological aspects involved in frontier optical and radio astronomy, including ultra-high speed networking, e-science/grids/high performance computing, data storage/processing/archiving, data imaging, robotic telescopes, data mining, search engines, time series and automatic classification, virtual observatories, remote astronomy and optimal scheduling.

Furthermore, the symposium's technical program focused on astroinformatics drew the attention of researchers in other areas specially relevant in Chile besides astronomy, such as mining, natural resources and biosciences, creating a truly interdisciplinary atmosphere. All of them benefited from the four-day discussions held in the sessions on *Algorithms, Tools and Techniques* (Simulation; Science with Massive Time Series and Transient; Next-Generation Search Engines and Knowledge Management; Machine Learning; Challenges ahead and needs for New Analytical Techniques; Massive Interferometric Data) and on *Massive Data-driven Sciences* (Network, Data and Computational Infrastructure for Massive Datasets; Tackling Massive Data Challenges through HPC; Frontier Statistics and Computational Mathematics for Massive Datasets; Advanced Imaging: Visualizing Massive Datasets). The final session of the meeting was an open discussion on the future challenges and development of this emerging community evaluating the progress made in identifying the right research problems.

Undoubtedly, the requirements of the next-generation astronomy facilities, such as ALMA and LSST, are strongly influencing other technology developments beyond the astronomy field, as all the described issues become critical to a number of other scientific and technological areas that begin to deal with massive datasets. (Details at <http://alma.mtk.nao.ac.jp/e/news/info/2011/>)

Note for Prof. Vera's contribution (TFIPP, K.Takahashi)

Two years have passed since another article related to this article was given by the author in IEICE Global Plaza, while the environment around research collaborations on radio-astronomy observatories has evolved to the new phase where ALMA officially began its early science operations in September, 2011. This article was written by the same author with his kind readiness to cover the overview and future perspectives of relevant projects in Chile. The author is well known as a world class scientist conducting international collaborative research activities on ICT, the article will surely impress you with the future possibilities of international collaborations.

Hot Topics

IEICE Organized Two Special Symposiums and Five Workshops at the Biggest Exhibition of ICT and Electronics in Asia, "CEATEC Japan 2011"



*Nobuo Hataoka, Prof. Dr.,
Tohoku Institute of Technology,
Chair, CEATEC Relations,
IEICE Strategic Planning Committee*

The Cutting-edge IT and Electronics Comprehensive Exhibition (CEATEC JAPAN) is focused on the collaborative works between industry and users related to the policy, strategy, design, production, applications, services and management of electronics, information, and communication. It is based on the long history which has been developed since the set-up of constituent exhibitions, "Electronics Show" in 1964, "DATA SHOW" in 1972, "COMMUNICATIONS TOKYO" in 1972 and enhanced "COM TOKYO" in 1997. It has been evolved to be the biggest exhibition of ICT and electronics in Asian region. It provides the all-inclusive display of the latest relevant technologies and products, while it also provides lectures and seminars at the Conference Session which will be presented by global and key industry leaders. The CEATEC Japan 2011 took place in Makuhari Messe on October 4th to 8th, this year.

The IEICE had established a good relationship with the CEATEC Japan and this year the IEICE organized again its special workshops in conjunction with CEATEC organizations. This year's collaboration is the second one by the IEICE, and the IEICE organized a Special Symposium related to the Great East Japan Earthquake of 11th of March, inviting distinguished speakers and panelists from the industries, government and academic society of Japan. The Session Title was "Overcoming the disaster – Constructing a smart ICT society with security and safety" and all speakers and panelists discussed their views and strategies for constructing coming ICT societies with enhanced security, safety, and smartness.



Fig.1 Opening Address by IEICE President, Prof. H. Yasuda



Fig.2 Panel discussion by global and key industry leaders in the relevant fields

Another symposium was "M2M (Machine to Machine) Communication Technology Towards a New Creative Society" sponsored by Tokyo Section of IEICE. M2M activities and issues in sensor network, in the home-network or in the public mobile network were discussed from the service, technical and policy aspects followed by a panel discussion on "What should M2M do now?".

The workshops gave a good chance for the researchers and developers working in industries or universities to know the hot issues such as disaster recovery, smart grid, pattern recognitions or flexible displays. The total number of participants of the symposium and workshops was 1,194 comparing to that of last year about 900. This result means this year's trial ended successfully. Moreover, this second trial of collaborative relationships between CEATEC and IEICE made IEICE activities more active and industry-based by the mutual cross-attendance between CEATEC attendants IEICE SGI workshop attendants.

New IEICE Overseas Section Representatives Started for 2011-2012 Fiscal Years

IEICE International Affairs Committee

The new lineup of IEICE Overseas Section Representatives in the 2011-2012 Fiscal Years was discussed and authorized by IEICE International Affairs Committee in July 2011, considering their requests and situations. Simultaneously, it was decided to reactivate IEICE Indonesia Section and found IEICE Europe Section there as well. The vision and profile of the Representatives are introduced below, in alphabetical order.

~~~~~ IEICE Bangkok Section ~~~~~



*Tuptim Angkaw, Assc. Prof., Dr.,
Chulalongkorn University,
Representative, IEICE Bangkok Section*

Vision IEICE Bangkok Section was set up as one of the four IEICE Overseas Sections based on the idea of IEICE globalization in 2001 (See <http://www.ieice.org/eng/area/2003report.html>) and has evolved the academic activities so far. In the past 2 years, workshops that linked the Japanese and Thai academicians together were organized, like IEICE Thai-Japan Microwave Workshop (TJMW) and Internet Workshop. This year, a workshop on "Writing good paper for submitting to publish in IEICE journal" was organized for graduate students in outstanding universities. About 150 students attended it.

IEICE Bangkok Section has a vision to focus on the participation of graduate students in academic activities organized by IEICE, and technical exchange with engineers from industries. These activities will encourage them to present papers and positively exchange opinions and foster a linkage between Thai and Japanese academicians. In addition, Bangkok Section will extend the activities to invite Japanese engineers who are working in Thailand to give a talk for IEICE in Bangkok. We hope that this will make Thai engineers and students understand the role of Japanese firms in Thailand.

Profile She received her BE degree in Electrical Engineering from King Mongkut's Institute of Technology Ladkrabang in 1984. She studied at Graduate School of Engineering, Department of Communication Engineering, Osaka University and received her PhD degree from the university in 1990. Then, she joined Chulalongkorn University and has been working at Department of Electrical Engineering. Her primary research interest is computational electrical engineering in microwave and photonic waveguides. She has been engaged in IEEE and IEICE activities as a volunteer over the past ten years.

~~~~~ IEICE Beijing Section ~~~~~



*Tao Zhang, Prof., Dr.,
Tsinghua University,
Representative, IEICE Beijing Section*

Vision IEICE Beijing Section was established in 2007. It already has more than 60 members. The current Representative of IEICE Beijing Section is Prof. Tao Zhang, Department of Automation, Tsinghua University. In the past three years, it has organized 7 special lectures which invited famous professors from the world to introduce their research achievements. In addition, IEICE Beijing Section has co-sponsored several international conferences. Each year it organizes an activity of IEICE Beijing Section members to improve the communication. It also nominates many persons to join IEICE overseas membership.

Profile Tao Zhang received B.E., M.E., and Ph.D. degrees from Tsinghua University, China in 1993, 1995, and 2000 respectively. He received his second Ph.D. degree from Saga University, Japan in 2002. He has been an Associate Professor of

Saga University and a Researcher of National Institute of Informatics, Japan. He is currently an Associate Professor of Tsinghua University. His research interests are nonlinear system control, robotics, artificial intelligence, etc. He is a senior member of IEEE.

~~~~~ IEICE Europe Section ~~~~~



*Haris Gacanin, Dr.,
Alcatel-Lucent Bell N.V. in Antwerp, Belgium,
Representative, IEICE Europe Section*

Vision The main goal of IEICE Europe Section is to develop a good organizational structure that will provide adequate services to its members. One of the first initiatives that are currently underway is to establish a yearly IEICE Europe event. Preparations for the first meeting of IEICE Europe Section in May 2012 have already started. The second meeting will be held at "The 4th Sarajevo Technology Forum 2012" (STF2012; please see the prior issue of IEICE Global Plaza). Our future plans are to establish different committees that will address their corresponding issues. We are sure that IEICE will be able to easier expand its academic activities and services in Europe.

Profile He received his M.E.E. and Ph.D. E. E. from Tohoku University, Japan, in 2005 and 2008, respectively. After graduation, he worked as a Postdoctoral Research Fellow of Japan Society for Promotion of Science (JSPS) and then he served Tohoku University as Assistant Professor from 2008 to 2010. Currently, he serves Alcatel-Lucent Bell N.V. in Antwerp, Belgium. His research interest is in the fields of both cable and wireless communication technologies. Meanwhile, he received the 2010 KDDI Foundation Research Grant Award, the 2008 JSPS Postdoctoral Fellowships for Foreign Researchers, the 2005 Active Research Award in Radio Communications, 2005 Vehicular Technology Conference (VTC 2005-Fall) Student Paper Award from IEEE VTS Japan Chapter and the 2004 Institute of IEICE Society Young Researcher Award, respectively.

~~~~~ IEICE Indonesia Section ~~~~~



*Jaka Sembiring, Asst. Prof., Ir., Dr.,
Bandung Institute of Technology,
Representative, IEICE Indonesia Section*

Vision With the activation of Indonesia Section of IEICE in Bandung Institute of Technology, we hope that there will be further collaborative efforts in many areas such as research, education and others to benefit the members in particular and the whole society in general. With several activities offered, we have confidence that there will be more and more who would join the Section.

Profile He received his S1 (eq. B.Sc) degree from Bandung Institute of Technology (Institut Teknologi Bandung, ITB) in 1990, Indonesia, M.Eng and Dr.Eng. degrees from Waseda University, Japan, in 1997 and 2000, respectively. Then, he joined ITB, has been serving as an Associate Professor in Electrical Engineering and Informatics and working at Laboratory for Signals and Systems, ITB. His research field covers stochastic information systems and enterprise architecture.

~~~~~ IEICE Korea, Communication Section ~~~~~



*Choong Seon Hong, Prof., Dr.,
Kyung Hee University,
Representative, IEICE Korea, Communication
Section*

Vision First of all, we hope that IEICE can keep its pace in the development as one of the top level academic society in the field of information, communications and

electronics all over the world. Also, members of Korea, Communication Section will continuously contribute to IEICE, especially through academic activities such as the paper publication in IEICE Transactions on Communications and the joining in committees of International conferences which are sponsored by IEICE communication society. The representative conferences are APNOMS and APCC. In addition, Korea Section – Communication holds the IEICE Joint Workshop with HSN 2012, January 2012. Actually this joint workshop is annually held with the invited speakers as Japanese IEICE member. For the more active contribution, Korean members hope to participate in the editorial board as associate editorship to the Journal such as the IEICE transactions on communications.

Profile He received his B.S. and M.S. degrees in Electronics Engineering from Kyung Hee University, Seoul, Korea, in 1983, 1985, respectively. In 1988 he joined Korea Telecom (KT), where he worked on Broadband Networks as a member of the technical staff. From Sept. 1993, he joined Keio University, Japan. He received the Ph.D. degree at Keio University in March 1997. He had worked for the Telecommunications Network Lab, KT as a senior member of technical staff and as a director of the networking research team until August 1999. Since September 1999, he has worked as a professor of the Department of Computer Engineering, Kyung Hee University. He also has served as a Program Committee Member and an Organizing Committee Member for International conferences such as NOMS, IM, APNOMS, E2EMON, CCNC, ADSN, ICPP, DIM, WISA, BcN and TINA. He is a member of IEEE, ACM, IPSJ, KIISE, KIPS, KICS and OSIA. His research interests include Ubiquitous Network, Future Internet, Mobile Computing, Wireless Sensor Networks, Network Security, and Network Management.

~~~~~ IEICE Korea, Electronics Section ~~~~~



*Duk-Gyoo Kim, Prof., Dr.,
Kyungpook National University,
Representative, IEICE Korea, Electronics Section*

Vision IEICE Korea, Electronics Section usually opens academic activities such as seminar, workshop or conference in November and invites one or two scholars among IEICE members every year. It invites domestic scholars or engineers in the related field as well. For the year 2011, we are planning a seminar on innovative method in engineering education. This seminar will be partially supported by the Korean Federation of Science and Technology Societies (KOFST) and jointly sponsored by the Korean Society for Engineering Education (KSEE) and the Institute of Electronics Engineers of Korea (IEEK).

Profile He serves Kyungpook National University as Professor of Electronics Engineering, in Daegu since 1980. He was appointed to one of three Directors in National Research Foundation of Korea in Daejeon on 25 July 2011, to be responsible for research promotion for the two-year term.

~~~~~ IEICE Korea, Information Section ~~~~~



*Dong-Whee Kim, Prof., Dr.,
Daegu University,
Representative, IEICE Korea, Information Section*

Vision IEICE Information Section of Korea is planning to strengthen cooperation with Industries. Nowadays, many mobile terminals such as smart phone, Galaxy tab and iPad etc. have been developed and used. As the function of mobile terminal becomes higher, the related applications become more important. To enhance the added value of the applications and improve

convenience of users, it is necessary not only to develop new applications but also apply IT technologies to traditional applications, for example, various qualifying examinations. For this purpose, IEICE Korea, Information Section tries to develop new applications in cooperation with related companies and societies. Contacting with traditional industries, it also informs and persuades them of various merits by introducing IT to their applications. As a small result, a pilot project was set up in clinicopathologic examination using iPad in October 2011. Through the continuing efforts, it will contribute to building more rich IT society.

Profile He received the B.E. and M.E. degrees in electronic engineering from Kyungpook University, Daegu, Korea, in 1981 and 1983, respectively. He also received Ph.D degree in communication engineering from Waseda University, Tokyo, Japan in 1995. Since 1996 he has been with Daegu University, Daegu, Korea. Currently he is a professor of Division of Computer & Information Technology.

~~~~~ **IEICE Shanghai Section** ~~~~~



*Wen Chen, Prof., Dr.,  
Shanghai Jiaotong University,  
Representative, IEICE Shanghai Section*

**Vision** We are going to attract more people to join IEICE in the next 2 years and expand IEICE involved conferences in Shanghai. In addition, we will recommend more students and faculties in the universities in Shanghai to publish more papers in IEICE transactions, PhD students usually have to publish 2 SCI indexed papers in international journals. This is a good external environment for us to persuade more people to submit more papers in IEICE journals which are SCI indexed. We are going to establish more substantial relationship with some sister institutes in Shanghai, such as Shanghai Institute of Electronics where I serve as a vice general secretary.

**Profile** He received BS and MS from Wuhan University, China in 1990 and 1993 respectively, and PhD from University of Electro-Communications, Tokyo, Japan in 1999. He was a JSPS research Fellow from 1999 through 2001. In 2001, he joined University of Alberta, Canada, starting as a post-doctoral fellow in Information Research Laboratory and continuing as a research associate in the Department of Electrical and Computer Engineering. Since 2006, he has been a full professor in the Department of Electronic Engineering, Shanghai Jiaotong University, China, where he is also the director of Institute for Signal Processing and Systems. He was awarded the Ariyama Memorial Research Prize in 1997, the PIMS Post-Doctoral Fellowship in 2001. He received the honors of "New Century Excellent Scholar in China" in 2006 and "Pujang Excellent Scholar in Shanghai" in 2007. He is elected to the vice general secretary of Shanghai Institute of Electronics in 2008. He is in the editorial board of the International Journal of Wireless Communications and Networking, and serves Journal of Communications, Journal of Computers, Journal of Networks and EURASIP Journal on Wireless Communications and Networking as (lead) guest editors. He is the TPC chair for IEEE-ICCSC2008, the General Conference Chair for IEEE-WCNIS2010 and IEEE-WiMob2011. He has published more than 100 papers in IEEE journals and conferences. His interests cover network coding, cooperative communications, cognitive radio, and MIMO-OFDM systems.

~~~~~ **IEICE Singapore Section** ~~~~~



*Arokiaswami Alphones, Prof., Dr.,
Nanyang Technological University,
Representative, IEICE Singapore Section*

Vision The Overseas Section of IEICE at Singapore has been

active in the past few years and organized few seminars by distinguished speakers from overseas every year in the upcoming area of metamaterials, microwave circuits and systems. The interaction of visiting speakers with the researchers in Singapore benefited very well and became a platform to further enhance the collaboration and brought some joint publications and even joint research proposals. The main challenge ahead of IEICE (Singapore section) is to promote more members into the folder of IEICE, and a membership drive will be done during seminars and conference events. In October 2011, International Topical meeting on Microwave Photonics will be held in Singapore which is a joint IEEE and IEICE technically co-sponsored event.

Profile He received his B.Tech. from Madras Institute of Technology in 1982, M.Tech. from Indian Institute of Technology Kharagpur in 1984 and Ph.D. degree in Optically Controlled Millimeter wave Circuits from Kyoto Institute of Technology (Japan) in 1992. He was a JSPS visiting fellow from 1996-97 at Japan. During 1997-2001, he was with Centre for Wireless Communications, National University of Singapore as Senior Member of Technical Staff, involved in the research on optically controlled passive/active devices. Currently he is Professor at the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore. He is also Program Director of OPTIMUS (Photonics Centre for Excellence) and Program Director of MSc Communication Engineering. He has 27 years of research experience. He has published and presented over 170 technical papers in international journals and conferences. His current interests are electro-magnetic analysis on planar RF circuits and integrated optics, microwave photonics, and metamaterial based leaky wave antennas.

~~~~~ **IEICE Taipei Section** ~~~~~



*Liang-Hung Lu, Prof., Dr.,  
National Taiwan University,  
Representative, IEICE Taipei Section*

**Vision** Serving as the new IEICE Overseas Section Representative, I would like to encourage Taipei Section members to join IEICE activities. Hopefully, there will be more international collaborations among the members for faculty, students and engineers within this society.

**Profile** He received his Ph. D. degree in Electrical Engineering from the University of Michigan in 2001. From 2001 to 2002, he was with IBM Watson Research Center, Yorktown Heights, NY. In the August of 2002, he joined the Department of Electrical Engineering, National Taiwan University, where he is currently a Professor. His research interests include CMOS RF/mixed-signal IC designs and bio-medical electronics systems.

~~~~~ **Note on this article (TFIPP)** ~~~~~

Each IEICE Overseas Section will support your academic activities as a regional center of IEICE. When you have any questions about the Sections, please call directly each Representative or global@ieice.org.

~~~~~ **Message from TFIPP Secretariat** ~~~~~

This issue is delivered also by a free mail magazine "IEICE Global Plaza on Line" with updated news of interest for you. Please contact Prof. Takahashi, TFIPP (Task Force for International Policy and Planning) at [global@ieice.org](mailto:global@ieice.org), if you need. Back numbers are available in archives at [http://www.ieice.org/eng/global\\_plaza/index.html/](http://www.ieice.org/eng/global_plaza/index.html/).

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