ICASSP 2015

Conference Guide

40th IEEE International Conference on Acoustics, Speech and Signal Processing

19–24 April 2015 | Brisbane Convention & Exhibition Centre | icassp2015.org

IEEE

IEEE Signal Processing Society

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GENERAL CHAIRS' WELCOME

We extend a very warm welcome to the 40th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015 in Brisbane, Australia.

On behalf of the entire Conference Organising Committee and the IEEE Signal Processing Society it is our honour and pleasure to be your hosts.

Brisbane is a young city by world standards yet, after Sydney, the oldest capital on the Australian mainland. From its harsh beginnings as the Moreton Bay Penal Settlement, it has blossomed to become one of the most attractive cities in the world. It boasts a picturesque, winding river, distinctive architecture, cycleways and a sunny, warm climate. The Conference venue, the Brisbane Convention & Exhibition Centre, is perfectly located in the city's "cultural precinct". There are many opportunities nearby to explore the great outdoors and the wonderful food and hospitality Brisbane has to offer.

Since getting the green light that Brisbane would host ICASSP 2015 in Australia, the Organising Committee, supported by our professional conference management, Arinex and CMS, has been working hard to ensure that the Brisbane event will be successful from technical, networking and social perspectives.

We're confident that you will find ICASSP 2015, with its wide range of signal-processing topics, to be technically stimulating. With five fantastic plenary speakers, seventeen tutorials and 149 general and special sessions, there's something to suit every taste. Students, moreover, can participate in the Signal Processing Cup and take advantage of the Careers Luncheon.

School of ICASSP is an exciting new initiative for this year, which incorporates a series of invited lecturers, run in parallel with the regular oral and poster sessions. The topics for School of ICASSP have been selected to provide an overview of some of the big advances in signal processing over the last decade. It covers the topics we'd all like to say we knew about, for example, the particle filter, the K-SVD and Massive MIMO. These sessions will fill the knowledge gaps with lectures by the original inventors or leading exponents in these fields, and are ideal for everyone who has an interest in signal processing. They will be particularly useful to early-stage Ph.D. students and some of our colleagues in industry.

The highlight of our social program is Thursday evening's Conference Dinner at the recently restored Brisbane City Hall. You will be amazed at the beauty of this heritage building. This is a wonderful opportunity to network, renew old friendships and make new acquaintances whilst enjoying fine Australian cuisine. Nor should you miss the Welcome Reception on Monday night at our conference venue—rightly renowned for its catering!

We are extremely grateful for the support of our patrons and exhibitors. During breaks we encourage all delegates to visit our patron and exhibitor booths in the Great Hall.

We trust that you will find the Conference to be an enjoyable and memorable event. We hope that the contacts you make here are of lasting benefit to your careers.

Enjoy your visit to Brisbane. Make yourself at home!

VAUGHAN CLARKSON

General Co-Chair, ICASSP 2015 Organising Committee

JONATHAN MANTON

General Co-Chair, ICASSP 2015 Organising Committee

TECHNICAL PROGRAM CHAIRS' OVERVIEW

Welcome to the 40th ICASSP! This year, the world's premier signal processing conference is being held at the Brisbane Convention & Exhibition Centre in Brisbane, the capital of sunny Queensland. The technical program of regular and special session papers, together with the tutorials and the School of ICASSP, is full of varied, interesting and stimulating ideas. We hope you will both benefit from and enjoy the conference.

This year, we received 2322 regular, 90 special session and an outstanding 90 SPL paper submissions. After a thorough and rigorous selection process, 1207 of the regular papers were accepted, resulting in an acceptance rate of 52%. To achieve this, a tremendous effort was put in by the Chairs of the numerous Technical Committees and Special Interest Groups of the IEEE Signal Processing Society. Nearly every submitted paper received at least three reviews, yet the tight deadlines for the review cycle were met. Our thanks go to these Chairs: Tomohiro Nakatani (AASP), Michael Liebling (BISP), Warren J. Gross (DISPS), Pascal Frossard (IVMSP), Béatrice Pesquet-Popescu (IDSP), Gwenaël Doërr (IFS), Paris Smaragdis (MLSP), Dinei Florencio (MMSP), Dominic Ho (SAM), Doug Williams (ED), Tim Davidson (SPCOM), Sergios Theodoridis (SPTM), Douglas O'Shaughnessy (SL), Bhuvana Ramabhradran (HLT), Antonio Ortega (BigData) and Yen-Kuang Chen (IoT). We are also indebted to the members of the ICASSP 2015 Technical Program Committee, comprised of the TC Chairs, their delegates, and several other volunteers whose support took many forms. The TPC members are listed individually on a separate page of this Conference Guide. The success of this conference should be primarily attributed to the efforts of these volunteers, and our sincere thanks go out to them. Of course, each of the TC Chairs was supported by a host of reviewers who carried out the difficult task of reading and assessing the submitted papers. While too numerous to acknowledge individually, their efforts underpin the quality of the Technical Program.

Complementing the regular oral and poster sessions, twelve special sessions have been included. Special Session Chairs, Robert Calderbank, Stephen Howard and Songsri Sirianunpiboon selected a program of varied and stimulating topics from an impressive set of proposals. We hope these will be of high interest to our signal processing community and we would like to thank the Special Session Chairs, the individual organisers of each of the sessions and the authors of the contributed papers for their efforts.

Following the precedent of recent ICASSPs, this year the Technical Program includes presentation of papers published in the journal IEEE Signal Processing Letters. A record number of 90 such papers were submitted and all of them appear in the program.

Prior to the start of the regular technical program on Tuesday, seventeen half-day tutorials will be held on Sunday and Monday. Daniel Palomar, the Tutorials Chair, has assembled a varied and stimulating set of tutorials, selected from the large number of high-quality tutorial proposals submitted. Some of the tutorials were oversubscribed well before the beginning of the conference – well done and thanks Daniel!

An innovative new element, the School of ICASSP, is being introduced in ICASSP 2015. This idea was conceived by our Conference Co-Chair, Vaughan Clarkson and its implementation has been spearheaded by Robby McKilliam and Gerald Matz. The School of ICASSP entails a series of one-hour instructional presentations on relatively recent topics of broad interest in Signal Processing. It is open to all ICASSP attendees and we hope it will provide some of you the chance to learn about a topic or two you've been meaning to read about but haven't yet found the time. Several leading experts have volunteered as presenters for the School of ICASSP, and we wish to express our appreciation to them as well as the organisers.

Our technical program includes five exciting plenary talks:

- Bayesian time series methods and the search for MH370 by Dr. Neil Gordon
- Open education: New opportunities for signal processing by Prof. Richard Baraniuk
- Estimating sparse eigenstructure for high dimensional data by Prof. Iain Johnstone
- Noise-enhanced information systems: Denoising noisy signals with noise by Prof. Pramod K. Varshney
- Future large scale power network control and operation: Opportunities and challenges by Prof. Rob Evans

We sincerely thank these prominent experts for agreeing to share their insights and experience with us on such a variety of topics.

The regular technical program starts on Tuesday, following the tutorials. It is organised into eleven different time slots during four days. Each time slot generally has five parallel oral sessions, eight parallel poster sessions, and one special session. The decisions on placement of papers into lecture or poster sessions were made to keep papers of similar and related technical contents in the same place. In the tradition of ICASSP, lecture and poster presentations are not distinguished by quality of the work presented.

At this 40th ICASSP, we will recognise students for their outstanding papers with the ICASSP 2015 Student Paper Award and the Starkey award. We are grateful to TC review coordinators for forwarding candidates to us and would like to particularly thank Nikos Sidiropoulos for his efforts in selecting winners for the Student Paper Award and to Patrick Taylor, Bhuvana Ramabhradran and Warren Gross for their efforts in selecting the winner of the Starkey award.

We would also like to express our utmost gratitude to Lance Cotton and Billene Mercer from Conference Management Services, whose prompt and professional assistance was invaluable in both putting together the technical program and ensuring that the submitted papers were dealt with quickly and efficiently.

Ultimately, the quality of the conference is determined by the efforts of the authors and speakers; our thanks go out to you for submitting your work and supporting this flagship conference, we appreciate your efforts and look forward to learning about your research.

DOUG GRAY AND DOUG COCHRAN

Technical Program Co-Chairs, ICASSP 2015

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- Min Wu, University of Maryland
- Zhiyuan Yan, Lehigh University
- Ge Yang, Carnegie Mellon University
- Xiao-Ping Zhang, Ryerson University
- Songqing Zhou, Apple

TECHNICAL COMMITTEE CHAIRS & LIAISONS

AASP - AUDIO AND ACOUSTIC SIGNAL PROCESSING

- Tomohiro Nakatani, NTT Communication Science Laboratories
- Shoji Makino, University of Tsukuba

BISP - BIO IMAGING SIGNAL PROCESSING

- Michael Liebling, Idiap Research Institute and University of California, Santa Barbara

DISPS - DESIGN AND IMPLEMENTATION OF SIGNAL PROCESSING SYSTEMS

- Warren J. Gross, McGill University
- Zhiyuan Yan, Lehigh University

IVMSP - IMAGE, VIDEO, AND MULTIDIMENSIONAL SIGNAL PROCESSING

- Pascal Frossard, École Polytechnique Fédérale de Lausanne
- James E. Fowler, Mississippi State University

IFS - INFORMATION FORENSICS AND SECURITY

- Gwenaël Doërr, Technicolor R&D France
- Min Wu, University of Maryland, College Park

IDSP - INDUSTRY DIGITAL SIGNAL PROCESSING TECHNOLOGY

- Béatrice Pesquet-Popescu, Télécom ParisTech
- Umit Batur, Texas Instruments

MLSP - MACHINE LEARNING FOR SIGNAL PROCESSING

- Paris Smaragdis, University of Illinois
- Vince Calhoun, The Mind Research Network and University of New Mexico

MMSP - MULTIMEDIA SIGNAL PROCESSING

- Dinei Florencio, Microsoft Research
- Oscar Au, Hong Kong University of Science and Technology

SAM - SENSOR ARRAY AND MULTICHANNEL SIGNAL PROCESSING

- Dominic Ho, University of Missouri
- Peter Willett, University of Connecticut
- Martin Haardt, Ilmenau University of Technology

SPCOM - SIGNAL PROCESSING FOR COMMUNICATIONS AND NETWORKING

- Timothy Davidson, McMaster University
- Erik G. Larsson, Linköping University

SPTM - SIGNAL PROCESSING THEORY AND METHODS

- Sergios Theodoridis, University of Athens
- V. John Mathews, University of Utah
- Alle-Jan van der Veen, TU Delft

SP/HLT - SPEECH PROCESSING AND HUMAN LANGUAGE TECHNOLOGY

- Douglas O'Shaughnessy, INRS
- Bhuvana Ramabhadran, IBM Research

BIG DATA SIG

- Antonio Ortega, University of Southern California

SIGNAL PROCESSING FOR INTERNET OF THINGS SIG

- Yen-Kuang Chen, Intel

EDUCATION TRACK

- Douglas Williams, Georgia Institute of Technology

SIGNAL PROCESSING AT UQ

OUR RESEARCH

Sensor Scheduling, Processing and Tracking
Scheduling, detection and tracking for active and passive radar, radar warning and space surveillance to get the most out of modern sensors.

Communications Signal Processing
Information theory, lattice theory, connections to beamforming, blind equalisation, timing recovery and frequency estimation.

Non-Cooperative Remote Biometrics
Video face recognition from CCTV, Unmanned Aerial Vehicles, mobile and wearable devices.

Biomedical Imaging and Analysis
Research for rapid acquisition of high resolution images, multi-modal data fusion and computer aided diagnosis.

SCHOOL OF INFORMATION TECHNOLOGY
AND ELECTRICAL ENGINEERING

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

AWARDS

2014 IEEE SIGNAL PROCESSING SOCIETY AWARDS PRESENTED IN BRISBANE, AUSTRALIA

The IEEE Signal Processing Society (SPS) congratulates the following SPS members who will receive the Society's prestigious awards during ICASSP 2015 in Brisbane, Australia.

The Society Award honours outstanding technical contributions in a field within the scope of the IEEE SPS and outstanding leadership within that field. The Society Award comprises a plaque, a certificate, and a monetary award of US$2,500. It is the highest-level award bestowed by the IEEE SPS. This year's recipient is **K. J. Ray Liu**, 'influential technical contributions and profound leadership impact'.

The IEEE Signal Processing Magazine Best Paper Award honours the author(s) of an article of exceptional merit and broad interest on a subject related to the Society's technical scope and appearing in the Society's magazine. The prize comprises of US$500 per author (up to a maximum of US$1,500 per award) and a certificate. In the event that there are more than three authors, the maximum prize shall be divided equally among all authors and each shall receive a certificate. This year, the IEEE Signal Processing Magazine Best Paper Award recipients are **Sergios Theodoridis**, **Konstantinos Slavakis,** and **Isao Yamada** for their article 'Adaptive Learning in a World of Projections: A unifying framework for linear and nonlinear classification and regression tasks', published in the *IEEE Signal Processing Magazine*, vol. 28, no. 1, January 2011.

The IEEE Signal Processing Magazine Best Column Award honours the author(s) of a column of exceptional merit and broad interest on a subject related to the Society's technical scope and appearing in the Society's magazine. The prize shall consist of US$500 per author (up to a maximum of US$1500 per award) and a certificate. In the event that there are more than three authors, the maximum prize shall be divided equally among all authors and each shall receive a certificate. This year, the IEEE Signal Processing Magazine Best Column Award recipients are **Göran Bergqvist** and **Erik G. Larsson** for their article 'The Higher-Order Singular Value Decomposition: Theory and an Application', published in the *IEEE Signal Processing Magazine*, vol. 27, no. 3, May 2010.

Two Technical Achievement Awards are presented this year. **Moeness G. Amin** will receive the award 'for fundamental contributions to signal processing algorithms for communications, satellite navigations, and radar imaging'. **Richard G. Baraniuk** will be recognised 'for contributions to the theory and applications of sparsity and compressive sensing'. The Technical Achievement Award honours a person who, over a period of years, has made outstanding technical contributions to theory and/or practice in technical areas within the scope of the Society, as demonstrated by publications, patents, or recognised impact on this field. The prize for the award is US$1,500, a plaque, and a certificate.

The Meritorious Service Award is presented this year to **V. John Mathews** 'for exemplary service to and leadership in the Signal Processing Society'. The award comprises a plaque and a certificate; judging is based on dedication, effort, and contributions to the Society.

The SPS Education Award honours educators who have made pioneering and significant contributions to signal processing education. Judging is based on a career of meritorious achievement in signal processing education as exemplified by writing of scholarly books and texts, course materials, and papers on education; inspirational and innovative teaching; and creativity in the development of new curricula and methodology. The award comprises a plaque, a monetary award of US$1,500 and a certificate. The recipient of the SPS Education Award is **Sergios Theodoridis**, 'for sustained contributions to education in the area of machine learning for signal processing'.

The Sustained Impact Paper Award shall honour the author(s) of a journal article of broad interest that has had sustained impact over many years on a subject related to the Society's technical scope. The prize shall consist of $500 per author (up to a maximum of $1500 per award) and a certificate. In the event that there are more than three authors, the maximum prize shall be divided equally among all authors and each shall receive a certificate. To be eligible for consideration, an article must have appeared in one of the IEEE Signal Processing Society Transactions or the Journal of Selected Topics in Signal Processing, in an issue predating the Spring Awards Board meeting by at least 10 years (typically held in conjunction with ICASSP). The recipient to receive the first Sustained Impact Paper Award is:

- **Stephane G. Mallat** and **Zhifeng Zhang**, 'Matching Pursuits With Time-Frequency Dictionaries', *IEEE Transactions on Signal Processing*, vol. 41, no. 12, December 1993.

Six Best Paper Awards were awarded, honouring the author(s) of a paper of exceptional merit dealing with a subject related to the Society's technical scope and appearing in one of the Society's transactions, irrespective of the author's age. The prize is US$500 per author (up to a maximum of US$1,500 per award) and a certificate. Eligibility is based on a five-year window preceding the year of election, and judging is based on general quality, originality, subject matter, and timeliness. Up to six Best Paper Awards may be presented each year. This year, the awardees are:

- **Namrata Vaswani** and **Wei Lu,** 'Modified-CS: Modifying Compressive Sensing for Problems With Partially Known Support', *IEEE Transactions on Signal Processing*, vol. 58, no. 9, September 2010.

- **Hiroshi Sawada**, **Shoko Araki,** and **Shoji Makino**, 'Underdetermined Convolutive Blind Source Separation via Frequency Bin-Wise Clustering and Permutation Alignment', *IEEE Transactions on Audio, Speech, and Language Processing*, vol. 19, no. 3, March 2011.

- **Alexey Ozerov** and **Cédric Févotte**, 'Multichannel Nonnegative Matrix Factorization in Convolutive Mixtures for Audio Source Separation', *IEEE Transactions on Audio, Speech, and Language Processing*, vol. 18, no. 3, March 2010.

- **Stefania Sardellitti, Jr.**, **Massimiliano Giona,** and **Sergio Barbarossa**, 'Fast Distributed Average Consensus Algorithms Based on Advection-Diffusion Processes', *IEEE Transactions on Signal Processing*, vol. 58, no. 2, February 2010.

AWARDS

- **Federico S. Cattivelli** and **Ali H. Sayed**, 'Diffusion LMS Strategies for Distributed Estimation', *IEEE Transactions on Signal Processing*, vol. 58, no. 3, March 2010.

- **Rony Ferzli** and **Lina J. Karam**, 'A No-Reference Objective Image Sharpness Metric Based on the Notion of Just Noticeable Blur (JNB)', *IEEE Transactions on Image Processing*, vol. 18, no. 4, April 2009.

The Young Author Best Paper Award honours the author(s) of an especially meritorious paper dealing with a subject related to the Society's technical scope and appearing in one of the Society's transactions and who, upon date of submission of the paper, is less than 30 years of age. The prize is US$500 per author (up to a maximum of US$1,500 per award) and a certificate. Eligibility is based on a three-year window preceding the year of election, and judging is based on general quality, originality, subject matter, and timeliness. Five Young Author Best Paper Awards are being presented this year:

- **Tomáš Filler** and **Jan Judas**, for the paper co-authored with Jessica Fridrich, 'Minimizing Additive Distortion in Steganography Using Syndrome-Trellis Codes', *IEEE Transactions on Information Forensics and Security*, vol. 6, no. 3, September 2011.

- **Jort F. Gemmeke**, for the paper co-authored with Tuomas Virtanen and Antti Hurmalainen, 'Exemplar-Based Sparse Representations for Noise Robust Automatic Speech Recognition', *IEEE Transactions on Audio, Speech, and Language Processing*, vol. 19, no. 7, September 2011.

- **Daniele Giacobello**, for the paper co-authored with Mads Græsbøll Christensen, Manohar N. Murthi, Søren Holdt Jensen, and Marc Moonen, 'Sparse Linear Prediction and Its Applications to Speech Processing', *IEEE Transactions on Audio, Speech, and Language Processing*, vol. 20, no. 5, July 2012.

- **Tiangao Gou** and **Chenwei Wang**, for the paper co-authored with Syed A. Jafar, 'Sparse Linear Prediction and Its Applications to Speech Processing', *IEEE Transactions on Audio, Speech, and Language Processing*, vol. 20, no. 5, July 2012.

- **Meisam Razaviyayn**, for the paper co-authored with Gennady Lyubeznik and Zhi-Quan Luo, 'On the Degrees of Freedom Achievable Through Interference Alignment in a MIMO Interference Channel', *IEEE Transactions on Signal Processing*, vol. 60, no. 2, February 2012.

The IEEE Signal Processing Letters Best Paper Award honours the author(s) of a letter article of exceptional merit and broad interest on a subject related to the Society's technical scope and appearing in the IEEE Signal Processing Letters. The prize shall consist of $500 per author (up to a maximum of $1500 per award) and a certificate. To be eligible for consideration, an article must have appeared in the IEEE Signal Processing Letters in an issue predating the Spring Awards Board meeting by five years (typically held in conjunction with ICASSP). Judging shall be on the basis of the technical novelty, the research significance of the work, quality and effectiveness in presenting subjects in an area of high impact to the Society's members. The recipient of the IEEE Signal Processing Letters Best Paper Award is:

- **Emanuël A. P. Habets**, **Sharon Gannot**, and **Israel Cohen**, 'Late Reverberant Spectral Variance Estimation Based on a Statistical Model', *IEEE Signal Processing Letters*, vol. 16, no. 9, September 2009.

The IEEE Signal Processing Society Malaysia Chapter has been selected as the fourth recipient of the 2014 Chapter of the Year Award, which will be presented at the ICASSP 2015 Awards Ceremony in Brisbane, Australia. The award is presented annually to a Chapter that has provided their membership with the highest quality of programs, activities and services. The SPS Malaysia Chapter will receive a certificate and a check in the amount of $1,000 to support local chapter activities. The Chapter will publish an article in a future issue of the IEEE Inside Signal Processing eNewsletter.

SPS MEMBERS RECEIVE 2015 IEEE AWARDS

The IEEE James L. Flanagan Speech and Audio Processing Technical Field Award will be presented to:

- **Stephen John Young** for 'pioneering contributions to the theory and practice of automatic speech recognition and statistical spoken dialogue systems'. This award was founded and is sponsored by the IEEE SPS.

The IEEE Fourier Award for Signal Processing will be presented to:

- **Georgios B. Giannakis** for contributions to the theory and practice of statistical signal processing and its applications to wireless communications. This award is sponsored by the IEEE Signal Processing Society and IEEE Circuits and Systems Society.

BEST STUDENT PAPER AWARDS *SPONSORED BY IBM*

The Best Student Paper Award recognises the authors of the best student papers accepted for publication in the proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP). The award will be announced at an event during the Conference.

IEEE FELLOWS

Each year, the IEEE Board of Directors confers the grade of Fellow on up to one-tenth percent of the members. To qualify for consideration, an individual must have been a Member, normally for five years or more, and a Senior Member at the time for nomination to Fellow. The grade of Fellow recognises unusual distinction in IEEE's designated fields.

The Signal Processing Society congratulates the following 51 SPS members who were recognised with the grade of Fellow as of **1 January 2015**:

- **Jean Armstrong**, Clayton, Australia: for contributions to the theory and application of orthogonal frequency division multiplexing in wireless and optical communications.
- **Kristine Bell**, Reston, Virginia: for contributions to statistical signal processing with radar and sonar applications.
- **Ewert Bengtsson**, Uppsala, Sweden: for contributions to quantitative microscopy and biomedical image analysis.
- **Daniel Bliss**, Tempe, Arizona: for contributions to adaptive sensor systems in radar and communications.
- **Christian Cachin**, Ruschlikon, Switzerland: for contributions to steganography and secure distributed systems.
- **Joseph Cavallaro**, Houston, Texas: for contributions to VLSI architectures and algorithms for signal processing and wireless communications.
- **Biao Chen**, Syracuse, New York: for contributions to decentralized signal processing in sensor networks and interference management of wireless networks.
- **Israel Cohen**, Haifa, Israel: for contributions to the theory and application of speech enhancement.
- **Iain Collings**, Epping, Australia: for contributions to multiple user and multiple antenna wireless communication systems.
- **Michael Davies**, Edinburgh, United Kingdom: for contributions to sparse representations in signal processing and compressed sensing.
- **Mrouane Debbah**, Gif-sur-Yvette, France: for contributions to the theory and application of signal processing in wireless networks.
- **Lieven De Lathauwer**, Leuven, Belgium: for contributions to signal processing algorithms using tensor decompositions.
- **Gordon Frazer**, Edinburgh, Australia: for contributions to advanced over-the-horizon radar.
- **Pascale Fung**, Clear Water Bay, Hong Kong: for contributions to human-machine interactions.
- **Xiqi Gao**, Nanjing, China: for contributions to broadband wireless communications and multirate signal processing.
- **Monisha Ghosh**, Mellville, New York: for contributions to cognitive radio and signal processing for communication systems.
- **S. Gunasekaran**, Rome, New York: for contributions to high-performance computer vision algorithms for airborne applications.
- **K.V.S. Hari**, Bangalore, India: for contributions to high-resolution signal parameter estimation.
- **Zhihai He**, Columbia, Missouri: for contributions to video communication and visual sensing technologies.
- **Jianying Hu**, Yorktown Heights, New York: for contributions to pattern recognition in business and health analytics, and document analysis.
- **Hong Jiang**, Santa Clara, California: for leadership in parallel multimedia computing architectures and systems.
- **Tzyy-Ping Jung**, La Jolla, California: for contributions to blind source separation for biomedical applications.
- **Simon King**, Edinburgh, United Kingdom: for contributions to text-to-speech synthesis and speech technology.
- **Stefanos Kollias**, Athens, Greece: for contributions to intelligent systems for multimedia content analysis and human-machine interaction.
- **Deepa Kundur**, Toronto, Canada: for contributions to signal processing techniques for multimedia and cyber security.
- **Edmund Lam**, Pokfulam, Hong Kong: for contributions to modeling and computational algorithms in imaging applications.
- **Henry Leung**, Calgary, Canada: for contributions to chaotic communications and nonlinear signal processing.
- **Zicheng Liu**, Redmond, Washington: for contributions to visual processing for multimedia interaction.
- **David Love**, West Lafayette, Indiana: for contributions to feedback-adaptive wireless communication systems.
- **Detlev Marpe**, Berlin, Germany: for contributions to video coding research and standardization.
- **Teresa Pace**, Orlando, Florida: for contributions to image and signal processing algorithms for sensor systems.
- **Mark Plumbley**, London, United Kingdom: for contributions to latent variable analysis.
- **Markus Rupp**, Wien, Austria: for contributions to adaptive filters and communication technologies.
- **Robert Safranek**, Warren, New Jersey: for contributions to perceptual image and video compression and quality.
- **Paris Smaragdis**, Urbana, Illinois: for contributions to audio source separation and audio processing.

IEEE FELLOWS

- **Hing Cheung So**, Kowloon, China: for contributions to spectral analysis and source localization.
- **Eckehard Steinbach**, Munich, Germany: for contributions to visual and haptic communications.
- **Wonyong Sung**, Seoul, Korea: for contributions to real-time signal processing systems.
- **Johan Suykens**, Leuven, Belgium: for developing the least squares support vector machines.
- **Dacheng Tao**, Sydney, Australia: for contributions to pattern recognition and visual analytics.
- **David Taubman**, Sydney, Australia: for contributions to image and video communications.
- **James Truchard**, Austin, Texas: for leadership in instrumentation and computing for signal processing.
- **Vesa Valimaki**, Espoo, Finland: for contributions to synthesis and processing of audio signals.
- **An-Yeu (Andy) Wu**, Taipei, Taiwan: for contributions to DSP algorithms and VLSI designs for communication IC/SoC.
- **Hsiao-Chun Wu**, Baton Rouge, Louisiana: for contributions to digital video broadcasting and wireless systems.
- **Isao Yamada**, Tokyo, Japan: for contributions to inverse problems and learning in signal processing.
- **Liuqing Yang**, Fort Collins, Colorado: for contributions to theory and practice of ultra-wideband communications.
- **Aylin Yener**, University Park, Pennsylvania: for contributions to wireless communication theory and wireless information security.
- **Moti Yung**, New York, New York: for contributions to cryptography.
- **Wei Zhang**, Sydney, Australia: for contributions to cognitive radio communications.
- **Haitao Zheng**, Santa Barbara, California: for contributions to dynamic spectrum access and cognitive radio networks.

GENERAL INFORMATION

CONFERENCE VENUE

Brisbane Convention & Exhibition Centre
Cnr Merivale & Glenelg Streets
South Brisbane, Queensland

The Brisbane Convention & Exhibition Centre is officially ranked among the top three convention centres world-wide by the International Association of Congress Centres. Located in the riverside South Bank precinct, heart of Brisbane's cultural and entertainment activities, the Centre accommodates events for eight or 8,000 and all serviced to the same high standards of excellence.

SOUTH BANK CONCIERGE PROGRAM – IT'S TIME TO PLAY!

ICASSP 2015 is working with the South Bank Concierge Program – a new initiative which focuses on ensuring delegates have a wonderful time whilst in Brisbane.

There is nothing better than getting out to experience the local surrounds of a new city and South Bank, only a short stroll away from the Brisbane Exhibition & Convention Centre, is brimming with incredible local food, shopping and experiences for ICASSP delegates.

By using the South Bank Concierge website delegates can unlock incredible conference deals throughout the South Bank precinct. Not only will you receive 10% off at participating retailers, you can also book event tickets, plan your itinerary and access special offers, plus so much more.

Visit www.southbankconcierge.com.au now to discover incredible conference exclusives as an ICASSP 2015 delegate.
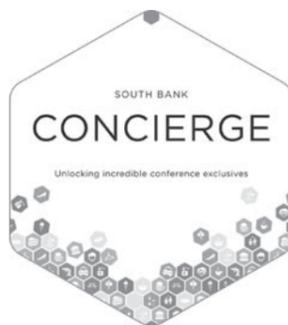
CONFERENCE MOBILE 'APP' - PROUDLY SPONSORED BY MICROSOFT

The ICASSP 2015 Mobile App is a native application for iPad, smart phones (iPhone, Android, and Windows phone), a hybrid web-based app for Blackberry, and there's also a web-based version of the application for all other web browser-enabled phones.

Features on the App include:

- Search for technical sessions by day or track
- Author Index
- Exhibitor Index
- Venue Maps
- Create your own schedule
- Network by creating a profile
- Receive conference alerts and keep updates
- Find information on social activities, meetings, tours etc.
- Upload and share photos with other attendees

Downloading the app is easy. Simply:

- Scan the QR Code (all device types), or
- Search for ICASSP 2015 in the app store (Android and iOS), or
- Type the following URL into your device's mobile browser: **http://m.core-apps.com/icassp2015**

WI-FI

The Organising Committee have arranged a wireless internet connection for ICASSP 2015 delegates. This is most suitable for web browsing and email access.

SSID: **ICASSP2015**

Password: **Brisbane2015**

GENERAL INFORMATION

CONFERENCE MANAGERS

Arinex Pty Ltd

Level 10, 51 Druitt St,

Sydney NSW 2001, AUSTRALIA

Email: **icassp2015@arinex.com.au**

Phone: +61 2 9265 0700

Fax: +61 2 9267 5443

Conference Management Services, Inc

3833 S Texas Ave, Ste 221, Bryan TX 77802 USA

Email: **icassp2015@cmsworkshops.com**

REGISTRATION

For enquiries during the Conference, please contact the staff at the Registration Desk, located in the Great Hall Foyer at the Merivale Street entrance to the Brisbane Convention & Exhibition Centre. The registration desk will be operational during the following times:

REGISTRATION DESK OPENING HOURS	
Sunday 19 April 2015	1230 – 1700
Monday 20 April 2015	0800 – 1900
Tuesday 21 April 2015	0700 – 1800
Wednesday 22 April 2015	0730 – 1730
Thursday 23 April 2015	0730 – 1730
Friday 24 April 2015	0800 – 1700

The registration desk can be contacted using the following phone number during operation hours: +61 7 3308 3541.

NAME BADGES

Each delegate registered for the Conference will receive a name badge at the Registration Desk. This badge will be your official pass and must be worn to obtain entry to all sessions, the exhibition and social functions.

CLOAKROOM

The Cloakroom at the Brisbane Convention & Exhibition Centre is located at the Information Desk on the Foyer Level (next to the Registration Desk). This facility is provided free of charge for ICASSP Conference delegates.

MEAL BREAKS

Morning and Afternoon Teas are being provided at the Conference and will be served in the Exhibition area in Great Halls 3 & 4.

SPECIAL DIETARY REQUIREMENTS

If you have notified the Conference Managers of any special dietary requirements (gluten free, vegan, lactose free, allergies etc.), please be advised that this information has been supplied to the Brisbane Convention & Exhibition Centre. It is requested that you make yourself known to venue catering staff during meal breaks. Please note that vegetarians will be able to choose food from the normal delegate catering as there is a variety of vegetarian options available.

MESSAGES

All messages received during the Conference will be placed on the Message Board in the Registration area. To collect or leave messages please visit the Registration Desk.

GENERAL INFORMATION

MOBILE PHONES

As a courtesy to fellow delegates and speakers, please ensure your mobile phone is switched off during Conference sessions and workshop/seminars.

PRIVACY

Australia introduced the Privacy Amendment (Private Sector) Act 2000 in 2001. The Conference Managers comply with such legislation which is designed to protect the right of the individual to privacy of their information. Information collected in respect of proposed participation in any aspect of the Conference will be used for the purposes of planning and conduct of the Conference and may also be provided to the organising body or to the organisers of future ICASSP events. All those participants included in the Delegate List, which has been included in the Conference satchels, provided their permission upon registration.

RECHARGING LOUNGE

The recharging lounge located within the Exhibition Hall (Great Hall 3 & 4) is available to delegates to relax and recharge! You will find power points in this area to recharge your electronic devices as required throughout the Conference.

WHITEBOARDS

The Organising Committee have chosen to set up a number of whiteboards within the Exhibition Hall (Great Hall 3 & 4) and on the Mezzanine Level Foyer. You are encouraged to use these whiteboards for the purpose of brainstorming and sharing ideas as you interact with your colleagues during the Conference.

LOCAL EVENTS THIS WEEK

SPORT

BRISBANE ROAR VS. MELBOURNE VICTORY

Code: A-League: Association Football (Soccer)

Date: Saturday 18 April 2015

Time: Gates open 6.30pm, kick off 7.45pm

Venue: Suncorp Stadium

BRISBANE BRONCOS VS. PARRAMATTA EELS

Code: National Rugby League

Date: Saturday 25 April 2015

Time: Kick off 8.00pm

Venue: Suncorp Stadium

BRISBANE LIONS VS. RICHMOND TIGERS

Code: Australian Football League (Australian Rules Football)

Date: Saturday 18 April 2015

Time: Kick off 7.20pm

Venue: The Gabba

BRISBANE LIONS VS. WEST COAST EAGLES

Code: Australian Football League (Australian Rules Football)

Date: Sunday 26 April 2015

Time: Kick off 1.10pm

Venue: The Gabba

BRISBANE ROAR VS. NEWCASTLE JETS

Code: A-League: Association Football (Soccer)

Date: Friday 24 April 2015

Time: Gates open 6.40pm, kick off 7.40pm

Venue: Suncorp Stadium

QUEENSLAND REDS VS. WELLINGTON HURRICANES

Code: Super Rugby (Rugby Union)

Date: Sunday 26 April 2015

Time: Kick off 4.00pm

Venue: Suncorp Stadium

CULTURAL

QUEENSLAND SYMPHONY ORCHESTRA

featuring violin soloist Sarah Chang, 'Maestro Series'

Date: Saturday 18 April 2015

Venue: Concert Hall, QPAC

QUEENSLAND THEATRE COMPANY, 'BRISBANE'

Dates: Nightly from Tuesday 21 – Sunday 26 April 2015

Venue: Playhouse, QPAC

WICKED THE MUSICAL

Date: Saturday 18 & Sunday 19 April 2015

Venue: Lyric Theatre, QPAC

THE PINK FLOYD EXPERIENCE

Date: Sunday 19 April 2015

Venue: Concert Hall, QPAC

100TH ANNIVERSARY ANZAC DAY DAWN SERVICE

Date: Saturday 25 April 2015

Time: 4.00am – 6.00 am

Venue: ANZAC Square, Brisbane

100TH ANNIVERSARY ANZAC DAY PARADE

Date: Saturday 25 April 2015

Time: 9.30am – 1.00pm

Venue: Adelaide Street, Brisbane

COSENTINO THE GRAND ILLUSIONIST LIVE

Date: Friday 24 April 2015

Venue: Lyric Theatre, QPAC

For more information about what's on in Brisbane, including ongoing Exhibitions at the Queensland Art Gallery, GOMA and the Queensland Museum, please see the Visitor Information Desk or visit www.visitbrisbane.com.au.

ACCOMMODATION

Following are the addresses and phone numbers of all Conference Hotels.

Rydges South Bank Brisbane

9 Glenelg Street, Southbank QLD 4101

Phone: +61 7 3364 0800

Mantra South Bank Brisbane

161 Grey St, Southbank QLD 4101

Phone: +61 7 3305 2500

Pullman Brisbane King George Square

Corner Ann and Roma Streets, Brisbane QLD 4000

Phone: +61 7 3229 9111

Mercure Brisbane King George Square

Corner Ann and Roma Streets, Brisbane QLD 4000

Phone: +61 7 3229 9111

Oaks Casino Towers

151 George St, Brisbane QLD 4000

Phone: +61 7 3017 4900

Hotel George Williams

317-325 George St, Brisbane QLD 4000

Phone: +61 7 3308 0700
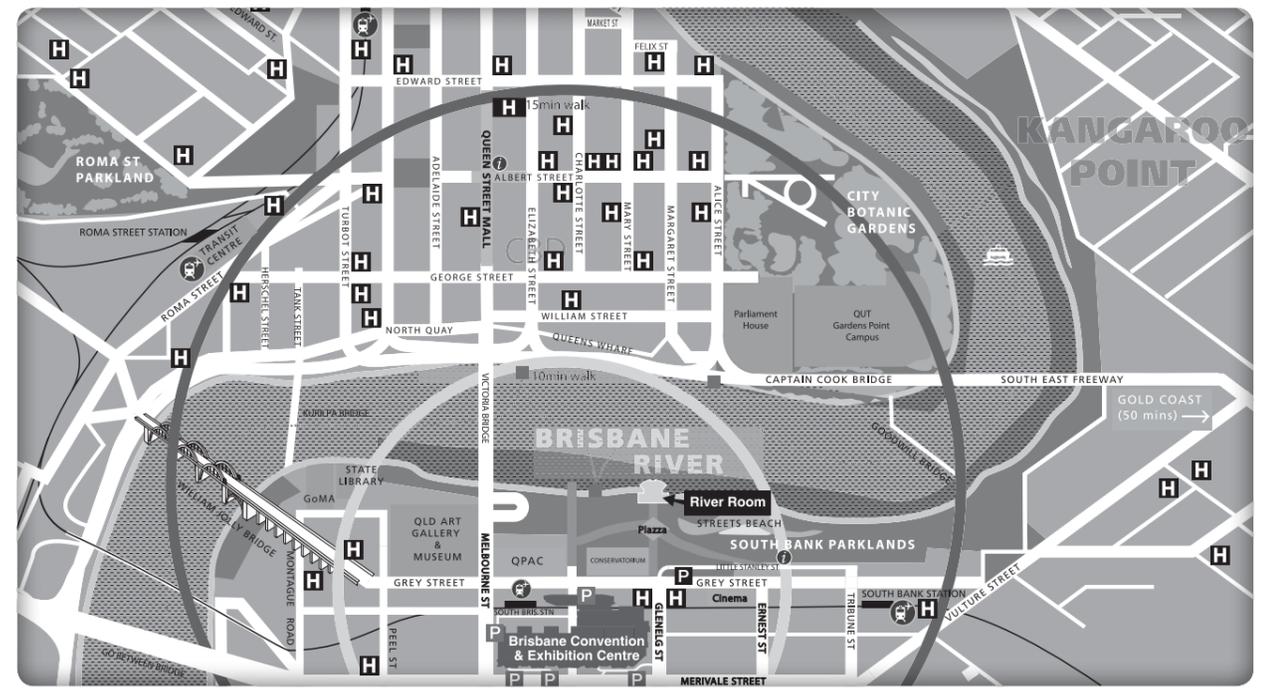

FLOOR PLANS

BRISBANE CONVENTION & EXHIBITION CENTRE

FOYER LEVEL
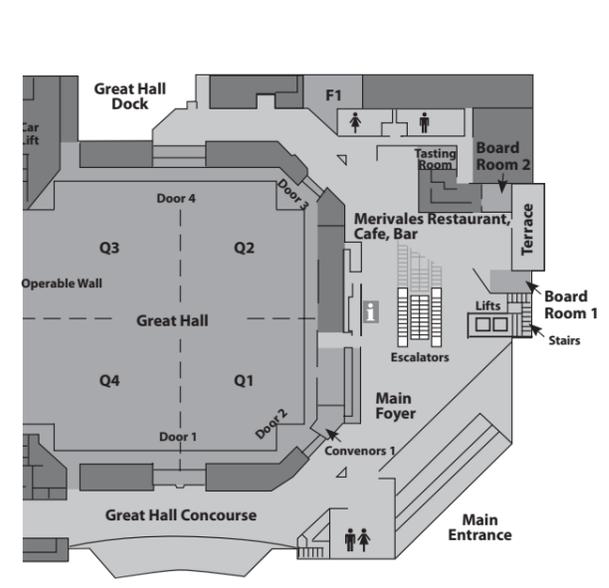
MEZZANINE LEVEL
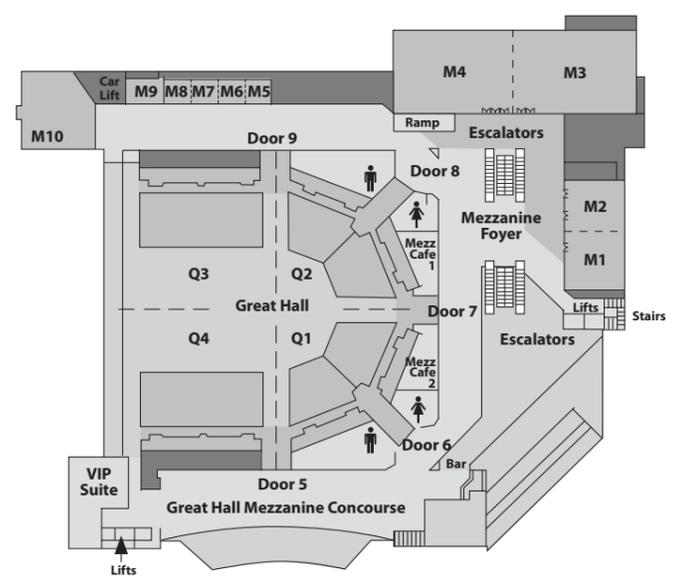
PLAZA LEVEL
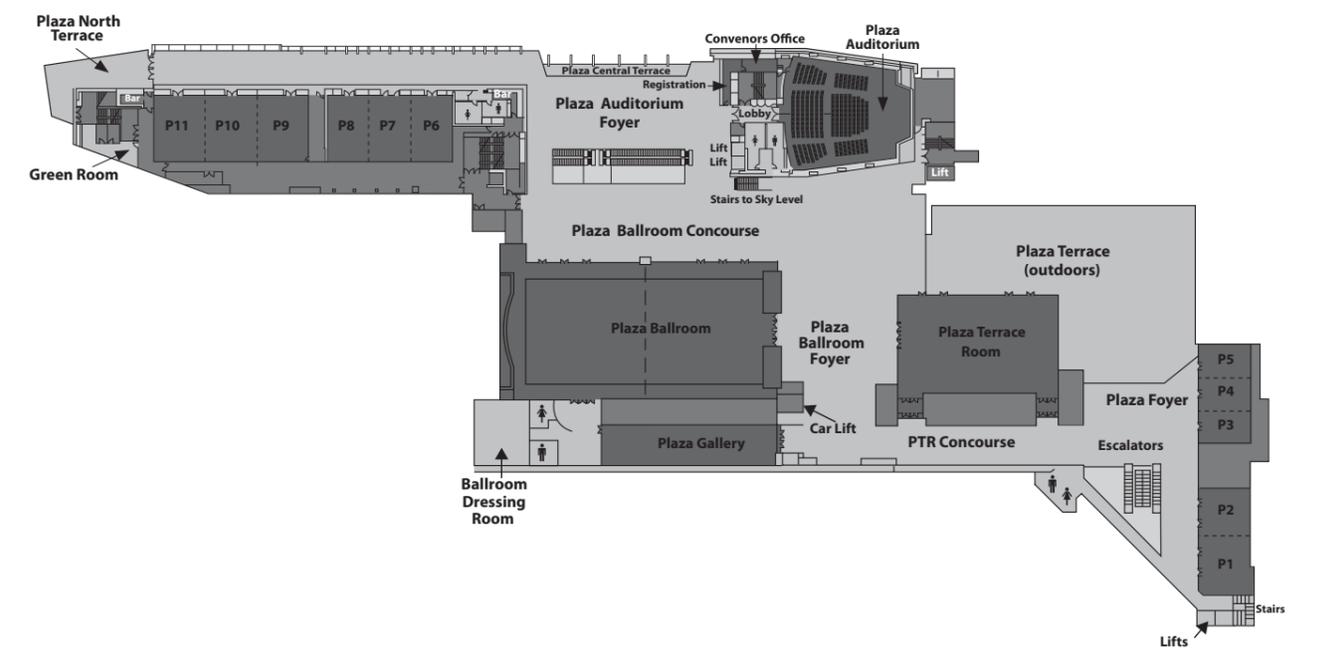
SOCIAL PROGRAM

WELCOME RECEPTION

Date: Monday 20 April 2015

Time: 1800 - 2000

Venue: Great Hall 3 & 4,
        Brisbane Convention & Exhibition Centre

Dress: Smart Casual

An invitation is extended to Conference delegates to attend the ICASSP 2015 Welcome Reception at the Brisbane Convention & Exhibition Centre. Renew old friendships and make new acquaintances as we welcome you to Brisbane. Canapés and drinks will be served in the exhibition hall.

This event is included in the registration fee for all delegates. Please see the staff at the registration desk if you wish to purchase additional tickets.

CONFERENCE DINNER

Date: Thursday 23 April 2015

Time: 1830 - 2200

Venue: Main Auditorium, Brisbane City Hall

Dress: Smart Casual

Tickets: A$135.00 per person (includes GST)

This stunning, heritage building is located in the heart of the city and is sure to provide an inspiring atmosphere for the ICASSP 2015 Conference Dinner. Join delegates, sponsors, colleagues and friends at this must attend event. Be treated to pre-dinner drinks under the stars in King George Square, before being seated in the Main Auditorium for an amazing two course meal of Australian cuisine and local entertainment.
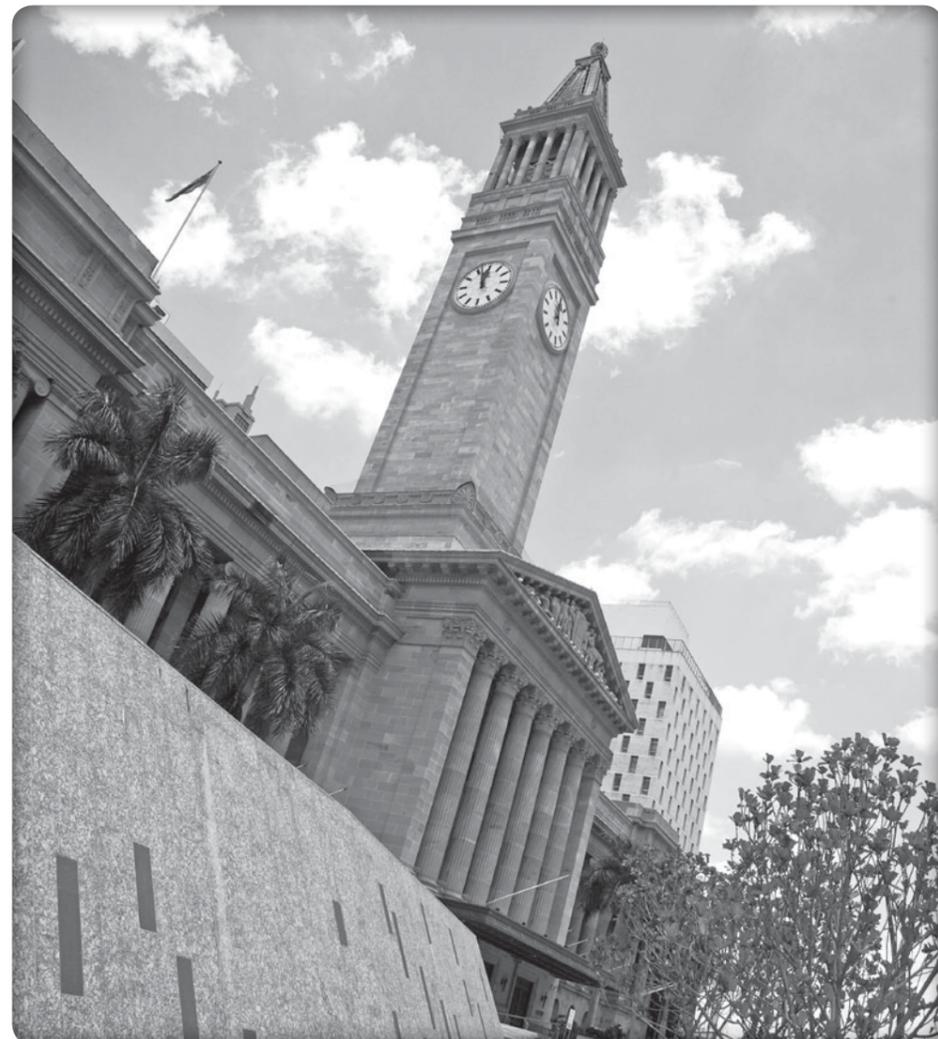
PLENARY SPEAKERS

All Plenary Speakers will present in Great Hall 1 & 2.

DR. NEIL GORDON

Defence Science & Technology Organisation, Australia and The University of Queensland

Presentation: Tuesday 21 April 2015, 1010 – 1100

Introduced by: Simon Maskell (University of Liverpool)

Bayesian time series methods and the search for MH370

On 7th March 2014 Malaysian Airlines flight MH370 carrying 239 passengers and crew from Kuala Lumpur to Beijing lost contact with Air Traffic Control and was subsequently reported missing. Over the following days an extensive air and sea search was made around the last reported location of the aircraft in the Gulf of Thailand without success. Signals transmitted by the aircraft's satellite communications terminal to Inmarsat's 3F1 Indian Ocean Region satellite indicated that the aircraft continued to fly for several hours after loss of contact. In this talk I will show how nonlinear/non-Gaussian Bayesian time series estimation methods were used to process the Inmarsat data and produce a probability distribution of potential MH370 flight paths leading to a prioritised search zone recommendation in the southern Indian Ocean.

Biography

Neil Gordon received a PhD in Statistics from Imperial College London in 1993. He was with the Defence Evaluation and Research Agency in the UK from 1988-2002 working on missile guidance and statistical data processing. He is best known for initiating the particle filter approach to nonlinear, non-Gaussian dynamic estimation which is now in widespread use throughout the world in many diverse disciplines. He is the co-author/co-editor of two books on particle filtering. In 2002 he moved to the Defence Science and Technology Organisation in Adelaide, Australia where he is currently head of the Data and Information Fusion group. In 2014 he became an honorary Professor with the School of Information Technology and Electrical Engineering at the University of Queensland.

PROF. RICHARD BARANIUK

Rice University

Presentation: Tuesday 21 April 2015, 1440 – 1540

Introduced by: Vaughan Clarkson (University of Queensland)
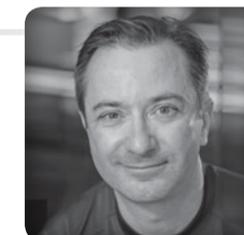
Open Education: New Opportunities for Signal Processing

A grassroots movement is sweeping through the academic world. The "open access movement" is based on a set of intuitions that are shared by a remarkably wide range of academics: that knowledge should be free and open to use and re-use; that collaboration should be easier, not harder; that people should receive credit and kudos for contributing to education and research; and that concepts and ideas are linked in unusual and surprising ways and not the simple linear forms that traditional media present. This talk will discuss the past, present, and future of the open access textbook movement from the perspective of the OpenStax platform and publishing initiative. Special attention will be paid to the role that new technologies can play in improving the quality and reach of education.

Biography

Richard Baraniuk is the Victor E. Cameron Professor of Electrical and Computer Engineering at Rice University and Founding Director of Connexions (cnx.org) and OpenStax (openstax.org). In addition to his "day job" in signal processing, he was a founder of the modern "open education" movement, which aims share knowledge and teaching materials freely online. Baraniuk launched Connexions in 1999. One of the first initiatives to offer free, open-source textbooks via the Web, the Rice-based initiative grew to become OpenStax CNX, a massive online repository that today is used each month by more than 2 million people in 190 countries. For his education projects, he has received the Eta Kappa Nu C. Holmes MacDonald National Outstanding Teaching Award, the Tech Museum Laureate Award, the Internet Pioneer Award from the Berkman Center for Internet and Society at Harvard Law School, the World Technology Network Education Award, the IEEE Signal Processing Society Education Award, and the IEEE James H. Mulligan, Jr. Education Medal. For his research projects in signal processing and machine learning, he has received young investigator awards from the US National Science Foundation and the Office of Naval Research, the Rosenbaum Fellowship from the Isaac Newton Institute of Cambridge University, the Wavelet Pioneer Award and the Compressive Sampling Pioneer Award from SPIE, and the IEEE Signal Processing Society Technical Achievement Award. He is a Fellow of IEEE and AAAS.

PLENARY SPEAKERS

PROF. IAIN JOHNSTONE

Department of Statistics, Stanford University, USA

Presentation: Wednesday 22 April 2015, 1420 – 1510

Introduced by: Barry Quinn (Macquarie University)

Estimating sparse eigenstructure for high dimensional data

When data is high dimensional, widely used multivariate methods such as principal component analysis can behave in unexpected ways. Upward bias in sample eigenvalues and inconsistency of sample eigenvectors are among the new phenomena that appear. In recent years there has been much progress on exploiting sparsity to respond to these phenomena. The talk will give an overview of this area and connect to the classic work of Australian statistician Alan James.

Biography

Iain Johnstone is Marjorie Mhoon Fair Professor in Quantitative Science in the Department of Statistics at Stanford University. He holds a joint appointment in biostatistics in Stanford's School of Medicine. He received his Ph.D. in Statistics from Cornell in 1981. His research has used ideas from harmonic analysis, such as wavelets, to understand noise-reduction methods in signal and image processing. More recently, he has applied random matrix theory to the study of high-dimensional multivariate statistical methods, such as principal components and canonical correlation analysis. A native of Australia, Johnstone is a member of the U.S. National Academy of Sciences and the American Academy of Arts and Sciences and a former president of the Institute of Mathematical Statistics.

PROF. PRAMOD K. VARSHNEY

Syracuse University

Presentation: Thursday 23 April 2015, 1420 – 1510

Introduced by: Rod Kennedy (Australian National University)

Noise-Enhanced Information Systems - Denoising Noisy Signals with Noise

Noise, traditionally defined as an unwanted signal, has been shown to play an important constructive role in many information processing systems. Performance enhancement via noise has been observed and employed in many physical, biological, and engineered systems. The concept of stochastic facilitation (SF) has been found critical for certain biological information functions such as detection of weak, subthreshold stimuli or suprathreshold signals through both experimental verification and analytical model simulations. In this talk, we present a systematic noise-enhanced information processing framework to analyze and optimize the performance of engineered systems. System performance is evaluated not only in terms of signal-to-noise ratio but also in terms of other more relevant metrics such as probability of error for signal detection or mean square error for parameter estimation. As an important new instance of SF, we also discuss the constructive effect of noise in associative memory recall. Potential enhancement of image processing systems through the addition of noise is discussed with important applications in biomedical image enhancement, image denoising, and classification. Some avenues for further research are outlined.

Biography

Pramod K. Varshney was born in Allahabad, India, on July 1, 1952. He received the B.S. degree in electrical engineering and computer science (with highest honors), and the M.S. and Ph.D. degrees in electrical engineering from the University of Illinois at Urbana-Champaign in 1972, 1974, and 1976 respectively. Since 1976 he has been with Syracuse University, Syracuse, NY where he is currently a Distinguished Professor of Electrical Engineering and Computer Science and the Director of CASE: Center for Advanced Systems and Engineering. He served as the Associate Chair of the department during 1993-96. He is also an Adjunct Professor of Radiology at Upstate Medical University in Syracuse, NY. His current research interests are in distributed sensor networks and data fusion, detection and estimation theory, wireless communications, physical layer security and image processing, radar. He has published extensively. He is the author of Distributed Detection and Data Fusion, published by Springer-Verlag in 1997.

While at the University of Illinois, Dr. Varshney was a James Scholar, a Bronze Tablet Senior, and a Fellow. He is a member of Tau Beta Pi and is the recipient of the 1981 ASEE Dow Outstanding Young Faculty Award. He was elected to the grade of Fellow of the IEEE in 1997 for his contributions in the area of distributed detection and data fusion. In 2000, he received the Third Millennium Medal from the IEEE and Chancellor's Citation for exceptional academic achievement at Syracuse University. He is the recipient of the IEEE 2012 Judith A. Resnik Award. He was awarded the degree of Doctor of Engineering honoris causa by Drexel University in 2014. He is on the editorial boards of Journal on Advances in Information Fusion and IEEE SP Magazine. He was the President of International Society of Information Fusion during 2001.

PLENARY SPEAKERS

PROF. ROB EVANS

Department of Electrical Engineering, The University of Melbourne

Presentation: Friday 24 April 2015, 1420 – 1510

Introduced by: Doug Gray (University of Adelaide)

Future Large Scale Power Network Control and Operation: Opportunities and Challenges

I will talk about distributed fault detection, optimal placement of sensors, security and large scale stochastic control. The 'grid' is one of the great achievements of the 20thcentury. The simple idea of connection a dynamo to a light bulb has growth into a vast, highly sophisticated and reliable energy delivery system enabling a high standard of living for a large part of the world. The grid is now facing challenges arising from its sheer scale and also its use of fossil fuels as the primary energy source. The so called future grid or misnamed 'smart grid' is a project to address these challenges by transforming the grid using modern electronics, control and communication technologies and 'cleaner' distributed energy sources. This talk will review the development of the grid and explore new opportunities arising from the current challenges.

Biography

Laureate Professor Rob Evans was born in 1947. He studied Electrical Engineering at the University of Melbourne. He spent 7 years on active duty as a Radar Engineering Officer with the Royal Australian Air Force working on automated ground control intercept systems. He obtained a PhD from the University of Newcastle and was a post-doctoral fellow at MIT and Cambridge University. He has served in many roles including Head of Electrical Engineering at both the University of Newcastle and the University of Melbourne. He also served as Dean of Engineering at the University of Melbourne. He was been Director of several research institutes and worked extensively with industry and defence over the past 40 years. He is currently Director of the Defence Science Institute. His research spans radar, signal processing, control systems and industrial electronics. He has worked extensively with industry and been involved in the development and commercialization of many industrial control and signal processing products including a number of large SCADA systems and power electronics systems. He is a Fellow of the Australian Academy of Science, a Fellow of the Australian Academy of Engineering and a Fellow of the IEEE.

SCHOOL OF ICASSP

PROGRAM

All School of ICASSP talks will take place in Great Hall 1 & 2.

TUESDAY 21 APRIL 2015

Afternoon Session SCH-1: 1600 – 1800

Chair: Neil Gordon (DSTO)

- 1600: Simon Maskell (University of Liverpool), 'Particle Filters—Learning from the Past, Tracking the Present and Predicting the Future'
- 1700: Jean-Christophe Olivo-Marin (Institut Pasteur), 'Quantitative cell dynamics'

WEDNESDAY 22 APRIL 2015

Early Morning Session SCH-2: 0830 – 1030

Chair: Robby McKilliam (University of South Australia)

- 0830: Alfred Hero (University of Michigan), on cooperative localisation
- 0930: Yonina Eldar (Techniion), 'Phase Retrieval with Application to Optical Imaging'

Morning Session SCH-3: 1050 – 1250

Chair: Iain Collings (Macquarie University)

- 1050: Erik G. Larsson (Linköping University), 'Introduction to Massive MIMO'
- 1150: Robert Heath (University of Texas at Austin), 'Millimeter Wave MIMO: A Signal Processing Perspective'

Afternoon Session SCH-4: 1530 – 1730

Chair: Vaughan Clarkson (University of Queensland)

- 1530: Michael Elad (Technion), 'Sparse & Redundant Representation Modeling of Images: Theory and Applications'
- 1630: Piotr Indyk (MIT), 'Recent Developments in the Sparse Fourier Transform'

THURSDAY 23 APRIL 2015

Morning Session SCH-5: 1050 – 1250

Chair: Jonathan Manton (University of Melbourne)

- 1050: Steven Smith (MIT Lincoln Laboratory), 'Signal Processing on Manifolds'
- 1150: Pradeep Ravikumar (University of Texas at Austin), 'Learning Graphical Model Structure'

Afternoon Session SCH-6: 1530 – 1730

Chair: Stefan Uhlich (Sony Stuttgart Technology Center)

- 1530: Sergio Barbarossa (Sapienza University of Rome), 'Joint optimization of radio and computational resources in mobile-edge computing'
- 1630: Min Wu (University of Maryland), 'Seeing the Invisibles: A Backstage Tour of Information Forensics'

FRIDAY 24 APRIL 2015

Morning Session SCH-7: 1050 – 1250

Chair: Douglas O'Shaughnessy (INRS)

- 1050: Dong Yu (Microsoft), 'Deep Learning for Automatic Speech Recognition—A Road Map'
- 1150: Shrikanth Narayanan (University of Southern California), 'Behavioral Signal Processing: Enabling human-centered behavioral informatics'

Afternoon Session SCH-8: 1530 – 1730

Chair: Gerald Matz (Vienna University of Technology)

- 1530: Rémi Gribonval (Inria), 'Dictionary learning: principles, algorithms, guarantees'
- 1630: Mikael Johansson (KTH), 'Networked sensing and control'

ABSTRACTS

PARTICLE FILTERS – LEARNING FROM THE PAST, TRACKING THE PRESENT AND PREDICTING THE FUTURE

Presenter: Simon Maskell, University of Liverpool

Abstract:

Particle filters provide a high-performance solution to the generic problem of using knowledge of the world to process an incoming stream of data to maintain an estimate of some state of interest. As a result of their wide applicability and ease of implementation, particle filters have gained popularity across a vast range of applications. This talk will focus on how to use particle filters to solve difficult statistical problems largely, but not exclusively, associated with sequential Bayesian inference. The talk will touch on using particle filters for machine learning (ie processing a fixed batch of data to estimate some parameters), tracking (ie filtering data to derive a current estimate of some state of interest) and prediction (ie extrapolating into the future). Additionally, the talk will give a personal perspective on some of the key advances made (eg the development of Sequential Monte Carlo Samplers), current misconceptions (eg the apparent inability to fully parallelise the resampling step) and future opportunities (eg particle flow). The aim is to help everyone, from novice to ninja, to learn something new about particle filters.

Biography:

Simon is Professor of Autonomous Systems at the University of Liverpool and honorary research fellow at Imperial College, London. While working at the UK defence and security company, QinetiQ, Simon co-authored the IEEE Transactions of Signal Processing tutorial on particle filters that is now the most cited paper on particle filtering. After thirteen years at QinetiQ, Simon moved to academia where he now leads an interdisciplinary research team working towards solutions to problems that span a variety of applications. All the research is underpinned by Simon's desire to use advanced statistical algorithms to improve the extraction of information from ambiguous data so as to inform difficult decision making. The applications include those associated with insurance, pharmaceuticals, cyber security, robotics and surveillance with customers that include the UK MoD, the UK police, the European Union, small companies and large organisations. The research includes the development of novel particle filters (and other Monte-carlo based tools), but also algorithms for single sensor processing (eg in radar, imagery and social media), multiple-target tracking, anomaly detection, machine learning (eg for Big Data) and decision support. Simon has an PhD, MEng and MA from Cambridge University, is a chartered Engineer and associate editor for IEEE-T-AES and IEEE-SPL.

QUANTITATIVE CELL DYNAMICS

Presenter: Jean-Chrisophe Olivo-Marin, Institut Pasteur

Abstract:

An increasing number of biological projects aim at elucidating the links between biological function and phenotype through imaging and modelling the spatiotemporal characteristics of cellular dynamics. This requires the automatic quantification of dynamics parameters and the characterization of phenotypic and morphological changes occurring during such diverse topics as cell motility, host/pathogen interaction or social interactions between animals. We will present and discuss some recent developments of image analysis algorithms and software for robust quantitative assessment of 2D/3D+t dynamic bioimaging data and show on a number of examples how these tools enable the extraction of exhaustive data from bioimages and facilitate the understanding of biological mechanisms. We will exemplify this by showing how the combination of computational imaging and physics modelling can be used to understand the capacity of cells to protrude blebs and generate whole-cell movements.

Biography:

Jean-Christophe Olivo-Marin is the head of the BioImage Analysis Unit and the Director of the Center for Innovation and Technological Research at Institut Pasteur, Paris. He chaired the Cell Biology and Infection Department (2010-2014) and was a cofounder and CTO of the Institut Pasteur Korea, Seoul (2004-2005). Previous to that, he was a staff scientist at the European Molecular Biology Laboratory, Heidelberg (1990-1998). He received the PhD and HDR degrees in optics and signal processing from the Institut d'Optique Théorique et Appliquée, University of Paris-Orsay, France. His research interests are in image analysis of microscopy images, computer vision and motion analysis for cellular dynamics, and in mathematical approaches to biological imaging. He is a Fellow of the IEEE, a Distinguished Lecturer of the SP Society, a Senior Area Editor of the IEEE Signal Processing Letters, and a member of the Editorial Board of the journals Medical Image Analysis and BMC Bioinformatics. He was the general chair of the IEEE International Symposium on Biomedical Imaging (ISBI) in 2008, and is presently the chair of the ISBI Steering Committee.

PHASE RETRIEVAL WITH APPLICATION TO OPTICAL IMAGING

Presenter: Yonina Eldar, The Technion - Israel Institute of Technology

Abstract:

The problem of phase retrieval, namely – the recovery of a function given the magnitude of its Fourier transform - arises in various fields of science and engineering, including electron microscopy, crystallography, astronomy, and optical imaging. Due to the loss of Fourier phase information, this problem is generally ill-posed. In this talk we review several modern methods for treating the phase retrieval problem including matrix lifting, structured illumination and short-time Fourier measurements. We also consider techniques that exploit sparsity on the input together with contemporary optimization tools to further facilitate recovery. We then illustrate the use of these methods in several different problems arising in optical imaging.

Biography:

Yonina C. Eldar is a Professor in the Department of Electrical Engineering at the Technion—Israel Institute of Technology, and holds the The Edwards Chair in Engineering. She has received numerous awards for excellence in research and teaching, including the Wolf Foundation Krill Prize for Excellence in Scientific Research, the Hershel Rich Innovation Award, the Michael Bruno Memorial Award from the Rothschild Foundation, the Weizmann Prize for Exact Sciences, the Muriel and David Jacknow Award for Excellence in Teaching, the IEEE Signal Processing Society Technical Achievement Award, and the IEEE/AESS Fred Nathanson Memorial Radar Award. She received several best paper awards together with her research students and colleagues. She is the Editor in Chief of Foundations and Trends in Signal Processing, a member of the IEEE Sensor Array and Multichannel Technical Committee, and an IEEE Fellow. She is also a member of the Young Israel Academy of Science and the Israel Committee for Higher Education. She is co-author of the books "Compressed Sensing" and "convex Optimization Methods in Signal Processing and Communications" and author of the book "Sampling Theory: Beyond Bandlimited Systems", all published by Cambridge University Press.

INTRODUCTION TO MASSIVE MIMO

Presenter: Erik G. Larsson, Linköping University

Abstract:

The exponential growth rate in wireless traffic has been sustained for over a century (this is known as Cooper's law). This trend will continue and perhaps even accelerate, due to new applications such as augmented reality and internet-of-things. Massive MIMO is a key technology for providing orders of magnitude more data traffic. This talk will give an introduction to the massive MIMO concept, and discuss the possibilities and limiting factors of massive MIMO systems. Some common misconceptions regarding massive MIMO technology will also be resolved.

Biography:

Erik G. Larsson is Professor and Head of the Division for Communication Systems in the Department of Electrical Engineering (ISY) at Linkoping University (LiU) in Linkoping, Sweden. He joined LiU in September 2007. He has previously held positions at the Royal Institute of Technology (KTH) in Stockholm, University of Florida, George Washington University (USA), and Ericsson Research (Stockholm). He received his Ph.D. from Uppsala University in 2002. His main professional interests are within the areas of wireless communications and signal processing. He has published some 100 journal papers on these topics, he is co-author of the textbook Space-Time Block Coding for Wireless Communications (Cambridge Univ. Press, 2003) and he holds 10 issued and many pending patents on wireless technology.

He has served as Associate Editor for several major journals, including the IEEE Transactions on Communications (2010-2014) and IEEE Transactions on Signal Processing (2006-2010). He serves as chair of the IEEE Signal Processing Society SPCOM technical committee in 2015-2016. He also serves as chair of the steering committee for the IEEE Wireless Communications Letters in 2014-2015. He is active in conference organization, most recently as the General Chair of the Asilomar Conference on Signals, Systems and Computers 2015 (he was Technical Chair in 2012). He received the IEEE Signal Processing Magazine Best Column Award twice, in 2012 and 2014.

MILLIMETER WAVE MIMO: A SIGNAL PROCESSING PERSPECTIVE

Presenter: Robert Heath, The University of Texas at Austin

Abstract:

Millimeter wave (mmWave) communication is one way to alleviate the spectrum gridlock at lower frequencies while simultaneously providing high bandwidth communication channels. MmWave makes use of MIMO (multiple-input multiple-output) through large antenna arrays at both the base station and the mobile station to provide sufficient received signal power. This talk explains the fundamentals of mmWave MIMO communication, with an emphasis on beamforming, precoding, and channel estimation. First the fundamental differences between mmWave and lower frequency MIMO is explained including array size, hardware constraints, channel models, and sensitivity to blockage. Then different mmWave-suitable approaches for beamforming and combining are reviewed including analog beamforming, hybrid analog/digital beamforming, hybrid switched/digital combining, and 1-bit ADC combining. Examples of relevant signal processing problems are provided in each case. The talk concludes with some highlights for future research directions.

Biography:

Robert W. Heath Jr. received the Ph.D. in EE from Stanford University. He is a Cullen Trust for Higher Education Endowed Professor in the Department of Electrical and Computer Engineering at The University of Texas at Austin and Director of the Wireless Networking and Communications Group. He is also the President and CEO of MIMO Wireless Inc and Chief Innovation Officer at Kuma Signals LLC. Prof. Heath is a recipient of the 2012 Signal Processing Magazine Best Paper award, a 2013 Signal Processing Society best paper award, the 2014 EURASIP Journal on Advances in Signal Processing best paper award, and the 2014 Journal of Communications and Networks best paper award. He is a licensed Amateur Radio Operator, a registered Professional Engineer in Texas, and is a Fellow of the IEEE.

SPARSE & REDUNDANT REPRESENTATION MODELING OF IMAGES: THEORY AND APPLICATIONS

Presenter: Michael Elad, The Technion - Israel Institute of Technology

Abstract:

In this survey talk I will walk you through a decade of fascinating research activity on "sparse and redundant representations". We will start with a classic image processing task of noise removal and use it as a platform for the introduction of data models in general, and sparsity and redundancy as specific forces in such models. The emerging model will be shown to lead to a series of key theoretical and numerical questions, which we will handle next. A key problem with the use of sparse and redundant representation modeling is the need for a sparsifying dictionary – we will discuss ways to obtain such a dictionary by learning from examples, and introduce the K-SVD algorithm. Then we will show how all these merge into a coherent theory that can be deployed successfully to various image processing applications.

Biography:

Michael Elad received his B.Sc. (1986), M.Sc. (1988) and D.Sc. (1997) from the department of Electrical engineering at the Technion, Israel. Since 2003 he is a faculty member at the Computer-Science department at the Technion, and since 2010 he holds a full-professorship position. Michael Elad works in the field of signal and image processing, specializing in particular on inverse problems, sparse representations and super-resolution. Michael received the Technion's best lecturer award six times, he is the recipient of the 2007 Solomon Simon Mani award for excellence in teaching, the 2008 Henri Taub Prize for academic excellence, and the 2010 Hershel-Rich prize for innovation. Michael is an IEEE Fellow since 2012. He is serving as an associate editor for SIAM SIIMS, IEEE-TIT, and ACHA, and as a senior editor for IEEE SPL.

RECENT DEVELOPMENTS IN THE SPARSE FOURIER TRANSFORM

Presenter: Piotr Indyk, MIT

Abstract:

The discrete Fourier transform (DFT) is a fundamental component of numerous computational techniques in signal processing and scientific computing. The most popular means of computing the DFT is the fast Fourier transform (FFT). However, with the emergence of big data, the "fast" in FFT is often no longer fast enough. In addition, in many applications it is hard to acquire a sufficient amount of data to compute the desired Fourier transform in the first place.

The Sparse Fourier Transform (SFT) is based on the insight that many real-world signals are sparse –i.e., most of the frequencies have negligible contribution to the overall signal. SFT exploits this insight by computing a compressed Fourier transform in time proportional to the data sparsity, not the data size. Furthermore, it uses only a subset of the signal.

The goal of this talk is to survey recent developments in this area and explain the basic techniques with examples and applications. Further resources are available at: **http://groups.csail.mit.edu/netmit/sFFT/**.

Biography:

Piotr Indyk is a Professor of Electrical Engineering and Computer Science at MIT. He joined MIT in 2000, after earning PhD from Stanford University. Earlier, he received Magister degree from Uniwersytet Warszawski in 1995. Piotr's research interests lie in the design and analysis of efficient algorithms. Specific interests include: high-dimensional computational geometry, sketching and streaming algorithms and sparse recovery. He has received the Sloan Fellowship (2003), the Packard Fellowship (2003) and the Simons Investigator Award (2013). His work on sparse Fourier sampling has been named to Technology Review "TR10" in 2012, while his work on locality-sensitive hashing has received the 2012 Kanellakis Theory and Practice Award.

SIGNAL PROCESSING ON MANIFOLDS

Presenter: Steven Smith, MIT Lincoln Laboratory

Abstract:

Signal processing theory and practice are built upon the foundation of linear algebra, which is the natural mathematical setting for physics-based applications. Yet many important problems encountered in signal processing are fundamentally nonlinear, not linear. Covariance matrices, statistical models, power constraints, graphs, and even the space of linear subspaces are all nonlinear objects that are best described using the generalization of linear algebra: manifolds. This talk presents a theoretical and practical approach to think about and solve signal processing problems on manifolds. The basic strategy involves interpreting signal processing geometrically and extending linear algebraic concepts to their corresponding geometric concepts on manifolds. This approach is comprehensive, ranging through the entire signal processing chain from filtering to detection to estimation, and provides powerful new tools and insights, as well as well as some startling surprises. Representative problems are presented and analyzed, with an emphasis on exploiting the tools of geometric invariance wherever possible. The traditional problem of covariance matrix estimation is considered from the perspective of intrinsic estimation on manifolds, and the relatively recent problem of subgraph detection is considered from the perspective of random walks on graphs. Finally, a summary of some novel results made possible by signal processing on manifolds is presented.

Biography:

Steven Thomas Smith is a Senior Staff Member at MIT Lincoln Laboratory, Lexington, MA. He received the B.A.Sc. degree in electrical engineering and mathematics from the University of British Columbia, Vancouver, BC in 1986 and the Ph.D. degree in applied mathematics from Harvard University, Cambridge, MA in 1993. He has over 15 years experience as an innovative technology leader with statistical data analytics, both theory and practice, and broad leadership experience ranging from first-of-a-kind algorithm development for groundbreaking

sensor systems to graph-based intelligence architectures. His contributions span diverse applications from optimum network detection, geometric optimization, geometric acoustics, statistical resolution limits, and nonlinear parameter estimation. He received the SIAM Outstanding Paper Award in 2001 and the IEEE Signal Processing Society Best Paper Award in 2010. He was associate editor of the IEEE Transactions on Signal Processing in 2000–2002, and currently serves on the IEEE Sensor Array and Multichannel and Big Data committees. He has taught signal processing courses at Harvard and for the IEEE.

LEARNING GRAPHICAL MODEL STRUCTURE

Presenter: Pradeep Ravikumar, University of Texas

Abstract:

Undirected graphical models, also known as Markov random fields, are widely used in a variety of domains, including coding theory, biostatistics, natural language processing and image analysis among others. They compactly represent distributions over a large number of variables using undirected graphs, which encodes conditional independence assumptions among the variables. Recovering this underlying graph structure is thus important for many of these applications of MRFs, especially under constrained settings where the number of variables is large, and the samples are limited.

Unlike typical model selection problems, the graphical model selection problem in particular has not one but two computationally intractable components: in addition to the combinatorial space of possible graphs, the likelihood itself is intractable. In this talk, we will cover two classes of recent approaches for recovering such graphical model structure that are not only computationally tractable but also come with strong statistical guarantees. The first is based on regularized convex programs that use carefully chosen approximations to the graphical model likelihood. The second will be based on very simple classes of greedy procedures that iteratively add and delete edges. We discuss conditions under which each of these classes of methods can be guaranteed to succeed in recovering the underlying graph structure, with high probability, even under high-dimensional settings.

Biography:

Pradeep Ravikumar received his B.Tech. in Computer Science and Engineering from the Indian Institute of Technology, Bombay, and his PhD in Machine Learning from the School of Computer Science at Carnegie Mellon University. He was then a postdoctoral scholar at the Department of Statistics at the University of California, Berkeley. He is now an Assistant Professor in the Department of Computer Science, at the University of Texas at Austin. He is also affiliated with the Department of Statistics and Data Sciences, and the Institute for Computational Engineering and Sciences at UT Austin. His thesis has received honorable mentions in the ACM SIGKDD Dissertation award and the CMU School of Computer Science Distinguished Dissertation award. He is a Sloan Fellow, a Siebel Scholar, a recipient of the NSF CAREER Award; and was Program Chair for the International Conference on Artificial Intelligence and Statistics (AISTATS) in 2013.

JOINT OPTIMIZATION OF RADIO AND COMPUTATIONAL RESOURCES IN MOBILE-EDGE COMPUTING

Presenter: Sergio Barbarossa, Sapienza University of Rome

Abstract:

Two of the major current thrusts in communication networks are the (ultra)-dense deployment of base stations and network functionality virtualization. The goal of this talk is to address dense deployment and computation offloading within a single holistic perspective, whose aim is to augment the capabilitites of resource-constrained mobile devices. The basic approach is a joint optimization of radio and computational resources aimed at minimizing energy consumption, under strict latency constraints. Within this context, cast in the 5G roadmap, new interesting signal processing problems arise, from application design to interference management and optimal resource allocation.

Biography:

Dr. Sergio Barbarossa received his MS and Ph.D. EE degree from the University of Rome "La Sapienza", where he is now a Full Professor. He received the 2000 and 2014 IEEE Best Paper Awards from the Signal Processing Society and the 2010 Technical Achievements Award from the European Signal Processing society. He is an IEEE Fellow and EURASIP Fellow. He served as IEEE Distinguished Lecturer (2013-2014). He is currently a member of the editorial board of the IEEE Transactions on Signal and Information Processing over Networks. Since 2000, he has been a principal investigator several EU projects. He has been the scientific coordinator of projects WINSOC, FREEDOM, and TROPIC on wirelesse sensor networks, femtocell networks and mobile cloud computing.

SEEING THE INVISIBLES: A BACKSTAGE TOUR OF INFORMATION FORENSICS

Presenter: Min Wu, University of Maryland, College Park, USA

Abstract:

With the wide adoption of media-oriented mobile devices and proliferation of social media networks, multimedia information is gaining momentum and making a strong social impact. In the mean time, a number of information forensic and provenance questions arise: using image as an example, we would like know how an image was generated, from where an image was from, what has been done on the image since its creation, by whom, when and how. This talk will provide a tutorial overview on some of the research advances on information forensics that explore a variety of invisible traces.

Reference:

M. Stamm, M. Wu, and K.J.R. Liu: "Information Forensics: An Overview of the First Decade," invited paper for the inaugural issue, IEEE Access, vol. 1, 2013. [http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=6515027]

Biography:

Min Wu is an ADVANCE Professor of Electrical and Computer Engineering and a Distinguished Scholar-Teacher at the University of Maryland, College Park. She received her Ph.D. degree in electrical engineering from Princeton University in 2001. At UMD, she leads the Media and Security Team (MAST), with main research interests on information security and forensics and multimedia signal processing. Her research and education have been recognized by a NSF CAREER award, a TR100 Young Innovator Award from the MIT Technology Review Magazine, an ONR Young Investigator Award, a Computer World "40 Under 40" IT Innovator Award, a University of Maryland Invention of the Year Award, an IEEE Mac Van Valkenburg Early Career Early Career Teaching Award, and several paper awards from IEEE SPS, ACM, and EURASIP. She was elected IEEE Fellow for contributions to multimedia security and forensics. Dr. Wu chaired the IEEE Technical Committee on Information Forensics and Security (2012-2013), and has served as Vice President - Finance of the IEEE Signal Processing Society (2010-2012) and Founding Chief Editor of the IEEE SigPort initiative (2013-2014). Currently, she is serving as Editor-in-Chief (2015-2017) of the IEEE Signal Processing Magazine and an IEEE Distinguished Lecturer. [URL: http://www.ece.umd.edu/~minwu/

DEEP LEARNING FOR AUTOMATIC SPEECH RECOGNITION – A ROAD MAP

Presenter: Dong Yu, Microsoft Research

Abstract:

Deep learning has greatly advanced the state-of-the-art in automatic speech recognition (ASR) and flourished across-the-board in ASR industry and academic research. In this tutorial I will discuss deep learning based automatic speech recognition (ASR) techniques from a historical point of view. I will list and analyze what we view as major milestones in developing the deep learning based ASR techniques and systems in the previous several years. I will describe the motivations of these studies, the innovations they have engendered, the improvements they have provided, and the impacts they have generated.

Biography:

Dr. Dong Yu is a principal researcher at Microsoft Research - Speech and Dialog Research Group. His research interests include speech recognition and machine learning. He has published over 140 papers in these areas and is the inventor/coinventor of more than 50 granted/pending patents. His work on context-dependent deep neural network hidden Markov model (CD-DNN-HMM) has helped to shape the new direction on large vocabulary speech recognition research and was recognized by the IEEE SPS 2013 best paper award. Most recently he has focused on applying computational networks, a generalization of many neural network models, to speech recognition.

BEHAVIORAL SIGNAL PROCESSING: ENABLING HUMAN-CENTERED BEHAVIORAL INFORMATICS

Presenter: Shrikanth Narayanan, University of Southern California

Abstract:

Audio-visual data have been a key enabler of human behavioral research and its applications. The confluence of sensing, communication and computing technologies is allowing capture and access to data, in diverse forms and modalities, in ways that were unimaginable even a few years ago. Importantly, these data afford the analysis and interpretation of multimodal cues of verbal and non-verbal human behavior. These data sources not only carry crucial information about a person's intent, identity and trait but also underlying attitudes and emotions. Automatically capturing these cues, although vastly challenging, offers the promise of not just efficient data processing but in tools for discovery that enable hitherto unimagined insights.

Recent computational approaches that have leveraged judicious use of both data and knowledge have yielded significant advances in this regards, for example in deriving rich, context-aware information from multimodal signal sources including human speech, language, and videos of behavior. These are even complemented and integrated with data about human brain and body physiology. This talk will focus on some of the advances and challenges in gathering such data and creating algorithms for machine processing of such cues. It will highlight some of our ongoing efforts in Behavioral Signal Processing (BSP)—technology and algorithms for quantitatively and objectively understanding typical, atypical and distressed human behavior—with a specific focus on communicative, affective and social behavior. The talk will illustrate Behavioral Informatics applications of these techniques that contribute to quantifying higher-level, often subjectively described, human behavior in a domain-sensitive fashion. Examples will be drawn from health and well being realms such as Autism, Couple therapy, Depression and Addiction counseling.

Reference:

S. Narayanan and P. Georgiou. Behavioral Signal Processing: Deriving Human Behavioral Informatics from Speech and Language. Proceedings of IEEE. 101(5): 1203 - 1233, May 2013.

Biography:

Shrikanth (Shri) Narayanan is Andrew J. Viterbi Professor of Engineering at the University of Southern California, where he is Professor of Electrical Engineering, Computer Science, Linguistics and Psychology, and Director of the Ming Hsieh Institute. Prior to USC he was with AT&T Bell Labs and AT&T Research. His research focuses on human-centered information processing and communication technologies. He is a Fellow of the Acoustical Society of America, IEEE, and the American Association for the Advancement of Science (AAAS). Shri Narayanan is an Editor for the Computer, Speech and Language Journal and an Associate Editor for the IEEE Transactions on Affective Computing, the Journal of Acoustical Society of America, IEEE Transactions on Signal and Information Processing over Networks, and the APISPA Transactions on Signal and Information Processing having previously served an Associate Editor for the IEEE Transactions on Speech and Audio Processing (2000-2004), the IEEE Signal Processing Magazine (2005-2008) and the IEEE Transactions on Multimedia (2008-2012). He is a recipient of several honors including the 2005 and 2009 Best Transactions Paper awards from the IEEE Signal Processing Society and serving as its Distinguished Lecturer for 2010-11. With his students, he has received a number of best paper

awards including winning the 2014 Ten-year Technical Impact Award from ACM ICMI and Interspeech Challenges in 2009 (Emotion classification), 2011 (Speaker state classification), 2012 (Speaker trait classification), 2013 (Paralinguistics/Social Signals) and in 2014 (Paralinguistics/Cognitive Load). He has published over 650 papers and has been granted 16 U.S. patents.

DICTIONARY LEARNING: PRINCIPLES, ALGORITHMS, GUARANTEES

Presenter: Remi Gribonval, Inria

Abstract:

Sparse modeling has become highly popular in signal processing and machine learning, where many tasks can be expressed as under-determined linear inverse problems. Together with a growing family of low-dimensional signal models, sparse models expressed with signal dictionaries have given rise to a rich set of algorithmic principles combining provably good performance with bounded complexity. In practice, from denoising to inpainting and super-resolution, applications require choosing a "good" dictionary. This key step can be empirically addressed through data-driven principles known as dictionary learning.

In this talk I will draw a panorama of dictionary learning for low-dimensional modeling. After reviewing the basic empirical principles of dictionary learning and related matrix factorizations such as PCA, K-means and NMF, we will discuss techniques to learn dictionaries with controlled computational efficiency, as well as a series of recent theoretical results establishing the statistical significance of learned dictionaries even in the presence of noise and outliers.

Biography:

Rémi Gribonval is a Research Director with Inria in Rennes, France, and the scientific leader of the PANAMA research group on sparse audio processing. A former student at Ecole Normale Supérieure, Paris, he received the Ph. D. degree in applied mathematics from the University of Paris-IX Dauphine in 1999. His research focuses on mathematical signal processing, machine learning, approximation theory and statistics, with an emphasis on low-dimensional modeling, dictionary learning and compressed sensing. In 2011, he was awarded the Blaise Pascal Award of the GAMNI-SMAI by the French Academy of Sciences, and a starting investigator grant from the European Research Council. He founded the series of international workshops SPARS on Signal Processing with Adaptive/Sparse Representations. He is a member of the IEEE Signal Processing Theory and Methods Technical Committee, and an IEEE fellow.

NETWORKED SENSING AND CONTROL

Presenter: Mikael Johansson, KTH

Abstract:

Advances in low-cost and low-power technologies for sensing, computing and communication allow us to observe, infer and monitor the state of the physical world on an unprecedented scale. However, developing algorithms for real-time decision-making that can execute on low-performance devices and operate reliably using data collected over unreliable communication links is challenging.

The intellectual challenges of networked control, and the broad impact that such a technology can have, has made the field a very active area of research during the last decade. Significant progress has been made, both in terms of new theory and algorithms, and in terms of applications.

In this talk, I will try to summarize some of the key challenges in networked sensing and control, and highlight some of the most fundamental, insightful and useful results in the literature. The talk will be focusing on four central questions: (1) how do delays and information loss affect the achievable closed-loop control performance; (2) how can we develop networking-protocol that support reliable real-time control, despite uncertainties and losses on individual links; (3) what is the role of information patterns in decentralized control; and (4) how can we design simple algorithms for coordinating a network of agents toward a common goal. Applications from process control, automotive systems, and critical infrastructures will illustrate the main ideas.

Biography:

Mikael Johansson received the M.Sc and Ph.D. degrees in electrical engineering from Lund University, Sweden, in 1994 and 1999, respectively. He held postdoctoral positions at Stanford University and U.C. Berkeley before joining KTH in 2002, where he now serves as full professor. His research interests include networked control and distributed optimization with applications. He has published two books and over hundred papers, several which are highly cited and have received recognition in terms of paper awards. He has served on the editorial boards of Automatica and the IEEE Transactions on Control of Networked Systems, as well as on the program committee for several top-tier conferences organized by IEEE and ACM.

MATHWORKS WORKSHOP

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MATHWORKS WORKSHOP: WHAT'S NEW IN MATLAB FOR SIGNAL ANALYTICS, STREAMING, AND ANTENNA-TO-BITS WIRELESS DESIGN?

Date: Wednesday 22 April 2015

Time: 1050 - 1250

Location: Meeting Room P5, Plaza Level

Abstract

In this session, you will learn about new capabilities in MATLAB® and Simulink® that help you bring your ideas to the real world. Use MATLAB's signal analytics tools to process and make sense of data generated by IoT (Internet of Things) sources and sensor arrays. Design and implement streaming DSP algorithms for real-time applications. Connect low-cost hardware to MATLAB to prototype and verify designs with over-the-air testing.

In this presentation we highlight multiple applications, including:

- Signal analytics and classification applied to data gathered from wearable and mobile devices
- Audio and Heart Sensor applications with low-latency desktop processing and prototyping on ARM® Cortex®-M and Cortex®-A
- Wireless connectivity to Xilinx Zync Radios and over-the-air testing of LTE signals as part of Software-Defined Radio (SDR) experiments
- Through demonstrations we show how you can set up labs and develop courseware to facilitate your research and teaching projects.

Presenter: Houman Zarrinkoub, PhD.

Dr. Houman Zarrinkoub is a senior product manager at MathWorks, based in Massachusetts, USA. During his tenure at MathWorks he also served as a development manager and has been responsible for multiple signal processing and communications software tools. Prior to MathWorks, he was a research scientist in the Wireless Group at Nortel Networks, where he contributed to multiple standardization projects for 3G mobile and voice coding technologies. He has been awarded multiple patents on topics related to computer simulations. Houman is the author of the book Understanding LTE with MATLAB: From Mathematical Modeling to Simulation and Prototyping (Wiley, 2014). He holds a B.Sc. degree in electrical engineering from McGill University and M.Sc. and Ph.D. degrees in telecommunications from the Institut National de la Recherche Scientifique, in Canada.

TUTORIALS

T1: GENOMIC SIGNAL PROCESSING: FROM COMPRESSION TO KNOWLEDGE MINING

Subject Area: Biomedical signal processing

Presenters: Olgica Milenkovic and Minji Kim (University of Illinois, Urbana-Champaign)

Location: Meeting Room P5, Plaza Level

T2: COMPUTATIONAL NETWORKS: A GENERALIZATION OF DEEP LEARNING MODELS

Subject Area: Mathematical tools

Presenters: Dong Yu, Mike Seltzer, Kaisheng Yao, Zhiheng Huang and Jasha Droppo (Microsoft Research)

Location: Meeting Room P1, Plaza Level

T3: RANDOM MATRICES, ROBUST ESTIMATION AND APPLICATIONS

Subject Area: Mathematical tools

Presenter: Romain Couillet (Supélec)

Location: Meeting Room P2, Plaza Level

T4: MIXED-INTEGER PROGRAMMING IN SIGNAL PROCESSING AND COMMUNICATIONS

Subject Area: Mathematical tools

Presenters: Marius Pesavento (Technische Universität Darmstadt), Marc E. Pfetsch (Technische Universität Darmstadt) and Yong Cheng (NEC Labs)

Location: Meeting Room P3, Plaza Level

T5: COVARIANCE ANALYSIS AND MACHINE LEARNING METHODS FOR ELECTRONIC TRADING

Subject Area: Signal processing for finance

Presenters: Ali Akansu (New Jersey Institute of Technology) and Dmitry Malioutov (IBM)

Location: Meeting Room P4, Plaza Level

TUTORIALS

T6: SIGNAL PROCESSING TOOLS FOR BIG DATA ANALYTICS

Subject Area: Big data

Presenters: Georgios B. Giannakis (University of Minnesota), Konstantinos Slavakis (University of Minnesota) and Gonzalo Mateos (University of Rochester)

Location: Meeting Room P1, Plaza Level

T7: INTRODUCTION TO SIGNAL PROCESSING AND OPTIMIZATION PROBLEMS IN THE SMART ELECTRIC POWER GRID NETWORKS

Subject Area: Signal processing for power & energy

Presenter: Anna Scaglione (Arizona State University)

Location: Meeting Room P4, Plaza Level

T8: AURALIZATION FOR ARCHITECTURAL ACOUSTICS, VIRTUAL REALITY AND COMPUTER GAMES: FROM PHYSICAL TO PERCEPTUAL RENDERING OF DYNAMIC SOUND SCENES

Subject Area: Audio signal processing

Presenters: Enzo De Sena (Katholieke Universiteit Leuven), Zoran Cvetkovic (King's College London) and Julus O. Smith (Stanford University)

Location: Meeting Room M1, Mezzanine Level

T9: SIGNAL PROCESSING FOR COCHLEAR IMPLANTS

Subject Area: Audio signal processing/biomedical signal processing

Presenters: Oldooz Hazrati (University of Texas at Dallas), John H. L. Hansen (University of Texas at Dallas), Brett A. Swanson (Cochlear Ltd. Australia) and Michael Goorevich (Cochlear Ltd. Australia)

Location: Meeting Room P2, Plaza Level

T10: COMPRESSIVE COVARIANCE SENSING

Subject Area: Sparsity techniques

Presenters: Geert Leus (Delft University of Technology), Zhi Tian (George Mason University) and Daniel Romero (University of Vigo)

Location: Meeting Room P3, Plaza Level

T11: OVER-THE-HORIZON RADAR: FUNDAMENTAL PRINCIPLES, ADAPTIVE PROCESSING AND EMERGING APPLICATIONS

Subject Area: Radar signal processing

Presenter: Giuseppe A. Fabrizio (Defence Science & Technology Organisation, Australia)

Location: Meeting Room P5, Plaza Level

TUTORIALS

DATE: MONDAY 20 APRIL 2015 ● TIME: 1330 – 1700

T12: CONVEX OPTIMIZATION FOR BIG DATA

Subject Area: Big data

Presenters: Volkan Cevher (EPFL), Mario Figueiredo (University of Lisbon), Mark Schmidt (University of British Columbia) and Quoc Tran-Dinh (EPFL)

Location: Meeting Room P1, Plaza Level

T13: ADAPTATION, LEARNING, AND OPTIMIZATION OVER NETWORKS

Subject Area: Network distributed signal processing

Presenter: Ali H. Sayed (University of California, Los Angeles)

Location: Meeting Room P3, Plaza Level

T14: IMAGING AND CALIBRATION FOR APERTURE ARRAY RADIO TELESCOPES

Subject Area: Image processing

Presenters: Amir Leshem (Bar-Ilan University) and Stefan J. Wijnholds (Netherlands Institute for Radio Astronomy)

Location: Meeting Room P4, Plaza Level

T15: PERCEPTUAL METRICS FOR IMAGE AND VIDEO QUALITY IN A BROADER CONTEXT: FROM PERCEPTUAL TRANSPARENCY TO STRUCTURAL EQUIVALENCE

Subject Area: Image processing

Presenters: Sheila S. Hemami (Northeastern University) and Thrasyvoulos N. Pappas (Northwestern University)

Location: Meeting Room P5, Plaza Level

T16: BEYOND RANDOMNESS: SPARSE SIGNAL PROCESSING IN PRACTICE

Subject Area: Sparsity techniques

Presenters: Waheed U. Bajwa (Rutgers University) and Marco F. Duarte (University of Massachusetts, Amherst)

Location: Meeting Room M1, Mezzanine Level

T17: ADAPTIVE LEARNING FOR MODEL-BASED BLIND SOURCE SEPARATION

Subject Area: Audio signal processing

Presenter: Jen-Tzung Chien (National Chiao Tung University)

Location: Meeting Room P2, Plaza Level

SPECIAL SESSIONS

PASSIVE RADAR SIGNAL PROCESSING TECHNIQUES

Organised by: James Palmer

Date: Tuesday 21 April 2015

Time: 1110 – 1310

Location: Meeting Room P3 & P4, Plaza Level

ANOMALY DETECTION AND INTENT INFERENCE

Organised by: Simon Godsill, Vikram Krishnamuthy and Bashar Ahmad

Date: Tuesday 21 April 2015

Time: 1600 – 1800

Location: Meeting Room P3 & P4, Plaza Level

AUDIO FOR ROBOTS – ROBOTS FOR AUDIO

Organised by: Emmanuel Vincent and Jonathan Le Roux

Date: Wednesday 22 April 2015

Time: 0830 – 1030

Location: Meeting Room P3 & P4, Plaza Level

SIGNAL PROCESSING CHALLENGES FOR THE SQUARE KILOMETER ARRAY

Organised by: Steven Tingay

Date: Wednesday 22 April 2015

Time: 1050 – 1250

Location: Meeting Room P3 & P4, Plaza Level

THEORY AND APPLICATION OF COHERENCE IN SIGNAL PROCESSING

Organised by: David Ramirez, Javier Via and Louis Scharf

Date: Wednesday 22 April 2015

Time: 1530 – 1730

Location: Meeting Room P3 & P4, Plaza Level

ENHANCED VOICE SERVICES

Organised by: Tom Bäckström, Takehiro Moriya and Milan Jelinek

Date: Thursday 23 April 2015

Time: 0830 – 1030

Location: Meeting Room P3 & P4, Plaza Level

SPECIAL SESSIONS

DIGITAL SIGNAL PROCESSING FOR ASSISTIVE LISTENING DEVICES

Organised by: Jesper Jensen, Simon Doclo and Michael Syskind Pederson

Date: Thursday 23 April 2015

Time: 1050 – 1250

Location: Meeting Room P3 & P4, Plaza Level

ADVANCES IN MANIFOLD-BASED SIGNAL AND INFORMATION PROCESSING

Organised by: Waheed Bajwa

Date: Thursday 23 April 2015

Time: 1530 – 1730

Location: Meeting Room P3 & P4, Plaza Level

COOPERATIVE SIGNAL PROCESSING IN HETEROGENEOUS AND MULTI-TASK SENSOR NETWORKS

Organised by: Sergios Theodirides, Abdelzhak Zoubir and Jorge Plata-Chaves

Date: Friday 24 April 2015

Time: 0830 – 1030

Location: Meeting Room P3 & P4, Plaza Level

SPEECH PROCESSING FOR LANGUAGES WITHOUT WRITTEN FORMS

Organised by: Alan Black, Aren Jensen, Sharon Goldwater and Tanja Schultz

Date: Friday 24 April 2015

Time: 1050 – 1250

Location: Meeting Room P3 & P4, Plaza Level

SIGNAL PROCESSING FOR ASSISTIVE HEARING DEVICES

Organised by: Fei Chen and Yu Tsao

Date: Friday 24 April 2015

Time: 1530 – 1730

Location: Meeting Room P3 & P4, Plaza Level

FINITE RATE OF INNOVATION SAMPLING AND APPLICATIONS

Organised by: Chandra Sekhar Seelamantula and Thierry Blu

Date: Friday 24 April 2015

Time: 1050 – 1250

Location: Poster Area D, Great Hall 3 & 4

SIGNAL PROCESSING CUP

Sponsored by MathWorks

MathWorks®
Accelerating the pace of engineering and science

Date: Monday 20 April 2015

Time: 1500 – 1700

Location: Meeting Room M2, Mezzanine Level

The IEEE SP Cup is a competition that provides undergraduate students with the opportunity to form teams and work together to solve a challenging and interesting real-world problem using signal-processing techniques and methods. Three teams will be selected to present their work, and prizes will be awarded at ICASSP 2015. The competition title is Heart Rate Monitoring During Physical Exercise Using Wrist-Type Photoplethysmographic (PPG) Signals.

STUDENT CAREER LUNCHEON

Date: Thursday 23 April 2015

Time: 1300 – 1430

Location: Sky Room, Sky Level

Students meet Potential Employers at ICASSP 2015

The IEEE Signal Processing Society (SPS) is pleased to organise the Student Career Luncheon at ICASSP 2015. At this luncheon, students will meet people from the industry, who will introduce their companies and job opportunities. Students and fresh graduates who have registered for ICASSP 2015 can attend this event for free, but SPS membership is required. As we have limited seats for the event, priority will be given to senior PhD students; paper quality will also be considered.

SPS ADMINISTRATIVE MEETINGS

Tuesday 21 April 2015	Time	Venue	Meeting Room
Signal Processing Letters Editorial Board	13:00-14:30	BCEC	Meeting Room P9, Plaza Level
Trans. Image Processing Editorial Board	13:00-14:30	BCEC	Meeting Room P10, Plaza Level
Journal of Selected Topics in Signal Processing	13:00-14:30	BCEC	Meeting Room B3, Boulevard Level
Trans. Information Forensics & Security Ed. Bd.	13:00-14:30	BCEC	Meeting Room P11, Plaza Level
Signal Processing Magazine Editorial Board	13:00-14:30	BCEC	Meeting Room P6, Plaza Level
Trans. On Computational Imaging	13:00-14:30	BCEC	Meeting Room A2, Arbour Level
Trans. On Signal and Info. Processing over Net.	13:00-14:30	BCEC	Concord Boardroom, Concord Level
Trans. Audio, Speech & Language Proc. Ed. Bd.	13:00-14:30	BCEC	Meeting Room B1, Boulevard Level
Trans. Signal Processing Editorial Board	13:00-14:30	BCEC	Meeting Room B2, Boulevard Level
S. P. for Communications & Networking TC	13:00-14:30	BCEC	Meeting Room P7, Plaza Level
Membership Board Lunch Meeting	13:00-16:00	BCEC	Meeting Room M5 & M6, Mezzanine Level
Standing Committee on Industry DSP Technology	18:00-19:30	Rydges South Bank	Podium 1
Publications Board Dinner	18:00-19:00	Rydges South Bank	Level 12 North
Publications Board Meeting	19:00-23:00	Rydges South Bank	Level 12 South

Wednesday 22 April 2015	Time	Venue	Meeting Room
Conference Board Executive Subcommittee	7:00- 8:30	BCEC	Meeting Room M7 & M8, Mezzanine Level,
Big Data SIG	7:00- 8:30	BCEC	Meeting Room P6, Plaza Level
Education Committee	7:00- 8:30	BCEC	Meeting Room P8, Plaza Level
Joint Regional Committees Meeting	7:00- 8:30	BCEC	Meeting Room P7, Plaza Level
Awards Board	7:00- 8:30	BCEC	Meeting Room M5 & M6, Mezzanine Level
ICASSP 2016 Organising Committee Meeting	08:30-11:00	BCEC	Meeting Room P9, Plaza Level
Membership Services Committee	13:00-14:30	BCEC	Meeting Room M7 & M8, Mezzanine Level
Student Services Committee	13:00-14:30	BCEC	Meeting Room M5 & M6, Mezzanine Level
SigPort Editorial Board	13:00-14:30	BCEC	Meeting Room P6, Plaza Level
Technical Directions Board	13:00-14:30	BCEC	Meeting Room P7, Plaza Level
Chapter Chairs Luncheon	13:00-14:30	BCEC	Meeting Room P8, Plaza Level
Women in Signal Processing Luncheon	13:00-14:30	BCEC	Meeting Room P10, Plaza Level
Industrial Relations Committee Dinner Meeting	18:00-20:00	Rydges South Bank	Executive Boardroom (P5)
AE Best Practices Discussion	18:00-20:00	Rydges South Bank	Level 12 South
Conference Board Dinner	18:00-19:00	Rydges South Bank	Podium 1
Conference Board Meeting	19:00-23:00	Rydges South Bank	Podium 3

SPS ADMINISTRATIVE MEETINGS

Thursday 23 April 2015	Time	Venue	Meeting Room
Strategic Investment Planning ad hoc Committee	7:00-8:30	BCEC	Meeting Room M7 & M8, Mezzanine Level
Internet of Things SIG	7:00-8:30	BCEC	Meeting Room P6, Plaza Level
Design & Implementation of S. P. Systems TC	13:00-14:30	BCEC	Meeting Room M7 & M8, Mezzanine Level
Signal Processing Theory and Methods TC	13:00-14:30	BCEC	Meeting Room P7, Plaza Level
Sensor Array and Multichannel TC Meeting	13:00-14:30	BCEC	Meeting Room P6, Plaza Level
Speech and Language Processing TC Meeting	13:00-14:30	BCEC	Meeting Room A2, Arbour Level
Machine Learning for SP TC Meeting	13:00-14:30	BCEC	Meeting Room P8, Plaza Level
Audio & Acoustic Signal Processing TC	13:00-14:30	BCEC	Meeting Room S1, Sky Level
Student Career Luncheon	13:00-14:30	BCEC	Sky Room, Sky Level
Visibility/Executive Committee	13:00-17:00	BCEC	Meeting Room M5 & M6, Mezzanine Level
Fellow Reference Cmte. Dinner Meeting	18:00-22:00	Rydges South Bank	Executive Boardroom (P5)

Friday 24 April 2015	Time	Venue	Meeting Room
TC Review Committee Meeting	10:00-11:30	BCEC	Meeting Room M5 & M6, Mezzanine Level
ICASSP to ICASSP	13:00-14:30	BCEC	Meeting Room P7, Plaza Level
Multimedia Signal Processing TC	13:00-14:30	BCEC	Meeting Room P6, Plaza Level
Information Forensics and Security TC	13:00-14:30	BCEC	Meeting Room M7 & M8, Mezzanine Level
Standing Cmte on Industry DSP Tech Review	14:30-15:15	BCEC	Meeting Room M5 & M6, Mezzanine Level
S.P. for Communications & Networking TC Review	15:15-16:00	BCEC	Meeting Room M5 & M6, Mezzanine Level
Information Forensics and Security TC Review	16:00-16:45	BCEC	Meeting Room M5 & M6, Mezzanine Level
Presentation of President Elect Candidates	17:30-18:30	BCEC	Meeting Room P6, Plaza Level
BoG Appreciation Dinner	18:45	Era Bistro	Circa Room

Saturday 25 April 2015	Time	Venue	Meeting Room
Board of Governors Breakfast	8:00- 9:00	Rydges South Bank	Level 12 North
Board of Governors Meeting	9:00-17:00	Rydges South Bank	Level 12 South
Board of Governors Luncheon	12:00-13:00	Rydges South Bank	Level 12 North

NOTES

NOTES

EXHIBITION

The Exhibition is located in Great Hall 3 & 4, accessible via Door 1 on the Foyer Level of the Brisbane Convention & Exhibition Centre. The Organising Committee extends an invitation to all delegates to visit the exhibition during their time at the Conference to meet the exhibition representatives in attendance and to view the products and services on display.

OPENING HOURS ARE AS FOLLOWS:

Monday 20 April 2015	1800 – 2000 (Welcome Reception)
Tuesday 21 April 2015	0830 – 1800
Wednesday 22 April 2015	0830 – 1730
Thursday 23 April 2015	0830 – 1730
Friday 24 April 2015	0830 – 1730

EXHIBITOR LISTING (in alphabetical order)

The ICASSP 2015 Organising Committee would like to extend their thanks to the following companies and organisations for participating in the Industry Exhibition.

STAND 14A

Organisation: Amazon
Website: **www.amazon.com**

STAND: 14

Organisation: Appen
Website: **www.appen.com**

STAND: 3

Organisation: Baidu
Website: **www.baidu.com**

STAND: 2

Organisation: Cambridge University Press
Website: **www.cambridge.org/knowledge**

STAND: 15

Organisation: Cobalt Speech & Language
Website: **www.cobaltspeech.com**

STAND 8

Organisation: Datatang
Website: **www.datatang.com**

STAND: 1

Organisation: DSTO
Website: **www.dsto.defence.gov.au**

STAND: 10

Organisation: Elsevier
Website: **www.elsevier.com**

STAND: 4

Organisation: Google. Inc.
Website: **www.google.com**

STAND: 11

Organisation: ICASSP 2016
Website: **dmlab.sjtu.edu.cn/icassp/icassp2016.html**

STAND: 6

Organisation: MathWorks
Website: **www.mathworks.com.au**

STAND: 12

Organisation: Speechocean Limited
Website: **www.speechocean.com**

STAND: 9

Organisation: Springer
Website: **www.springer.com**

STAND: 7

Organisation: Starkey Hearing Technologies
Website: **www.starkey.com**

TABLE: T3

Organisation: Wiley
Website: **www.wiley.com**

EXHIBITION FLOOR PLAN
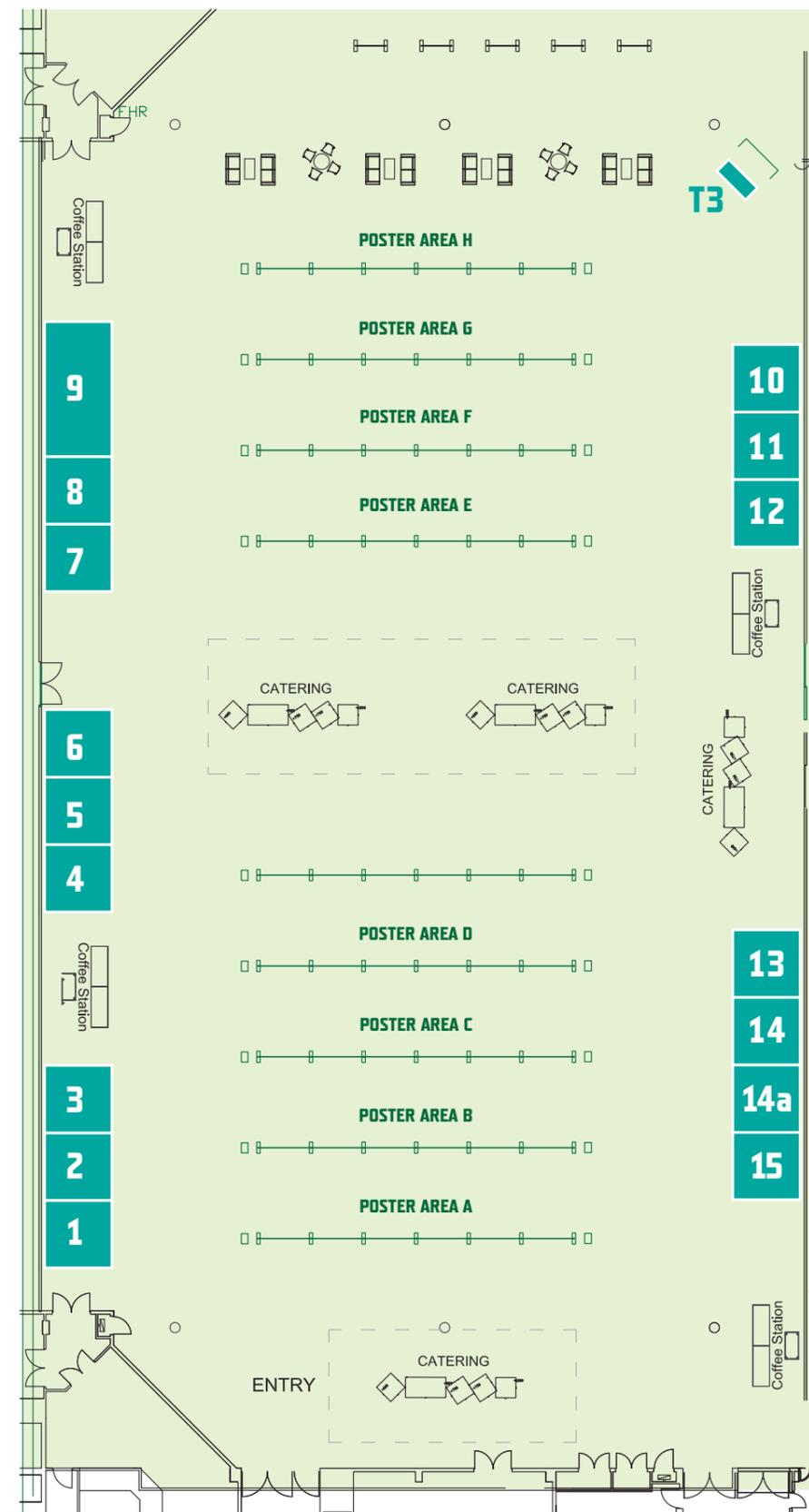
ICASSP 2015

40th IEEE International Conference on Acoustics, Speech and Signal Processing

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