16 December 2015 (Wed.)
08:00 - 09:00  Registration
09:00 - 17:30  Tutorials
18:00 - 20:00  Welcome Reception (for all)

17 December 2015 (Thur.)
08:00 - 09:00  Registration
09:00 - 09:30  Opening Ceremony
09:30 - 10:30  Keynote 1: “Whither speech recognition? - Deep learning to deep thinking” by Professor Sadaoki Furui
10:30 - 11:00  Coffee Break
11:00 - 12:00  Keynote 2: “Can I trust this photo?” by Professor Alex Kot
12:00 - 14:00  Lunch (on your own)
14:00 - 15:30  Technical Sessions/Special Sessions
15:30 - 16:00  Coffee Break
16:00 - 17:30  Technical Sessions/Special Sessions
18:00 - 21:00  BOG Meeting

18 December 2015 (Fri.)
08:00 - 09:00  Registration
09:00 - 10:00  Keynote 3: “Graph Signal Processing: Filterbanks, Sampling and Applications to Machine Learning and Video Coding” by Professor Antonio Ortega
10:00 - 10:30  APSIPA Assembly
10:30 - 11:00  Coffee Break
11:00 - 12:30  Technical Sessions/ Special Sessions
12:30 - 14:00  Lunch (on your own)
14:00 - 15:30  Technical Sessions/ Special Sessions
15:30 - 16:00  Coffee Break
16:00 - 17:30  Plenary Industrial Forum: The Future of Smart Life
18:30 - 21:30  Banquet (for ticket holders only)

19 December 2015 (Sat.)
08:00 - 09:00  Registration
09:00 - 10:30  Technical Sessions/ Special Sessions
10:30 - 11:00  Coffee Break
11:00 - 12:30  Technical Sessions/ Special Sessions
12:30 - 14:00  Lunch (on your own)
14:00 - 15:30  Technical Sessions/ Special Sessions
15:30 - 16:00  Coffee Break
16:00 - 17:30  Technical Sessions/ Special Sessions
17:30 - 18:00  Closing Ceremony
18:00 - 22:00  BOG Appreciation Dinner (by invitation)
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<th>Time</th>
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<tbody>
<tr>
<td>08:00 - 0900</td>
<td>Tutorial Registration</td>
<td>Y Core 3rd Floor Podium</td>
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</table>
| 09:00 - 10:30| Tutorial 2: Assisted Listening for Headphones and Hearing Aids: Signal Processing Techniques  
Woon-Seng Gan and Jianjun He | Room Y302 |
|              | Tutorial 3: Introduction to Deep Learning and its Applications in Computer Vision  
Wanli Ouyang and Xiaogang Wang | Room Y304 |
| 10:30 - 10:50| Coffee Break                                                        |               |
| 10:50 - 12:20| Tutorial 2: Assisted Listening for Headphones and Hearing Aids: Signal Processing Techniques  
Woon-Seng Gan and Jianjun He | Room Y302 |
|              | Tutorial 3: Introduction to Deep Learning and its Applications in Computer Vision  
Wanli Ouyang and Xiaogang Wang | Room Y304 |
| 12:30 - 14:00| Lunch (on your own)                                                  |               |
| 14:00 - 15:30| Tutorial 5: Depth-based Video Processing Techniques for 3D Contents Generation  
Yo-Sung Ho | Room Y301 |
|              | Tutorial 6: Graph Signal Processing for Image Compression & Restoration  
Gene Cheung and Xianming Liu | Room Y302 |
|              | Tutorial 7: Spoofing and Anti-Spoofing: A Shared View of Speaker Verification, Speech Synthesis and Voice Conversion  
Zhizheng Wu, Tomi Kinnunen, Nicholas Evans, and Junichi Yamagishi | Room Y304 |
| 15:30 - 15:50| Coffee Break                                                        |               |

*Tutorials 1, 4, and 8 are not available.

<table>
<thead>
<tr>
<th>Time</th>
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</table>
| 15:50 - 17:20| Tutorial 5: Depth-based Video Processing Techniques for 3D Contents Generation  
Yo-Sung Ho | Room Y301 |
|              | Tutorial 6: Graph Signal Processing for Image Compression & Restoration  
Gene Cheung and Xianming Liu | Room Y302 |
|              | Tutorial 7: Spoofing and Anti-Spoofing: A Shared View of Speaker Verification, Speech Synthesis and Voice Conversion  
Zhizheng Wu, Tomi Kinnunen, Nicholas Evans, and Junichi Yamagishi | Room Y304 |
| 17:20 - 1800 | Free Time                                                            |               |
| 18:00 - 2000 | Welcome Reception (All are welcome)  
Venue: Colour Crystal Restaurant.  
2/F, Harbour Crystal Centre, 100 Granville Road, Tsim Sha Tsui, Kowloon, Hong Kong |               |

**Thursday, 17th December 2015**

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<th>Time</th>
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<tr>
<td>08:00 - 0900</td>
<td>Registration</td>
<td>Y Core 3rd Floor Podium</td>
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<tr>
<td>09:00 - 0930</td>
<td>Opening Ceremony</td>
<td>Room V322</td>
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</tbody>
</table>
| 09:30 - 1030 | Keynote 1: Whither speech recognition? - Deep learning to deep thinking  
Speaker: Professor Sadaoki Furui, Toyota Technological Institute at Chicago, U.S.A. | Room V322 |
|              | Coffee Break                                                        |               |
| 11:00 - 1200 | Keynote 2: Can I trust this photo?  
Speaker: Professor Alex Kot, Nanyang Technological University, Singapore | Room V322 |
| 12:00 - 1400 | Lunch (on your own)                                                  |               |

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<tr>
<th>Time</th>
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<tr>
<td>09:00 - 0930</td>
<td>Conference Board Meeting</td>
<td>Room Y502</td>
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<tr>
<td>09:30 - 1030</td>
<td>Technical Committee Meeting 1 TC, SIPTM</td>
<td>Room Y515</td>
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<tr>
<td>10:00 - 1100</td>
<td>Technical Committee Meeting 2 TC, SLA</td>
<td>Room Y516</td>
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<tr>
<td>11:00 - 1200</td>
<td>Technical Committee Meeting 3 TC, WCN</td>
<td>Room Y520</td>
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<tr>
<td>12:00 - 1400</td>
<td>Friend Lab Session TN1</td>
<td>Room Y306</td>
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Thursday, 17th December 2015 (Cont.)

<table>
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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>14:00 - 15:30</td>
<td>(TP1-1) <strong>Invited Overview Session</strong></td>
<td>Y301</td>
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<tr>
<td></td>
<td>(TP1-2) Speech Recognition I</td>
<td>Y302</td>
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<tr>
<td></td>
<td>(TP1-3) Face and Facial Expression Recognition</td>
<td>Y303</td>
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<tr>
<td></td>
<td>(TP1-4) <strong>Special Session</strong> Signal Processing and Machine Learning Methods for Brain/neural Computer Interaction Applications</td>
<td>Y304</td>
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<td>(TP1-5) <strong>Special Session</strong> Recent Topics of the Linear and Non-linear Adaptive Signal and Information Processing</td>
<td>Y305</td>
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<td></td>
<td>(TP1-6) <strong>Special Session</strong> Recent Topics in Convex Optimization and Applications</td>
<td>Y521</td>
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<tr>
<td></td>
<td>(TP1-7) Signal and Information Processing Theory and Methods I</td>
<td>Y12</td>
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15:30 - 16:00 | Coffee Break                                                                                 |

16:00 - 17:30 | (TP2-1) High Efficiency Video Coding                                                          | Y301 |
|              | (TP2-2) Speech Recognition II                                                                  | Y302 |
|              | (TP2-3) Sound Reproduction                                                                    | Y303 |
|              | (TP2-4) **Special Session** Neural Signal Processing for Responses to Visual Stimuli          | Y304 |
|              | (TP2-5) **Special Session** Advanced Topics in Volumetric Image Processing                    | Y305 |
|              | (TP2-6) **Special Session** Recent Advances in Pattern Recognition, Machine Learning and Biometrics | Y521 |
|              | (TP2-7) Wireless and Data Communications Networks                                              | Y12  |

17:30 - 18:00 | Free Time                                                                                    |

18:00 - 21:00 | BOG Meeting                                                                                   | CD64 |

Friday, 18th December 2015

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<thead>
<tr>
<th>Time</th>
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<td>08:00 - 09:00</td>
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<tr>
<td>09:00 - 10:00</td>
<td><strong>Keynote 3</strong> Graph Signal Processing: Filterbanks, Sampling and Applications to Machine Learning and Video Coding Speaker: Professor Antonio Ortega, University of Southern California, U.S.A.</td>
<td>V322</td>
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</table>

Friday, 18th December 2015 (Cont.)

<table>
<thead>
<tr>
<th>Time</th>
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<tr>
<td>10:00 - 10:30</td>
<td>APSIPA Assembly</td>
<td>V322</td>
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<tr>
<td>10:30 - 11:00</td>
<td>Coffee Break</td>
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<tr>
<td>11:00 - 12:30</td>
<td>(FA1-1) Image/Video Coding and Transcoding</td>
<td>Y301</td>
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<tr>
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<td>(FA1-2) Microphone Array Processing</td>
<td>Y302</td>
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<td>(FA1-3) Signal and Information Processing Theory and Methods II</td>
<td>Y303</td>
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<td>(FA1-4) <strong>Special Session</strong> Image Restoration via Low-Rank Approach and Transform Domain</td>
<td>Y304</td>
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<td>(FA1-5) <strong>Special Session</strong> Sparse Signal Processing for Wireless Communications</td>
<td>Y305</td>
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<td>(FA1-6) <strong>Special Session</strong> Recent Advances in Audio and Acoustic Signal Processing</td>
<td>Y521</td>
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<td>(FA1-7) Signal Processing System Design</td>
<td>Y12</td>
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<tr>
<td>12:30 - 14:00</td>
<td>Lunch (On your own)</td>
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<td></td>
<td>APSIPA TSIP Editorial Board Meeting</td>
<td>Y302</td>
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<td>Technical Committee Meeting 4 TC. BioSIPS</td>
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<td>Technical Committee Meeting 3 TC. IVM</td>
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<td>Technical Committee Meeting 6 TC. SPS</td>
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<td>Friend Lab Session FN1</td>
<td>Y306</td>
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<tr>
<td>14:00 - 15:30</td>
<td>*(FP1-1) <strong>Invited Overview Session</strong></td>
<td>Y301</td>
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<td>*(FP1-2) Speaker Verification and Recognition</td>
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<td>*(FP1-3) Image Enhancement and superresolution</td>
<td>Y303</td>
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<td>*(FP1-4) <strong>Special Session</strong> Human Visual Information Processing and Its Applications</td>
<td>Y304</td>
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<td>*(FP1-5) <strong>Special Session</strong> Advanced Secure and Shared Wireless Networks</td>
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<td>*(FP1-6) <strong>Special Session</strong> Recent Advances on Active Control of Sound</td>
<td>Y306</td>
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<td>*(FP1-7) Biomedical Signal Processing and Systems</td>
<td>Y12</td>
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15:30 - 16:00 | Coffee Break                                                                                 |

16:00 - 17:30 | Plenary Industrial Forum: The Future of Smart Life                                             |
|              | Speakers: Yi Hao, TCL Multimedia, China; Kevin Jou, MediaTek, Taiwan; Benoit Schillings, Yahoo!, USA; Yasunori Mochizuki, NEC, Japan |
|              |                                                                                              | V322 |

17:30 - 18:30 | Free Time / Traveling to Banquet Venue                                                        |

18:30 - 21:30 | Banquet (for ticket holders only)                                                             |
<p>|              | <strong>Venue</strong>: Star Seafood Floating Restaurant                                                   |
|              | 55-57 Tai Chung Kiu Road, Sha Tin, New Territories, Hong Kong                                |</p>
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<tr>
<td>08:00 - 09:00</td>
<td>Registration</td>
<td>Y Core 3rd Floor Podium</td>
<td>(SA1-1) Image and Video Based Object Tracking and Detection</td>
<td>Room Y301</td>
<td>(SA1-2) Speech Enhancement and Noise Cancellation</td>
<td>Room Y302</td>
<td>(SA1-3) Speech Understanding</td>
<td>Room Y303</td>
<td>(SA1-4) (Special Session) Advanced Image Processing and Computer Vision Techniques</td>
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<td>(SA1-5) (Special Session) Medical and Health Care Service Development</td>
<td>Room Y305</td>
<td>(SA1-6) (Special Session) Content-aware Multimedia Signal Processing and Representation (Part I)</td>
<td>Room Y521</td>
<td>(SA1-7) Signal Sensing and Acquisition</td>
<td>Room Y512</td>
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<td>09:00 - 10:30</td>
<td>(SA1-1) Image and Video Based Object Tracking and Detection</td>
<td>Room Y301</td>
<td>(SA1-2) Speech Enhancement and Noise Cancellation</td>
<td>Room Y302</td>
<td>(SA1-3) Speech Understanding</td>
<td>Room Y303</td>
<td>(SA1-4) (Special Session) Advanced Image Processing and Computer Vision Techniques</td>
<td>Room Y304</td>
<td>(SA1-5) (Special Session) Medical and Health Care Service Development</td>
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<td>(SA1-6) (Special Session) Content-aware Multimedia Signal Processing and Representation (Part I)</td>
<td>Room Y521</td>
<td>(SA1-7) Signal Sensing and Acquisition</td>
<td>Room Y512</td>
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<td>10:30 - 11:00</td>
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<td>11:00 - 12:30</td>
<td>(SA1-1) Invited Overview Session</td>
<td>Room Y301</td>
<td>(SA2-2) Acoustic Modeling and Speech Quality Assessment</td>
<td>Room Y302</td>
<td>(SA2-4) (Special Session) Perceptual-based Texture Analysis and Application</td>
<td>Room Y304</td>
<td>(SA2-5) (Special Session) Social Multimedia and Big Data Analytics</td>
<td>Room Y305</td>
<td>(SA2-6) (Special Session) Content-aware Multimedia Signal Processing and Representation (Part II)</td>
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<td>12:30 - 14:00</td>
<td>Lunch (On your own)</td>
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<td>14:00 - 15:30</td>
<td>(SP1-1) Invited Overview Session</td>
<td>Room Y301</td>
<td>(SP1-2) Spoken Language Analysis and Identification</td>
<td>Room Y302</td>
<td>(SP1-4) Image Analysis, Representation and Classification I</td>
<td>Room Y304</td>
<td>(SP1-5) (Special Session) Multimedia Forensics and Security</td>
<td>Room Y305</td>
<td>(SP1-6) (Special Session) Recent Advances in Low-level Image and Video Processing</td>
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<td>16:00 - 17:30</td>
<td>(SP2-1) Virtual Reality and 3D Image Processing</td>
<td>Room Y301</td>
<td>(SP2-2) Deep Learning for Speech Processing</td>
<td>Room Y302</td>
<td>(SP2-4) Image Analysis Representation and Classification II</td>
<td>Room Y304</td>
<td>(SP2-5) (Special Session) Chatbots and Dialogue Agents</td>
<td>Room Y305</td>
<td>(SP2-6) (Special Session) Recent Advances in Low-level Image and Video Processing</td>
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<td>17:30 - 18:30</td>
<td>Closing Ceremony</td>
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<td>18:00 - 22:00</td>
<td>BOG Appreciation Dinner (By Invitation Only)</td>
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**Venue:** Tienyi Chinese Restaurant  
Shop 3 A, Level 2, The Peak Tower, 128 Peak Road, Hong Kong
Welcome Message from the General Co-Chairs

On behalf of the Organizing Committee, it is our great pleasure to invite you to attend the 2015 Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC 2015), to be held in Hong Kong from December 16-19, 2015 at The Hong Kong Polytechnic University.

This is the seventh annual conference organized by APSIPA. Annual conferences have previously been held in Japan (2009), Singapore (2010), China (2011), the USA (2012), Taiwan (2013), and Cambodia (2014). This Conference strives to bring together leading engineers, researchers and academics from the world of signal and information processing, to provide an international forum for the reporting of current developments, novel theories and ideas, and technologies and applications in these areas. We have chosen to hold this Conference in Hong Kong, a unique city where Eastern and Western cultures meet. Despite its compact size, Hong Kong is one of the most popular tourist destinations in Asia and is a paradise for shopping. Furthermore, Hong Kong, also known as the Pearl of the Orient, is famous for its spectacular harbour views.

We would like to thank all the Organizing Committee members for making this conference a success, and we would also like to thank the sponsors for their support of this conference. We are very confident that your participation in the APSIPA ASC 2015, and your visit to Hong Kong, will be stimulating, exciting and enjoyable.

General Co-Chairs, APSIPA ASC 2015
Kenneth Lam
Helen Meng
Oscar Au

APSIPA Administrative Meetings Schedule

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<tbody>
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<td>12:30 – 14:00</td>
<td>Room Y502</td>
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<tr>
<td>Technical Activities Board Meeting</td>
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<td>Conference Board Meeting</td>
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<td>12:00 – 14:00</td>
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<td>12:00 – 14:00</td>
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<td>SLA TC Meeting</td>
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<td>12:00 – 14:00</td>
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<td>WCN TC Meeting</td>
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<td>18:00 – 21:00</td>
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<td>18 December 2015</td>
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<tr>
<td>APSIPA Assembly</td>
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<td>APSIPA TSIP Editorial Board Meeting</td>
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<td>12:30 – 14:00</td>
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<td>BioSIPS TC Meeting</td>
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<td>12:30 – 14:00</td>
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<td>IVM TC Meeting</td>
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<td>12:30 – 14:00</td>
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<td>SPS TC Meeting</td>
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<td>Membership Board Meeting</td>
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<td>17:30 – 18:00</td>
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<tr>
<td>Closing Ceremony</td>
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</table>
On behalf of the Technical Program Committee, it is our great pleasure to welcome you to Hong Kong and the 2015 Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC 2015).

The APSIPA conference strives to provide a top-quality forum for experts to present and discuss the latest developments in signal and information processing. This year, we received 325 submissions from authors of 28 countries. To provide a thorough and fair review of these submissions, we had the generous support of 93 technical program committee members who had invited 389 reviewers to create over 970 reviews for these submissions. We are pleased to let you know that the quality of the papers submitted to APSIPA ASC 2015 has been outstanding. Due to the limited presentation timeslots, the Technical Program Committee can only select the best papers from a large number of quality submissions, which has proved to be a difficult task. As a result, around 69% of the total regular submissions are accepted to be presented in the conference.

Thanks to the effort made by the Special Session Chairs, this year we have 22 special sessions which address a number of areas that are beyond the scope of regular sessions. To introduce the state-of-the-art of different signal and information processing technologies, 5 tutorials and 11 invited overview talks will be given by renowned scholars in the respective fields of study. This year, we are particularly glad to have Prof. Sadaoki Furui, Prof. Alex Kot and Prof. Antonio Ortega join the conference and give the keynote speeches on “Whither speech recognition? - Deep learning to deep thinking”, “Can I trust this photo?”, and “Graph Signal Processing: Filterbanks, Sampling and Applications to Machine Learning and Video Coding”, respectively. They are definitely one of the highlights of the conference. The APSIPA conference is a place for people to discuss their aspiration of the future of signal and information processing. To this end, a plenary industrial forum session on the future of smart life will be held. A few leading industrialists have kindly accepted our invitation to shed light on that topic.

We would like to express our sincere appreciation to the keynote speakers, forum guest speakers, invited overview session speakers, tutorial presenters, reviewers, session chairs and all authors for their contributions to APSIPA ASC 2015. A special vote of thanks should go to all the Technical Program Committee members whose continuous support has been instrumental for the success of APSIPA ASC 2015. We would also like to express our gratitude to the Special Session Chairs, Mrityunjoy Chakraborty, Yui-Lam Chan, Lap-Pui Chau, Hao-Jiang Deng, Hsueh-Ming Hang, and Hitoshi Kiya, who put considerable effort into coordinating 22 special sessions for the conference.

While we hope that all of you will fully enjoy the technical program of APSIPA ASC 2015, we would also suggest you to find time to travel around to feel the unique fascination of Hong Kong. Despite its small area, Hong Kong is one of the most popular tourist destinations in Asia, particularly during the wonderful Christmas season. Including the technical program and other social events, you will find APSIPA ASC 2015 to be one of your most memorable conferences you have attended.

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Wing-Kuen Ling, Guangdong University of Technology  
Lee Tan, The Chinese University of Hong Kong
**Keynote Speeches**

**Whither Speech Recognition? - Deep Learning to Deep Thinking**

**Professor Sadaoki Furui**  
*Toyota Technological Institute at Chicago, USA*

**Date:** Thursday 17 December 2015  
**Time:** 09:30 - 10:30  
**Place:** Room V322

**Chair:**  
Haizhou Li, *Institute for Infocomm Research A*STAR (Singapore)

**Abstract**

“Whither speech recognition?” is the title of a well-known paper written by J. R. Pierce in 1969 which unfortunately stopped Bell Labs from continuing speech recognition research for several years at the beginning of the 1970s. Even though 45 years have passed since then and we have actually observed various successes in speech recognition research, the paper is still worthwhile to read.

Pierce wrote “Speech recognition has glamor. Funds have been available. Results have been less glamorous. ¡K General-purpose speech recognition seems far away. Special-purpose speech recognition is severely limited. It would seem appropriate for people to ask themselves why they are working in the field and what they can expect to accomplish.”

It is still true that what we can do with speech recognition technology is very limited, and even though DNNs (Deep Neural Networks) using “deep learning” have significantly raised the performance since several years ago, we still have many challenges that cannot be solved simply by relying on their capability. We definitely need to deeply think about and analyze how human beings are recognizing/understanding speech, and implement various knowledge sources in speech recognition systems using advanced machine learning techniques to achieve innovations. This talk focuses on my personal perspectives for future speech recognition research.

**Biography**

**Professor Sadaoki Furui**  
Received the B.S., M.S., and Ph.D. degrees from the University of Tokyo, Japan in 1968, 1970, and 1978, respectively. After joining the Nippon Telegraph and Telephone Corporation (NTT) Labs in 1970, he has worked on speech analysis, speech recognition, speaker recognition, speech synthesis, speech perception, and multimodal human-computer interaction. From 1978 to 1979, he was a visiting researcher at AT&T Bell Laboratories, Murray Hill, New Jersey. He was a Research Fellow and the Director of Furui Research Laboratory at NTT Labs. He became a Professor at Tokyo Institute of Technology in 1997. He was Dean of Graduate School of Information Science and Engineering, and Director of University Library. He was given the title of Professor Emeritus and became Professor at Academy for Global Leadership.
in 2011. He is now serving as President of Toyota Technological Institute at Chicago (TTI-C). He has authored or coauthored over 990 published papers and books. He was elected a Fellow of the IEEE, the Acoustical Society of America (ASA), the Institute of Electronics, Information and Communication Engineers of Japan (IEICE) and the International Speech Communication Association (ISCA). He received the Paper Award and the Achievement Award from the IEEE SP Society, the IEICE, and the Acoustical Society of Japan (ASJ). He received the ISCA Medal for Scientific Achievement, and the IEEE James L. Flanagan Speech and Audio Processing Award. He received the NHK (Japan Broadcasting Corporation) Broadcast Cultural Award and the Okawa Prize. He also received the Achievement Award from the Minister of Science and Technology and the Minister of Education, Japan, and the Purple Ribbon Medal from Japanese Emperor.

**Can I Trust This Photo?**

**Professor Alex Kot**  
*School of EEE Associate Dean, College of Engineering  
Director, Rapid-Rich Object Search (ROSE) Lab  
School of EEE Nanyang Technological University, Singapore*

**Date:** Thursday, 17 December 2015  
**Time:** 11:00 - 12:00  
**Place:** Room V322

Chair: W.C. Siu, *The Hong Kong Polytechnic University (Hong Kong)*

**Abstract**  
With the fast proliferation of digital cameras and other image acquisition devices due to the advancement in digital photography technology, photos from the public may have good news values for making journalist reports. However, one big challenge is how to authenticate the photo contents from the public, which may come from unreliable sources. A large variety of forensics works have been proposed to address various forensic challenges based on different types of tell-tale signs. This talk introduces several techniques for: (1) Accurate detection of image demosaicing regularity as a general type of image forensics features. (2) Identification of various common image source models including digital still cameras, RAW conversion tools and the low-end mobile cameras; (3) Universal detection of a wide range of common image tampering. (4) Tampering detection for blur images. (5) EXIF file tampering or content manipulations, (6) Tempering detection with blur images, and (7) Prevention of the image recapturing threat. These techniques help expose common image forgeries, especially those easy-to-make forgeries, which can be hardly seen directly by human eyes. The common theme behind these forensics techniques is through statistical detection of some intrinsic image regularity or tampering anomalies.

**Graph Signal Processing: Filterbanks, Sampling and Applications to Machine Learning and Video Coding**

**Professor Antonio Ortega**  
*Signal and Image Processing Institute, Department of Electrical Engineering, University of Southern California, Los Angeles, CA, USA*

**Date:** Friday, 18 December 2015  
**Time:** 09:00 - 10:00  
**Place:** Room V322

Chair: Helen Meng, *The Chinese University of Hong Kong (Hong Kong)*

**Abstract**  
Graphs have long been used in a wide variety of problems, such analysis of social networks, machine learning, network protocol optimization, decoding of LDPCs or image processing. Techniques based on spectral graph theory provide a “frequency” interpretation of graph data and have proven to be quite popular in multiple applications. In the last few years, a growing amount of work has started extending and complementing spectral graph techniques, leading
to the emergence of “Graph Signal Processing” as a broad research field. A common characteristic of this recent work is that it considers the data attached to the vertices as a “graph-signal” and seeks to create new techniques (filtering, sampling, interpolation), similar to those commonly used in conventional signal processing (for audio, images or video), so that they can be applied to these graph signals.

In this talk, we first introduce some of the basic tools needed in developing new graph signal processing operations, with a brief overview of our design of wavelet filterbanks of graphs. We then present our recent work on sampling of graph signals, which extends familiar signal processing concepts to a new context. Finally, we discuss how this graph signal processing perspective can be used for two applications: semi-supervised learning and video coding.

Biography

Professor Antonio Ortega received the Telecommunications Engineering degree from the Universidad Politecnica de Madrid, Madrid, Spain in 1989 and the Ph.D. in Electrical Engineering from Columbia University, New York, NY in 1994. In 1994 he joined the Electrical Engineering department at the University of Southern California (USC), where he is currently a Professor and where he has served as Associate Chair. He is also a visiting Professor at National Institute of Informatics, Tokyo, Japan. He is a Fellow of the IEEE since 2007, and a member of ACM and APSIPA. He has served as associate editor for several IEEE journals, was chair of the Image and Multidimensional Signal Processing (IMDSP) technical committee, a member of the Board of Governors of the IEEE Signal Processing Society (SPS), technical program co-chair of ICIP 2008 and PCS 2013, and currently chairs the SPS SIG on Big Data. He is the inaugural Editor-in-Chief of the APSIPA Transactions on Signal and Information Processing, launched by APSIPA and Cambridge University Press in 2012. He has received several paper awards, including most recently at ICIP 2011 and Globecom 2012, and was a plenary speaker at ICIP 2013. His recent research work is focusing on distributed compression, multiview coding, error tolerant compression, wavelet-based signal analysis, information representation in wireless sensor networks and graph signal processing. Close to 40 PhD students have completed their PhD thesis under his supervision at USC and his work has led to over 300 publications in international conferences and journals, as well as several patents.

Keynote Speeches

Plenary Industrial Forum: The Future of Smart Life

Plenary Speakers:
Yi Hao, President, TCL Multimedia, China
Kevin Jou, CTO and Corporate VP, MediaTek, Taiwan
Benoit Schillings, Vice President & Technical Fellow, Yahoo!, USA
Yasunori Mochizuki, Vice President, NEC, Japan

Moderator:
Qian Zhang, Hong Kong University of Science and Technology (Hong Kong)

Date: Friday, 18 December 2015
Time: 16:00 - 17:30
Place: Room V322

Abstract:
In this Plenary Industrial Forum, we invite top executives of world leading companies and organizations in the general ecosystem of future Smart Life, covering the aspects of chip, device, software and system solution, content, applications and services, to share their vision and insights to the bright future of our lives. They will highlight the potential trends and challenges from technology and business perspective in the areas.

Biographies

Yi Hao
President, TCL Multimedia, China
Mr. Yi Hao is currently the President of TCL Multimedia Technology Holdings Ltd. and Vice President of TCL Corporation. He is a world-recognized pioneer in cross-border/culture business development, and a very experienced leader in consumer electronics, automotive and on-line gaming industry. He joined TCL Corporation in 2004 and took on several key positions within the organization including General Manager of the Overseas Business Center, Chief Sales Officer and Vice President of the TCL Multimedia, and the Chief Executive Officer of TCL Multimedia. Under his great leadership, TCL Multimedia has become the world 3rd largest TV maker.

Mr. Hao earned a Bachelor’s degree in Economics from York University (Canada) and EMBA degree from Cheung Kong Graduate School of Business.

Kevin Jou
CTO and Corporate Vice President, MediaTek, Taiwan
Dr. Jou is a Corporate Vice President and the Chief Technology Officer at MediaTek Inc., the third largest fabless semiconductor company in the world with leading products in cellular phones, tablets, wireless connectivity, home entertainment, and optical storage. In addition to providing guidance to the company’s technology and business strategies, he oversees its communication system,
Benoit Schillings

Vice President and Technical Fellow, Yahoo!, USA

Benoit Schillings has been a Fellow at Yahoo! since 2012, after being Chief Technology Officer at the Myriad Group. He is known for being one of the lead developers of the Be Operating System (BeOS), following an association with Be Inc. that began in 1990 as a developer of software for the Apple Macintosh. Schillings became the second engineer at Be, working on the operating system for a new computer called BeBox. Starting in 1991 he developed a file system and an associated user-space database application that indexed the metadata in the file system as well as a computing system engineering, and multimedia design teams as well as the corporate technology office. The communication system design team is responsible for architecture and algorithm design for all modem related projects in the company, including cellular (2G, 3G, and 4G), WiFi, Bluetooth, NFC, digital TV, digital FM, Ethernet, and digital RF systems. The computing system engineering team works on computing platform and system software, graphic processors, and low power technologies for smartphones and tablets. The multimedia design team’s scope encompasses audio, image, and video signal processing, display technologies, and computer vision, with applications to the company’s smartphone, tablets, TV, Blu-ray Disc player, and automotive products. The corporate technology office is engaged in advanced research and development in various areas related to smart devices and wearable bioelectric devices. The corporate technology office also oversees sponsored university researches and joint programs with research institutes and government agencies.

Before joining MediaTek in 2011, Dr. Jou spent nearly 22 years at Qualcomm Incorporated. He was involved in the design and development of the original CDMA prototype system, the IS-95 standard, and several early CDMA base station and mobile station modem chips. He was a key contributor to the design and standardization of the third generation (3G) cellular systems, including leading the development of CDMA2000 standards for voice and packet data services. In particular, Dr. Jou was innovative in applying interference cancellation techniques and intelligent signal transmission to wireless voice communications, which resulted in a system with industry-leading voice capacity up to this date. He was also involved in the design of the Globalstar LEO satellite communication system. Dr. Jou played a major role in Qualcomm’s technical and business activities in the Greater China area. He served as Qualcomm China’s Chief Technology Officer from 2003 to 2005.

Dr. Jou received a Bachelor of Science degree in electrical engineering from National Taiwan University in 1982 and Master of Science and Ph.D. degrees, both in electrical engineering, from the University of Southern California in 1985 and 1989, respectively.

Yasunori Mochizuki

Vice President, NEC Corporation, Japan

Dr. Yasunori Mochizuki is Vice President of Central Research Laboratories (CRL), NEC Corporation since June, 2011 and is responsible for the management and/or coordination of cloud-related research activities covering computing architecture, networking, applications and services. Before being appointed as VP, he was General Manager of Information and Media Processing Laboratories in CRL from 2010, where he led the research groups on video object recognition, audio/video signal processing, speech recognition, natural language processing, data mining, and security technologies. Since April, 2013, he is also a General Manager of Corporate Technology which is responsible for corporate-wide strategy on technologies for NEC. Yasunori Mochizuki received his BS, MS, and PhD degrees in Electronic Engineering from the University of Tokyo in 1982, 1984 and 1987, respectively. In 1987, he joined NEC Corporation (Fundamental Research Laboratories) as a research staff on semiconductor solid state physics. He was also a Visiting Associate Professor of University of Tsukuba (Physics Department) from 1997 to 2001. From 2000 through 2009, he was a manager in the research department for Silicon LSI technologies, for which he was appointed to be General Manager in 2007. Dr. Mochizuki is a fellow of Japan Society of Applied Physics.

Qian Zhang

Professor, Hong Kong University of Science and Technology, Hong Kong

Dr. Zhang joined Hong Kong University of Science and Technology in Sept. 2005 where she is a full Professor in the Department of Computer Science and Engineering. She is also serving as the co-director of Huawei-HKUST innovation lab and the director of digital life research center of HKUST. Before that, she was in Microsoft Research Asia, Beijing, from July 1999, where she was the research manager of the Wireless and Networking Group. Dr. Zhang has published more than 300 refereed papers in international leading journals and key conferences in the areas of wireless/Internet multimedia networking, wireless communications and networking, wireless sensor networks, and overlay networking.
Plenary Industrial Forum: The Future of Smart Life

She is the inventor of about 30 pending International patents. Her current research is on cognitive and cooperative networks, dynamic spectrum access and management, as well as wireless sensor networks. She also participated many activities in the IETF ROHC (Robust Header Compression) WG group for TCP/IP header compression. She is a Fellow of IEEE for “contribution to the mobility and spectrum management of wireless networks and mobile communications”. Dr. Zhang has received MIT TR100 (MIT Technology Review) world’s top young innovator award. She also received the Best Asia Pacific (AP) Young Researcher Award elected by IEEE Communication Society in year 2004. She received the Best Paper Award in Multimedia Technical Committee (MMTC) of IEEE Communication Society in 2005 and Best Paper Award for QShine 2006, IEEE Globecom 2007, IEEE ICDCS 2008, IEEE ICC 2010, and IEEE Globecom 2012. She received the Oversea Young Investigator Award from the National Natural Science Foundation of China (NSFC) in 2006. She holds the Cheung Kong Chair Professor in Huazhong University of Science and Technology (2012-2015). She has been elected as IEEE Communication Society Distinguished Lecture from Jan. 2010 to Dec. 2011.


Dr. Zhang was the Chair of the Multimedia Communication Technical Committee of the IEEE Communications Society from 2008 to 2010. She was the Chair of Chapter Coordination Committee and Technical Activity Committee of IEEE Asia Pacific Board (APB) of IEEE Communication Society. Dr. Zhang is also a member of the Visual Signal Processing and Communication Technical Committee and the Multimedia System and Application Technical Committee of the IEEE Circuits and Systems Society.

Internet Access

Conference Attendees can enjoy free Wi-Fi service on the PolyU campus by selecting the Wi-Fi SSID (Service Set Identifier) of ‘Wi-Fi. HK via PolyU’. After accepting the terms and conditions, users can use the service for two hours, after which they have to accept the terms again to continue using the service.

Social Events

Welcome Reception at Colour Crystal Restaurant (all are welcome)
Wednesday, 16 December 2015, 18:00 - 20:00
Dress: Smart Casual
Address:
2/F Harbour Crystal Centre, 100 Granville Road, Tsim Sha Tsui East, Kowloon, Hong Kong

Banquet at Star Seafood Floating Restaurant (for ticket holders only)
Friday, 18 December 2015, 18:30 - 21:30
Dress: Smart Casual
Address:
55-57 Tai Chung Kiu Road, Shatin, New Territories, Hong Kong

BOG Appreciation Dinner (by invitation only) at Tienny Chinese Restaurant
Saturday, 19 December 2015, 18:00 - 22:00
Dress: Smart Casual
Address:
Shop 3A, L2/F, The Peak Tower, 128 Peak Road, Hong Kong

Registration

The APSIPA ASC 2015 Registration Desk is located at level 3 of core Y, The Hong Kong Polytechnic University.

Registration Hours:
Wednesday, 16 December 2015 08:00 - 16:00
Thursday, 17 December 2015 08:00 - 18:00
Friday, 18 December 2015 08:00 - 18:00
Saturday, 19 December 2015 08:00 - 18:00
The APSIPA ASC 2015 will be held at The Hong Kong Polytechnic University, which is located in Hung Hom, Kowloon. Located at the centre of the city, The Hong Kong Polytechnic University is easily accessible by various means of public transport:

- **MTR**
  Head for Hung Hom Station on the East Rail Line, then take the footbridge at Exit A1 to reach our main campus.

- **Buses**
  For public buses that run through the Cross Harbour Tunnel, get off at the stop at the entrance/exit of the Tunnel on the Kowloon side.

- **Taxis**
  Pick-up and drop-off at the entrance on Cheong Wan Road.

Address:
The Hong Kong Polytechnic University
Hung Hom, Kowloon

For details of the conference site, please visit http://www.polyu.edu.hk

The APSIPA ASC 2015 Organizing Committee wishes to thank the following organizations for the contribution and support to the Conference:

- **Centre for Signal Processing, Department of Electronic and Information Engineering, The Hong Kong Polytechnic University**

- **Faculty of Engineering, The Hong Kong Polytechnic University**

- **Croucher Foundation Sponsorship of Conference**

- **IEEE Signal Processing Society**

- **The Hong Kong Polytechnic University**

- **The Chinese University of Hong Kong**

- **City University of Hong Kong**

- **Hong Kong University of Science and Technology**

- **The University of Hong Kong**

- **IEEE Hong Kong Chapter of Signal Processing**

- **IEEE Hong Kong Section**
## Notes on Tropical Cyclone/Rainstorm Warning

<table>
<thead>
<tr>
<th>Signal No. 1 or 3</th>
<th>Activities will be held as scheduled.</th>
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</thead>
<tbody>
<tr>
<td>Signal No. 8 or above</td>
<td>Signal hoisted/to be hoisted 2 hours before the session/activity</td>
</tr>
<tr>
<td></td>
<td>Signal hoisted during the session/activity</td>
</tr>
<tr>
<td></td>
<td>If Signal No. 8 is lowered two hours before the commencement of the session/activity, the session/activity will be held as scheduled.</td>
</tr>
</tbody>
</table>

For urgent announcements, please go to the web page [www.apsipa2015.org](http://www.apsipa2015.org) and/or you may approach the registration counter for rescheduled arrangement two hours after the cyclone warning signal No. 8 has been lowered.

## Rainstorm Warning

<table>
<thead>
<tr>
<th>Amber/Red warning</th>
<th>Activities will be held as scheduled.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black warning</td>
<td>Signal hoisted 2 hours before the session/activity</td>
</tr>
<tr>
<td></td>
<td>Signal hoisted during the session/activity</td>
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<tr>
<td></td>
<td>If the Black warning is lowered two hours before the commencement of the session/activity, the session/activity will be held as scheduled.</td>
</tr>
</tbody>
</table>

For urgent announcements, please go to the web page [www.apsipa2015.org](http://www.apsipa2015.org) and/or you may approach the registration counter for rescheduled arrangement two hours after the Black warning has been lowered.

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**APSIPA ASC 2015 Technical Program**

For possible updates, please refer to the APSIPA ASC 2015 web page: [www.apsipa2015.org](http://www.apsipa2015.org)
Tutorial 2  
Assisted Listening for Headphones and Hearing Aids: Signal Processing Techniques  
Woon-Seng Gan, Jianjun He  
Digital Signal Processing Lab, School of EEE, Nanyang Technological University, Singapore  
Time: 09:00 - 12:20  
Place: Room Y302

Tutorial 3  
Introduction to Deep Learning and Its Applications in Computer Vision  
Wanli Ouyang, Xiaogang Wang  
Department of Electronic Engineering, the Chinese University of Hong Kong, Shatin, Hong Kong  
Time: 09:00 - 12:20  
Place: Room Y304

Tutorial 5  
Depth-based Video Processing Techniques for 3D Contents Generation  
Yo-Sung Ho  
Gwangju Institute of Science and Technology (GIST), Korea  
Time: 14:00 - 17:20  
Place: Room Y301

Tutorial 6  
Graph Signal Processing for Image Compression & Restoration  
Gene Cheung, National Institute of Informatics, Tokyo, Japan  
Xianming Liu, Department of Computer Science, Harbin Institute of Technology (HIT), Harbin, China  
Time: 14:00 - 17:20  
Place: Room 302

Tutorial 7  
Spoofing and Anti-Spoofing: A Shared View of Speaker Verification, Speech Synthesis and Voice Conversion  
Zhizheng Wu, University of Edinburgh, UK  
Tomi Kinnunen, University of Eastern Finland, Finland  
Nicholas Evans, EURECOM, France  
Junichi Yamagishi, University of Edinburgh, UK  
Time: 14:00 - 17:20  
Place: Room 304

*Tutorials 1, 4 and 8 are not available.
TP1-1: Thursday, December 17, 14:00 - 15:30

TP1-1
Type: Invited Overview Session
Time: 14:00 - 15:30
Place: Room Y301
Chair: Kenneth K.M. Lam, The Hong Kong Polytechnic University (Hong Kong)

TP1-1.1 Recent Advances in Energy Harvesting Communications
M.L. Willy Ku, Yan Chen, K.J. Ray Liu, University of Maryland College Park, U.S.A.

TP1-1.2 Perceptual Coding: Hype or Hope?
C. C. Jay Kuo, University of Southern California, U.S.A.

TP1-1.3 Learning Approach on Image Interpolation and Super-resolution
Wan-Chi Siu, The Hong Kong Polytechnic University, Hong Kong

TP1-2: Thursday, December 17, 14:00 - 15:30

TP1-2
Type: Regular Session
Time: Thursday, December 17, 14:00 - 15:30
Place: Room Y302
Chair: Dong Wang, Tsinghua University (China)

TP1-2.1 Audio-visual speech recognition using deep bottleneck features and high-performance lipreading
Satoshi Tamura, Gifu University (Japan), Hiroshi Ninomiya, Norihide Kitaoka, Nagoya University (Japan), Shin Osuga, Aisin Seiki Co., Ltd. (Japan), Yurie Iribe, Aichi Prefectural University (Japan), Kazuya Takeda, Nagoya University (Japan), Satoru Hayamizu, Gifu University (Japan)

TP1-2.2 Improving Bottleneck Features for Automatic Speech Recognition using Gammatone-based Cochleagram and Sparsity Regularization
Chao Ma, Tsinghua University (China), Jun Qi, University of Washington (USA), Dongmei Li, Runsheng Liu, Tsinghua University (China)

TP1-2.3 Speech selection and environmental adaptation for asynchronous speech recognition
Bo Ren, Longbiao Wang, Nagaoka University of Technology (Japan), Atsuhiko Kai, Shizuoka University (Japan), Zhaofeng Zhang, Nagaoka University of Technology (Japan)

TP1-2.4 Music Removal by Convolutional Denoising Autoencoder in Speech Recognition
Mengyuan Zhao, Dong Wang, Zhiyong Zhang, Xuewei Zhang, Tsinghua University (China)

TP1-2.5 Speech recognition for mixed speech and music by NMF using various cost functions and noise adaptive training methods
Naoaki Hashimoto, Kazumasa Yamamoto, Seiichi Nakagawa, Toyohashi University of Technology (Japan)
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<td><strong>TP1-3.3</strong></td>
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<td><strong>TP1-3.4</strong></td>
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TP1-5: Thursday, December 17, 14:00 - 15:45

TP1-5

Type: Special Session

Time: Thursday, December 17, 14:00 - 15:45

Place: Room Y305

Organizers: Kiyoshi Nishikawa, Tokyo Metropolitan University (Japan), Felix Albu, Valahia University of Targoviste (Romania), Li Xu, Guan Gui, Akita Prefectural University (Japan)

Chair: Kiyoshi Nishikawa, Tokyo Metropolitan University (Japan)

TP1-5.1 Sparsity-Aware Recursive Maximum Correntropy Criteria Adaptive Filtering Algorithm
Wentao Ma, Badong Chen, Jiandong Duan, Xi’an Jiaotong University (China), Hongyun Wei, Akita International University (Japan), Guan Gui, Nanjing University of Posts and Telecommunications (China)

TP1-5.2 Fast NLMF-Type Algorithms for Adaptive Sparse System Identifications
Guan Gui, Nanjing University of Posts and Telecommunications (China), Beiyi Liu, Li Xu, Akita Prefectural University (Japan), Wentao Ma, Xi’an University of Technology (China)

TP1-5.3 New Iterative Kernel Algorithms for Nonlinear Acoustic Echo Cancellation
Felix Albu, Valahia University of Targoviste (Romania), Kiyoshi Nishikawa, Tokyo Metropolitan University (Japan)

TP1-5.4 Adaptive Feedback Canceller with Howling Detection for Hearing Aids
Kakeru Kashima, Arata Kawamura, Osaka University (Japan), Masahiro Sunohara, Kazuki Nishiyama, Nobuhiko Hiruma, Rion Co., Ltd. (Japan), Youji Iiguni, Osaka University (Japan)

TP1-5.5 A Complete Parallel Narrowband Active Noise Control System based on Residual Error Separation Using Variable Leaky LMS
Boyan Huang, Liang Wen, Harbin Institute of Technology (China), Yegui Xiao, Prefectural University of Hiroshima (Japan), Jinwei Sun, Yi Shen, Harbin Institute of Technology (China)

TP1-5.6 A Hybrid Nonlinear Adaptive Noise Canceller for Fetal ECG Extraction
Yaping Ma, Harbin Institute of Technology (China), Yegui Xiao, Prefectural University of Hiroshima (Japan), Guo Wei, Jinwei Sun, Harbin Institute of Technology (China), Hongyun Wei, Akita International University (Japan)
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<td><strong>TP1-6</strong> Recent Topics in Convex Optimization and Applications</td>
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<td><strong>Type:</strong> Special Session</td>
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<td><strong>Time:</strong> Thursday, December 17, 14:00 - 15:30</td>
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<td><strong>Place:</strong> Room Y521</td>
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<tr>
<td><strong>Organizer/Chair:</strong> Akira Hirabayashi, Ritsumeikan University (Japan)</td>
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<tr>
<th>TP1-6.1 Pool Size Control for Adaptive Group Testing via Boolean Compressed Sensing with Solution Space Reduction</th>
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<tr>
<td>Riho Kawasaki, Kazunori Hayashi, Megumi Kaneko, Kyoto University (Japan)</td>
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<tr>
<th>TP1-6.2 Improvement of pixel enhancement algorithm for high-speed camera imaging using 3D sparsity</th>
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<tr>
<td>Naoki Nogami, Akira Hirabayashi, Jeremy White, Ritsumeikan University (Japan), Laurent Condat, University of Grenoble Alps (France)</td>
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<th>TP1-6.3 A Robust Registration Method using Huber ICP and Low Rank and Sparse Decomposition</th>
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<td>Qiaochu Zhao, Xian-Hua Han, Yen-Wei Chen, Ritsumeikan University (Japan)</td>
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<tr>
<th>TP1-6.4 A nonexpansive operator for computationally efficient hierarchical convex optimization</th>
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<td>Masao Yamagishi, Isao Yamada, Tokyo Institute of Technology (Japan)</td>
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<tr>
<th>TP1-6.5 A Simple Proof for The Equivalence of Multiple Kernel Regressors and Single Kernel Regressors with Sum of Kernels</th>
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<tr>
<td>Akira Tanaka, Hokkaido University (Japan)</td>
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<th>TP1-7: <strong>THURSDAY, DECEMBER 17, 14:00 - 15:30</strong></th>
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<td><strong>Type:</strong> Regular Session</td>
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<td><strong>Chairs:</strong> Anthony Kuh, University of Hawaii (U.S.A.), Masahiro Yukawa, Keio University (Japan)</td>
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<tr>
<th>TP1-7.1 Supervised Nonnegative Matrix Factorization Using Active-Period-Aware Structured L1-norm for Music Transcription</th>
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<tr>
<td>Yu Morikawa, Niigata University (Japan), Masahiro Yukawa, Keio University (Japan), Hisakazu Kikuchi, Niigata University (Japan)</td>
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<tr>
<th>TP1-7.2 Non-negative Matrix Factorization using Stable Alternating Direction Method of Multipliers for Source Separation</th>
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<tr>
<td>Shaofei Zhang, Northwestern Polytechnical University (China), Dongyan Huang, Institute for Infocomm Research, A<em>STAR (Singapore), Lei Xie, Northwestern Polytechnical University (China), Eng Siong Chng, Nanyang Technological University (Singapore), Haizhou Li, Minghui Dong, Institute for Infocomm Research, A</em>Star (Singapore)</td>
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<th>TP1-7.3 Analysis Of Sports Statistics Via Graph-Signal Smoothness Prior</th>
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<td>Haitian Zheng, University of Science and Technology China (China), Gene Cheung, National Institute of Informatics (Japan), Lu Fang, University of Science and Technology China (China)</td>
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<th>TP1-7.4 A Fast Automatic Low-rank Determination Algorithm for Noisy Matrix Completion</th>
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<td>Tatsuya Yokota, RIKEN Brain Science Institute (Japan), Andrzej Cichocki, Polish Academy of Science (Poland)</td>
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<tr>
<th>TP1-7.5 Vocal Separation by Constrained Non-Negative Matrix Factorization</th>
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<tr>
<td>Eri Ochiai, Takanori Fujisawa, Masaaki Ikehara, Keio University (Japan)</td>
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<td>Thursday, December 17, 16:00 - 17:30</td>
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**TP2-1: High Efficiency Video Coding**

**Type:** Regular Session  
**Time:** Thursday, December 17, 16:00 - 17:30  
**Place:** Room Y301  
**Chairs:** Ming-Ting Sun, University of Washington (U.S.A.), Sam Kwong, City University of Hong Kong (Hong Kong)

1. **TP2-1.1 On SSIM-Bit Rate Comparison of HEVC Encoders**  
   Tiesong Zhao, Fuzhou University (China), Zhou Wang, University of Waterloo (Canada), Sam Kwong, City University of Hong Kong (Hong Kong), Chang Wen Chen, State University of New York at Buffalo (U.S.A.)

2. **TP2-1.2 Fast CU Partition Strategy for HEVC Intra-Frame Coding Using Learning Approach via Random Forests**  
   Bochuan Du, Wan-Chi Siu, Xuefei Yang, The Hong Kong Polytechnic University (Hong Kong)

3. **TP2-1.3 AN ADAPTIVE SEGMENT-BASED VIEW SYNTHESIS OPTIMIZATION METHOD FOR 3D-HEVC**  
   Huan Dou, Beijing University of Technology (China), Yui-Lam Chan, The Hong Kong Polytechnic University (Hong Kong), Ke-Bin Jia, Beijing University of Technology (China), Wan-Chi Siu, The Hong Kong Polytechnic University (Hong Kong), Peng-Yu Liu, Qiang Wu, Beijing University of Technology (China)

4. **TP2-1.4 Hash Based Fast Local Search for Intra Block Copy (IntraBC) Mode in HEVC Screen Content Coding**  
   Sik-Ho Tsang, Yui-Lam Chan, Wan-Chi Siu, The Hong Kong Polytechnic University (Hong Kong)

5. **TP2-1.5 Adaptive Transform with HEVC Intra Coding**  
   Tao Zhang, Harbin Institute of Technology (China), Haoming Chen, Ming-Ting Sun, University of Washington (United States of America), Ankur Saxena, Samsung Research America (U.S.A.), Debin Zhao, Wen Gao, Harbin Institute of Technology (China)

**TP2-2: Speech Recognition II**

**Type:** Regular Session  
**Time:** Thursday, December 17, 16:00 - 17:45  
**Place:** Room Y302  
**Chair:** Tomoki Toda, Nagoya University (Japan)

1. **TP2-2.1 A Myanmar Large Vocabulary Continuous Speech Recognition System**  
   Hay Mar Soe Naing, Aye Mya Hlaing, Win Pa Pa, University of Computer Studies (Myanmar), Xin Hui Hu, Ye Kyaw Thu, National Institute of Information and Communications Technology (Japan), Chiori Hori, Mitsubishi Electric Research Laboratories (U.S.A.), Hisashi Kawai, National Institute of Information and Communications Technology (Japan)

2. **TP2-2.2 Two-Stage Lexicon Optimization of G2P-Converted Pronunciation Dictionary Based on Statistical Acoustic Confusability Measure**  
   Nam Kyun Kim, Woo Kyeong Seong, Hun Kyu Ha, Hong Kook Kim, Gwangju Institute of Science and Technology (Korea)

3. **TP2-2.3 Automatic Classification of Usability of ASR Result for Real-time Captioning of Lectures**  
   Yuya Akita, Kyoto Nobuhiro Kuwahara, Tatsuya Kawahara, Kyoto University (Japan)

4. **TP2-2.4 On a robust ASR based on complex AR speech analysis**  
   Keita HIGA, Keiichi FUNAKI, University of the Ryukyus (Japan)

5. **TP2-2.5 Integrating Prosodic Information into Recurrent Neural Network Language Model For Speech Recognition**  
   Tong Fu, Yang Han, Xiangang Li, Yi Liu, Xihong Wu, Peking University (China)

6. **TP2-2.6 Enhancing the Complex-valued Acoustic Spectrograms in Modulation Domain for Creating Noise-Robust Features in Speech Recognition**  
   Hsin-Ju Hsieh, National Chi Nan University (Taiwan), Berlin Chen, National Taiwan Normal University (Taiwan), Jeih-wei Hung, National Chi Nan University (Taiwan)
TP2-3: Thursday, December 17, 16:00 - 17:30

Type: Sound Reproduction
Time: Thursday, December 17, 16:00 - 17:30
Place: Room Y303
Chair: Waleed Abdulla, The University of Auckland (New Zealand), Yoshinobu Kajikawa, Kansai University (Japan)

TP2-3.1 Linearization of the Parametric Array Loudspeaker upon Varying Input Amplitudes
Yuta Hatano, Chuang Shi, Satashi Kinoshita, Yoshinobu Kajikawa, Kansai University (Japan)

TP2-3.2 Multizone Reproduction of Speech Soundfields: A Perceptually Weighted Approach
Jacob Donley, Christian Ritz, University of Wollongong (Australia)

TP2-3.3 On Rayleigh distance and absorption length of parametric loudspeaker
Felipe Farias, Waleed Abdulla, University of Auckland (New Zealand)

TP2-3.4 3D Multizone Soundfield Reproduction in the Reverberant Room Using a Spherical Loudspeaker Array
Meng-fang Zha, Chang-chun Bao, Mao-shen Jia, Beijing University of Technology (China)

TP2-4: Thursday, December 17, 16:00 - 17:30

Type: Neural Signal Processing for Responses to Visual Stimuli
Time: Thursday, December 17, 16:00 - 17:30
Place: Room Y304
Chair: Toshihisa Tanaka, Tokyo University of Agriculture and Technology (Japan)

TP2-4.1 Frequency Recognition for SSVEP-BCI Using Reference Signals With Dominant Stimulus Frequency
Md. Rabiul Islam, Toshihisa Tanaka, Tokyo University of Agriculture and Technology (Japan), Md. Khademul Islam Molla, Most. Sheuli Akter, The University of Rajshahi (Bangladesh)

TP2-4.2 SVM Classification Study of Code-modulated Visual Evoked Potentials
Daiki Aminaka, Shoji Makino, Tomasz M. Rutkowski, University of Tsukuba (Japan)

TP2-4.3 Subspace-Constrained Multilinear Discriminant Analysis for ERP-based Brain Computer Interface Classification
Hiroshi Higashi, Toyohashi University of Technology (Japan), Tomasz M. Rutkowski, University of Tsukuba (Japan), Toshihisa Tanaka, Yuichi Tanaka, Tokyo University of Agriculture and Technology (Japan)

TP2-4.4 SSVEP by checkerboard related to grid size and board size
Arao Funase, Nagoya Institute of Technology (Japan), Kenyu Wakita, Tokyo Institute of Technology (Japan), Akitoshi Itai, Chubu University (Japan), Ichi Takumi, Nagoya Institute of Technology (Japan)
**TP2-5: Thursday December 17, 16:00 - 17:30**

**TP2-5**

**Advanced Topics in Volumetric Image Processing**

**Type:** Special Session  
**Time:** Thursday, December 17, 16:00 - 17:30  
**Place:** Room Y305  
**Organizers:** Shogo Muramatsu, Niigata University (Japan)  
**Chairs:** Masahiro Iwahashi, Nagaoka University of Technology (Japan)

**TP2-5.1 3-D OCT Data Denoising with Nonseparable Oversampled Lapped Transform**

Shogo MURAMATSU, Samuel CHOI, Takumi KAWAMURA, Niigata University (Japan)

**TP2-5.2 Multispectral filter array and demosaicking for pathological images**

Kazuma Shinoda, Shu Ogawa, Yudai Yanagi, Madoka Hasegawa, Shigeo Kato, Utsunomiya University (Japan)  
Masahiro Ishikawa, Hideki Komagata, Naoki Kobayashi, Saitama Medical University (Japan)

**TP2-5.3 Real-Time View Synthesis System Using Active Illumination and Adaptive Space-Time Cost-Volume Filtering**

Sho Nishimura, Shunsuke Yamada, Keita Takahashi, Toshiaki Fujii, Nagoya University (Japan)

**TP2-5.4 Intensity Estimation of LEDs from Spatially and Temporally Mixed Images in Image Sensor Communication**

Takazumi ASAI, Diago IWASE, Ryoko IEKI, Tomohiro YENDO, Nagaoka University of Technology (Japan), Shintaro ARAI, Kagawa College (Japan), Takaya YAMAZATO, Hiraku OKADA, Toshiaki FUJII, Nagoya University (Japan), Koji KAMAKURA, Chiba Institute of Technology (Japan),

**TP2-5.5 Channel Scaling for Rounding Noise Reduction in Minimum Lifting 3D Wavelet Transform**

Fairoza Amira Binti Hamzah, Taichi Yoshida, Masahiro Iwahashi, Nagaoka University of Technology (Japan)  
Hitoshi Kiya, Tokyo Metropolitan University (Japan)

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**TP2-6: Thursday December 17, 16:00 - 17:45**

**TP2-6**

**Recent Advances in Pattern Recognition, Machine Learning, and Biometrics**

**Type:** Special Session  
**Time:** Thursday, December 17, 16:00 - 17:45  
**Place:** Room Y521  
**Organizers:** Andrew Beng Jin Teoh, Yonsei University (Korea), Tee Connie, Michael Kah Ong Goh, Multimedia University (Malaysia)  
**Chair:** Andrew Beng Jin Teoh, Yonsei University (Korea)

**TP2-6.1 Tensor Kernel Supervised Dictionary Learning for Face Recognition**

Yeong Khang Lee, Cheng Yaw Low, Andrew Beng Jin Teoh, Yonsei University (Korea, The Republic of)

**TP2-6.2 Learning Compact Discriminant Local Face Descriptors with VLAD**

Cheng-Yaw Low, Yonsei University (South Korea)

**TP2-6.3 DCTNet : A Simple Learning-free Approach for Face Recognition**

Cong Jie Ng, Andrew Beng Jin Teoh, Yonsei University (South Korea)

**TP2-6.4 A Preliminary Study of Gait-based Age Estimation Techniques**

Benz Kek Yeo Chuen, Tee Connie, Ong Thian Song, Michael Goh, Multimedia University (Malaysia)

**TP2-6.5 Multi-instance Finger Vein Recognition Using Local Hybrid Binary Gradient Contour**

William Ardianto, Thian Song Ong, Tee Connie, Michael Goh, Multimedia University (Malaysia)

**TP2-6.6 Cancellability for Local Binary Pattern Biometric Authentication**

Munalih Ahmad Syarif, Leslie Ching Ow Tiong, Alwyn Goh, Latifah Mat Nen, Kay Win Lee, MIMOS Berhad (Malaysia)
### TP2-7: Thursday, December 17, 16:00 - 17:30

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<td><strong>TP2-7</strong></td>
<td>Wireless and Data Communications Networks</td>
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<tr>
<td><strong>Time:</strong></td>
<td>Thursday, December 17, 16:00 - 17:30</td>
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<tr>
<td><strong>Place:</strong></td>
<td>Room Y512</td>
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<tr>
<td><strong>Chairs:</strong></td>
<td>Tomoaki Ohtsuki, Keio University (Japan), Kazunori Hayashi, Kyoto University (Japan)</td>
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#### TP2-7.1

**Scheduling Algorithm with Delay-limited for VoIP in LTE**  
Juan Chen, Wenguo Yang, Suixiang Gao, University of Chinese Academy of Sciences (China), Lei Zhou, Huawei Technologies Co. LTD. Beijing, China (China)

#### TP2-7.2

**Intrusion Detection in Wireless Sensor Networks for Destructive Intruders**  
Qixiang Yu, Zhenxing Luo, Paul Min, Washington University in St. Louis (U.S.A.)

#### TP2-7.3

**An Efficient Heuristic for Restorable Energy Aware Routing in Networks with Bundled Links**  
Rui Wang, Suixiang Gao, Wenguo Yang, Zhipeng Jiang, University of Chinese Academy of Sciences (China)

#### TP2-7.4

**A Reduced-dimensional Music Algorithm with Modulus Constraint Based on Electromagnetic Vector Sensor Array**  
Huiyong Li, Yuanfang Zhang, Julan Xie, University of Electronic Science and Technology of China (China)

### FA1-1: Friday, December 18, 11:00 - 12:30

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<td><strong>Time:</strong></td>
<td>Friday, December 18, 11:00 - 12:30</td>
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<tr>
<td><strong>Place:</strong></td>
<td>Room Y301</td>
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<td><strong>Chairs:</strong></td>
<td>Hitoshi Kiya, Tokyo Metropolitan University (Japan), Yuk-Hee Chan, The Hong Kong Polytechnic University (Hong Kong)</td>
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#### FA1-1.1

**Learning based fast H.264 to H.265 transcoding**  
Qingxiong Huangyuan, Li Song, Yue Ma, Rong Xie, Shanghai Jiao Tong University (China), Zhengyi Luo, Shanghai University of Electric Power (China)

#### FA1-1.2

**Producing color-indexed images with scalable color and spatial resolutions**  
Yik Hing Fung, Yuk Hee Chan, The Hong Kong Polytechnic University (Hong Kong)

#### FA1-1.3

**Two Layer Coding of HDR Images with Noise Bias Compensation**  
Masahiro Iwahashi, Fairoza Amira Binti Hamzah, Taichi Yoshida, Nagaoka University of Technology (Japan), Hitoshi Kiya, Tokyo Metropolitan University (Japan)

#### FA1-1.4

**Designing Sparse Graphs via Structure Tensor for Block Transform Coding of Images**  
Ivano Rotondo, Gene Cheung, National Institute of Informatics (Japan), Antonio Ortega, Hilmi Egilmez, University of Southern California (U.S.A.)
## FA1-2: Friday, December 18, 11:00 - 12:45

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<td><strong>Time:</strong></td>
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<tr>
<td><strong>Place:</strong></td>
<td>Room Y302</td>
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<tr>
<td><strong>Chairs:</strong></td>
<td>Christian Ritz, University of Wollongong (Australia), Futoshi Asano, Kogakuin University (Japan)</td>
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### FA1-2.1 Sound source localization using a single-point stereo microphone for robots
Futoshi Asano, Kogakuin University (Japan), Mitsuharu Morisawa, Kenji Kaneko, Kazuhiro Yokoi, National Institute of Advanced Industrial Science and Technology (Japan)

### FA1-2.2 The Development of the Vehicle Sound Source Localization System
Yoonho Jang, Jaekwang Kim, Jinhak Kim, Hyundai Motor Company (Korea, Republic of)

### FA1-2.3 Offset estimation for microphone localization using alternating projections
Simayijiang Zhayida, Fredrik Andersson, Kalle Åström, Lund University (Sweden)

### FA1-2.4 Spot-forming method by using two shotgun microphones
Motoyuki Suzuki, Takeshi Honjo, Osaka Institute of Technology (Japan)

### FA1-2.5 Clustered Multi-channel Dereverberation for Ad-hoc Microphone Arrays
Shahab Pasha, Christian Ritz, University of Wollongong (Australia)

### FA1-2.6 Omnidirectional Sound Source Tracking Based on Sequential Updating Histogram
Yusuke SHIKI, Kenji SUYAMA, Tokyo Denki University (Japan)

## FA1-3: Friday, December 18, 11:00 - 12:30

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<td><strong>Chairs:</strong></td>
<td>Mrityun Chakraborty, Indian Institute of Technology (India), Toshihisa Tanaka, Tokyo University of Agriculture and Technology (Japan)</td>
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### FA1-3.1 Blind infrared spectroscopic data restoration with the similarity of multi-scales regularization
Hai Liu, Zhaoli Zhang, Sanyan Liu, Jiangbo Shu, Zhi Liu, Central China Normal University (China)

### FA1-3.2 WIRELESS DIGITAL DEMODULATION SYSTEM VIA HIERARCHICAL MULTIRESOLUTION EMPIRICAL MODE DECOMPOSITION APPROACH
Weichao Kuang, Bingo W. K. Ling, Zhijing Yang, Wai-Lok Woo, Guangdong University of Technology (China)

### FA1-3.3 Research Trends in Optical Spectrum for Honey Analysis
Ary Noviyanto, Waleed Abdulla, Wei Yu, Zoran Salcic, The University of Auckland (New Zealand)

### FA1-3.4 A Novel Pruning Model of Deep Learning for Large-Scale Distributed Data Processing
Yiqiang Sheng, Chinese Academy of Sciences (China), Chaopeng Li, University of Chinese Academy of Sciences (China), Jinlin Wang, Haojiang Deng, Chinese Academy of Sciences (China), Zhenyu Zhao, University of Science and Technology of China (China)

### FA1-3.5 Analysis of the FXLMS algorithm with norm-constant time-varying primary path
Norihiro Ishibushi, Yoshinobu Kajikawa, Seiji Miyoshi, Kansai University (Japan)
### FA1-4: Friday December 18, 11:00 - 12:30

**FA1-4**

Image Restoration via Low-Rank Approach and Transform Domain  
**Type:** Special Session  
**Time:** Friday, December 18, 11:00 - 12:30  
**Place:** Room Y304  
**Organizers:** Jiaying Liu, Zongming Guo, Peking University (China)  
**Chair:** Zongming Guo, Peking University (China)

**FA1-4.1** Re-sampling and Interpolation of DIBR-synthesized Images using Graph-signal Smoothness Prior  
Benedicte Motz, EPFL (Switzerland), Gene Cheung, National Institute of Informatics (Japan), Antonio Ortega, University of Southern California (United States of America), Pascal Frossard, EPFL (Switzerland)

**FA1-4.2** Face Hallucination Based on Neighbor Embedding via Illumination Adaptation  
Sijie Song, Yanghao Li, Zhihan Gao, Jiaying Liu, Peking University (China)

**FA1-4.3** Error Concealment with Multiscale Patch Clustering and Low-Rank Minimization  
Mading Li, Wenhan Yang, Sijie Song, Zongming Guo, Peking University (China)

**FA1-4.4** Compression Noise Estimation and Reduction via Patch Clustering  
Xinfeng Zhang, Weisi Lin, Nanyang Technological University (Singapore), Jiaying Liu, Siwei Ma, Peking University (China)

**FA1-4.5** Global Face Reconstruction for Face Hallucination Using Orthogonal Canonical Correlation Analysis  
Huiling Zhou, The Hong Kong Polytechnic University (Hong Kong), Jiwei Hu, Wuhan University of Technology (China), Kin-Man Lam, The Hong Kong Polytechnic University (Hong Kong)

### FA1-5: Friday December 18, 11:00 - 12:30

**FA1-5** Sparse Signal Processing for Wireless Communications  
**Type:** Special Session  
**Time:** Friday, December 18, 11:00 - 12:30  
**Place:** Room Y305  
**Organizers:** Masoumeh Azghani, Sahand University of Technology (Iran), Sun Sumei, Institute for Infocomm Research (Singapore)  
**Chair:** Masoumeh Azghani, Sahand University of Technology (Iran)

**FA1-5.1** MIMO-OFDM Pilot Symbol Design For Sparse Channel Estimation  
Roozbeh Mohammadian, Arash Amini, Babak H. Khalaj, Naeimeh Omidvar, Sharif University of Technology (Iran (Islamic Republic of))

**FA1-5.2** List message passing algorithm for noiseless compressed sensing  
Francisco Ramirez-Javega, Meritxell Lamarca, Universitat Politecnica de Catalunya (Spain)

**FA1-5.3** On Introducing Damping to Bayes Optimal Approximate Message Passing for Compressed Sensing  
Kazushi Mimura, Hiroshima City University (Japan)

**FA1-5.4** BPSK-OFDM Signal Detection in Time-Varying Channels Using Prior Information  
Min Huang, Lei Huang, Weize Sun, Qiang Li, Peichang Zhang, Shenzhen University (China)

**FA1-5.5** Low-Rank Block Sparse Decomposition Algorithm for Abnormaly Detection in Networks  
Masoumeh Azghani, Sumei Sun, Institute for Infocomm Research (Singapore)
**FA1-6: FRIDAY DECEMBER 18, 11:00 - 12:30**

**FA1-6**

Recent Advances in Audio and Acoustic Signal Processing

**Type:** Special Session

**Time:** Friday, December 18, 11:00 - 12:30

**Place:** Room Y521

**Organizers:** Shoji Makino, University of Tsukuba (Japan), Hiroshi Saruwatari, The University of Tokyo (Japan)

**Chairs:** Shoji Makino, University of Tsukuba (Japan), Shoichi Koyama, The University of Tokyo (Japan)

**FA1-6.1 A Gain-adaptive Parallel HMM for Speech Enhancement**
Qi He, Chang-chun Bao, Beijing University of Technology (China)

**FA1-6.2 In-car Noise Field Analysis and Multi-zone Noise Cancellation Quality Estimation**
Hanchi Chen, Prasanga Samarasinghe, Thushara D. Abhayapala, Australian National University (Australia)

**FA1-6.3 Evaluation of Two-microphone Acoustic Feedback Cancellation Using Uniform and Non-uniform Sub-bands in Hearing Aids**
Linh T.T. Tran, Hai H. Dam, Curtin University (Australia)
Henning Schepker, Simon Doclo, University of Oldenburg (Germany)
Sven E. Nordholm, Curtin University (Australia)

**FA1-6.4 Sparse Sound Field Decomposition Using Group Sparse Bayesian Learning**
Shoichi Koyama, Atsushi Matsubayashi, Naoki Murata, Hiroshi Saruwatari, The University of Tokyo (Japan)

**FA1-6.5 Diffuse noise suppression with asynchronous microphone array based on amplitude additivity model**
Yoshikazu Murase, Hironobu Chiba, University of Tsukuba (Japan)
Nobutaka Ono, National Institute of Informatics/SOKENDAI (Japan)
Shigeki Miyabe, Takeshi Yamada, Shoji Makino, University of Tsukuba (Japan)

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**FA1-7: FRIDAY, DECEMBER 18, 11:00 - 12:30**

**FA1-7**

Signal Processing System Design

**Type:** Regular Session

**Time:** Friday, December 18, 11:00 - 12:30

**Place:** Room Y512

**Chair:** Woon Seng Gan, Nanyang Technological University (Singapore)

**FA1-7.1 An ACO Approach for Design of CSD Coefficient FIR Filters**
Tomohiro Sasahara, Kenji Suyama, Tokyo Denki University (Japan)

**FA1-7.2 Performance Evaluation of IIR Filter Design Using Multi-Swarm PSO**
Haruna Aimi, Kenji Suyama, Tokyo Denki University (Japan)

**FA1-7.3 Parallelization of Cipher Algorithm on CPU/GPU for Real-time Software-Defined Access Network**

**FA1-7.4 An Affordable and Attachable Electronic Device for the Blind**
Hejun Wong, Santi Peksi, Woon Seng Gan, Nanyang Technological University (Singapore)
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<td>Woon-Seng Gan, Nanyang Technological University (Singapore)</td>
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**Presenters:**
- Yoshinobu Kajikawa, Kansai University (Japan)
- Cheng-Yuan Chang, Chung Yuan Christian University (Taiwan)
- Dong Wang, Tsinghua University (China)
- Xiong Xiao, Nanyang Technological University (Singapore)
- Lap Pui Chau, Nanyang Technological University (Singapore)
- Minghui Dong, I2R (Singapore)
- KaiKuang Ma, Nanyang Technological University (Singapore)
- Woon-Seng Gan, Nanyang Technological University (Singapore)
- Toshihisa Tanaka, Tokyo University of Agriculture and Technology (Japan)

### FP1-1: Friday, December 18, 14:00 - 15:30

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<td>Daniel P.K. Lun, The Hong Kong Polytechnic University (Hong Kong)</td>
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**Presentations:**

1. **FP1-1.1 Virtual-View Based 3D Video Composition**
   - Hsueh-Ming HANG, National Chiao Tung University (Taiwan)

2. **FP1-1.2 From Algorithm/Architecture Co-Exploration to Internet of Things**
   - Gwo Gium (Chris) Lee, National Cheng Kung University (Taiwan)

3. **FP1-1.3 A MIMO-OFDM System for High Quality Video Communication**
   - Yoshikazu Miyanaga, Hokkaido University (Japan)
FP1-2: FRIDAY, DECEMBER 18, 14:00 - 15:30

FP1-2
Speaker Verification and Recognition
Type: Regular Session
Time: Friday, December 18, 14:00 - 15:30
Place: Room Y302
Chairs: Tatsuya Kawahara, Kyoto University (Japan), Man-Wai Mak, The Hong Kong Polytechnic University (Hong Kong)

FP1-2.1 Fast Scoring for Mixture of PLDA in I-Vector/PLDA Speaker Verification
Man-Wai Mak, The Hong Kong Polytechnic University (Hong Kong)

FP1-2.2 The SYSU System for the Interspeech 2015 Automatic Speaker Verification Spoofing and Countermeasures Challenge
Shitao Weng, Shushan Chen, Lei Yu, Xuewei Wu, SYSU-CMU Shunde International Joint Research Institute (China), Weicheng Cai, Sun Yat-Sen University (China), Zhi Liu, SYSU-CMU Shunde International Joint Research Institute (China), Yiming Zhou, Zhejiang University (China), Ming Li, Sun Yat-Sen University (China)

FP1-2.3 A Spectrum Smoothing Method for Speaker Verification
Zhaoofeng Zhang, Nagaoka University of Technology (Japan), Jing Deng, ZingTech. Co. Ltd. (China), Longbiao Wang, Nagaoka University of Technology (Japan), Xiong Xiao, Nanyang Technological University (Singapore)

FP1-2.4 Robust Formant Features for Speaker Verification in the Lombard Effect
Ileun Kwak, Hong-Goo Kang, Yonsei University (Korea)

FP1-2.5 Improved Deep Speaker Feature Learning for Text-Dependent Speaker Recognition
Lantian Li, Yiye Lin, Zhiyong Zhang, Dong Wang, Tsinghua University (China)

FP1-3: FRIDAY, DECEMBER 18, 14:00 - 15:30

FP1-3
Image Enhancement and Superresolution
Type: Regular Session
Time: Friday, December 18, 14:00 - 15:30
Place: Room Y303
Chairs: Wan-Chi Siu, The Hong Kong Polytechnic University (Hong Kong), Lap-Pui Chau, Nanyang Technological University (Singapore)

FP1-3.1 Image Super-resolution via Hybrid NEDI and Wavelet-based Scheme
Zhi-Song Liu, Wan-Chi Siu, Jun-Jie Huang, The Hong Kong Polytechnic University (Hong Kong)

FP1-3.2 Removing harmonic distortion in tiled screens
Xiao Chen, Yuk Hee Chan, The Hong Kong Polytechnic University (Hong Kong)

FP1-3.3 Underwater Image Color Correction based on Surface Reflectance Statistics
Hui Liu, Lap-Pui Chau, Nanyang Technological University (Singapore)

FP1-3.4 Noise Bias Compensation based on Bayesian Inference for Tone Mapped Noisy Image
Masahiro Iwahashi, Fairoza Amira Binti Hamzah, Taichi Yoshida, Nagaoka University of Technology (Japan), Hitoshi Kiya, Tokyo Metropolitan University (Japan)
### FP1-4: Friday December 18, 14:00 - 15:45

**FP1-4** Human Visual Information Processing and Its Applications  
**Type:** Special Session  
**Time:** Friday, December 18, 14:00 - 15:45  
**Place:** Room Y304  
**Organizers:** Kosin Chamnongthai, King Mongkut’s University of Technology Thonburi (Thailand)  
**Chair:** Montri Phothisonothai, King Mongkut’s Institute of Technology Ladkrabang (Thailand)

**FP1-4.1** Depth cue combinations for density judgment in three-dimensional display  
Kentaro Yamamoto, Waseda University (Japan), Ricky K. C. Au, The Hong Kong Polytechnic University (Hong Kong), Katsumi Watanabe, Waseda University (Japan)

**FP1-4.2** Multi sensor system for automatic fall detection  
Chokemongkol Nadee, Kosin Chamnongthai, King Mongkut’s University of Technology Thonburi (KMUTT) (Thailand)

**FP1-4.3** Preference distorts visual space  
Miho Kitamura, Waseda University (Japan), Yousuke Kawachi, Tohoku Fukushi University (Japan), Jiro Gyoba, Tohoku University (Japan)

**FP1-4.4** An Investigation of using SSVEP for EEG-based User Authentication System  
Montri Phothisonothai, King Mongkut’s Institute of Technology Ladkrabang (Thailand)

**FP1-4.5** Facial Expression Recognition with Emotion-Based Feature Fusion  
Cigdem Turan, Kin-Man Lam, The Hong Kong Polytechnic University (Hong Kong), Xiangjian He, University of Technology, Sydney (Australia)

**FP1-4.6** Sparse Representation of Adaptive Key Frame Features for Human Action Classification  
Kanokphan Lertniphonphan, Supavadee Aramvith, Thanarat H. Chalidabhongse, Chulalongkorn University (Thailand)

### FP1-5: Friday December 18, 14:00 - 15:45

**FP1-5** Advanced Secure and Shared Wireless Networks  
**Type:** Special Session  
**Time:** Friday, December 18, 14:00 - 15:45  
**Place:** Room Y305  
**Organizer/Chair:** Osamu Takyu, Shinshu University (Japan)

**FP1-5.1** Room-Level Proximity Detection Using Beacon Frame From Multiple Access Points  
Yugo Agata, Jihoon Hong, Tomoaki Ohtsuki, Keio University (Japan)

**FP1-5.2** Fusion Center Controlled Carrier Sense Multiple Access for Physical Wireless Parameter Conversion Sensor Networks  
Koji Kakinuma, Shunsuke Takagi, Shunta Sakai, Takeo Fujii, The University of Electro-Communications (Japan)

**FP1-5.3** Performance Evaluation of the Physical Layer Security Using Artificial Noise and Relay Station  
Junichi Kabeya, Osamu Takyu, Shinshu University (Japan), Tomoaki Ohtsuki, Keio University (Japan), Fumihito Sasamori, Shiro Handa, Shinshu University (Japan)

**FP1-5.4** Service-Aware User-Centric Clustering and Scheduling for Cloud-RAN with Coordinated Multi-Point Transmission  
Anthony Beylerian, Tomoaki Ohtsuki, Keio University (Japan)

**FP1-5.5** Operation of Reconfigurable Mobile Device for Spectrum Sharing  
Kyunghoon Kim, Yong Jin, Donghyun Keum, Seungwon Choi, Hanyang University (Korea), Markus Mueck, Inel Mobile Communications Group (Germany), Vladimir Ivanov, LG Electronics Inc. (Korea)

**FP1-5.6** Implementation of Reconfigurable Mobile Device with Licensed Shared Access Functionality  
Yong Jin, Kyunghoon Kim, Seungwon Choi, Hanyang University (Korea), Markus Mueck, Intel Mobile Communications Group (Germany), Vladimir Ivanov, LG Electronics Inc. (Korea)
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<th>Robust sound image localization for moving listener with curved-type parametric loudspeaker</th>
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<th>A Novel DNA Sequence Compression Scheme Using Both Intra and Inter Sequences Correlation</th>
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<th>FP1-7.2</th>
<th>Investigation of relation between speech perception and production based on EEG source reconstruction</th>
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**Type:** Regular Session  
**Time:** Saturday, December 19, 09:00 - 10:45  
**Place:** Room Y301  
**Chair:** Qin Liu, Nanjing University (China)

**SA1-1.1** An Adherent Raindrop Detection Method Using MSER  
Koichi Ito, Kazumasa Noro, Takafumi Aoki, Tohoku University (Japan)

**SA1-1.2** A Comparison Study of Stationary and Mobile Eye Tracking on EXITS Design in a Wayfinding System  
Yun Zhang, Xi’an Jiao Tong University (China), Xiujuan Zheng, Sichuan University (China), Wei Hong, Xuanqin Mou, Xi’an Jiao Tong University (China)

**SA1-1.3** A Novel Algorithm For Shuttlecock Tracking  
Zhishen Huang, Wai-Kuen Cham, The Chinese University of Hong Kong (Hong Kong)

**SA1-1.4** Automatic Tongue Contour Tracking in Ultrasound Sequences without Manual Initialization  
Hongcui Wang, Siyu Wang, Bruce Denby, Jianwu Dang, Tianjin University (China)

**SA1-1.5** Ghost-Free High Dynamic Range Imaging via Moving Objects Detection and Extension  
Benkang Zhang, Qin Liu, Nanjing University (China)  
Takeshi IKENAGA, Waseda University (Japan)

**SA1-1.6** Eye Corner Detection with Texture Image Fusion  
Zhiyu Zhang, Yang Shen, Weiyao Lin, Shanghai Jiao Tong University (China), Bing Zhou, Zhengzhou University (China)

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**SA1-2: Saturday, December 19, 09:00 - 10:30**

**Type:** Regular Session  
**Time:** Saturday, December 19, 09:00 - 10:30  
**Place:** Room Y302  
**Chairs:** Chang-Chun Bao, Beijing University of Technology (China), Hsin-Min Wang, Academia Sinica (Taiwan)

**SA1-2.1** Impact Noise Suppression Using Spectral Phase Estimation  
Kohei FUJIKURA, Arata KAWAMURA, Youji IIGUNI, Osaka University (Japan)

**SA1-2.2** Improving Denoising Auto-encoder Based Speech Enhancement With the Speech Parameter Generation Algorithm  
Syu-Siang Wang, National Taiwan University (Taiwan), Hsin-Te Hwang, Ying-Hui Lai, Yu Tsao, Academia Sinica (Taiwan), Xugang Lu, National Institute of Information and Communications Technology (Japan), Hsin-Min Wang, Academia Sinica (Taiwan), Borching Su, National Taiwan University (Taiwan)

**SA1-2.3** Multi-channel Feedforward ANC System Combined with Noise Source Separation  
Satoshi Kinoshita, Yoshinobu Kajikawa, Kansai University (Japan)

**SA1-2.4** Codebook-based Speech Enhancement with Bayesian LP Parameters Estimation  
Qing Wang, Chang-chun Bao, Beijing University of Technology (China)

**SA1-2.5** An Improved Dictionary Learning Method for Speech Enhancement  
Yue Hao, Changchun Bao, Beijing University of Technology (China)
### SA1-3: Saturday, December 19, 09:00 - 10:30

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<td>SA1-3.3</td>
<td>A Framework of Human-based Speech Transcription with a Speech Chunking Front-end</td>
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<td>Takashi Saito, Shonan Institute of Technology (Japan)</td>
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<td>SA1-3.4</td>
<td>A Two-pass Framework of Mispronunciation Detection &amp; Diagnosis for Computer-aided Pronunciation Training</td>
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<td>Xiaojun Qian, Helen Meng, The Chinese University of Hong Kong (Hong Kong), Frank Soong, Microsoft Research Asia (China)</td>
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<td>SA1-3.5</td>
<td>A Spoken Dialog System with Redundant Response to Prevent User Misunderstanding</td>
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<td>Masaki Yamaoka, Sunao Hara, Masanobu Abe, Okayama University (Japan)</td>
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### SA1-4: Saturday, December 19, 09:00 - 10:30

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<td>Chang-Su Kim, Korea University (Korea), Kyoung Mu Lee, Seoul National University (Korea)</td>
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<td>Near-Duplicate Video Clustering Using Multiple Complementary Video Signatures</td>
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<td>SA1-4.2</td>
<td>New Intra Prediction Methods Based on Channel Correlation and their Combination for Color Image Compression</td>
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<td>SA1-4.3</td>
<td>Color Preserving Contrast Enhancement for Low Light Level Images based on Retinex</td>
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<td>Probabilistic Compression Artifacts Reduction Using Self-Similarity Based Noise Region Estimation</td>
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<td>Random Forest with Data Ensemble for Saliency Detection</td>
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<td>Seungjun Nah, Kyoung Mu Lee, Seoul National University (Korea)</td>
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**SA1-5: Saturday December 19, 09:00 - 10:30**

**SA1-5**

Medical and Health Care Service Development

**Type:** Special Session  
**Time:** Saturday, December 19, 09:00 - 10:30  
**Place:** Room Y305  
**Organizer:** Koichi Fujiwara, Kyoto University (Japan)  
**Chairs:** Koichi Fujiwara, Kyoto University (Japan), Toshitaka Yamakawa, Kumamoto University (Japan)

**SA1-5.1**

Development of Stroke Detection Method by Heart Rate Variability Analysis and Support Vector Machine  
Keisuke Kamata, Koichi Fujiwara, Tomonobu Kodama, Manabu Kano, Kyoto University (Japan), Toshitaka Yamakawa, Kumamoto University (Japan), Noritaka Kobayashi, Fumonori Shimizu, Shimizu Hospital (Japan)

**SA1-5.2**

Heart Rate Monitoring by Pulse Sensor Embedded Game Controller  
Erika Abe, Kyoto University (Japan), Hiroshi Chigira, NTT (Japan), Koichi Fujiwara, Kyoto University (Japan), Toshitaka Yamakawa, Kumamoto University (Japan), Manabu Kano, Kyoto University (Japan)

**SA1-5.3**

Accuracy Comparison between Two Microcontroller-embedded R-wave Detection Methods for Heart-rate Variability Analysis  
Toshitaka Yamakawa, Ryunosuke Kinoshita, Kumamoto University (Japan), Koichi Fujiwara, Manabu Kano, Kyoto University (Japan), Miho Miyajima, Tokyo Medical and Dental University (Japan), Tadashi Sakata, Yuichi Ueda, Kumamoto University (Japan)

**SA1-5.4**

In-Home Measurement System of User’s Motion and Center of Pressure  
Tomoya Tamei, Yasuyuki Orito, Nara Institute of Science and Technology (Japan), Tomohiro Shibata, Kyushu Institute of Technology (Japan), Kazushi Ikeda, Nara Institute of Science and Technology (Japan)

**SA1-6: Saturday December 19, 09:00 - 10:30**

**SA1-6**

Content-aware Multimedia Signal Processing and Representation (Part I)  
**Type:** Special Session  
**Time:** Saturday, December 19, 09:00 - 10:30  
**Place:** Room Y521  
**Organizers:** Li-Wei Kang, National Yunlin University of Science and Technology (Taiwan), Chih-Yang Lin, Asia University (Taiwan)  
**Chairs:** Chih Yang Lin, Asia University (Taiwan), Wen-Chuan Wu, Aletheia University (Taiwan)

**SA1-6.1**

Lossless Contour Compression Using Morphology, Chain Coding, and Distribution Transform  
Ching-Wen Hsiao, Jian-Jiun Ding, Po-Jen Chen, National Taiwan University (Taiwan)

**SA1-6.2**

An Image Retargeting Scheme with Content-based Cropping and Local Significance Aware Seam Carving  
Po-Chyi Su, Yung-Chieh Chou, National Central University (Taiwan)

**SA1-6.3**

Power Saving on Mobile Devices Through Contrast-Aware Backlight Control  
Vivian Yang, Jia-Ying Lin, Kyle Shih-Haung Lo, Chia-Hung Yeh, National Sun Yat-sen University (Taiwan), Chia-Chen Kuo, National Applied Research Laboratories (Taiwan), Li-Wei Kang, National Yunlin University of Science and Technology (Taiwan)

**SA1-6.4**

Human Action Recognition Based on Non-negative Matrix Factorization  
Chih-Yang Lin, Asia University (Taiwan), Bo-You Chen, National Chung Cheng University (Taiwan), Wen-Chuan Wu, Aletheia University (Taiwan), Wei-Yang Lin, National Chung Cheng University (Taiwan), Chia-Ling Tsai, Iona College (U.S.A.)

**SA1-6.5**

Benchmarking Human Motion Analysis Using Kinect: an open source dataset  
Daniel Lightley, Moi Hoon Yap, Jessica Coulson, Yoann Barnouin, Jamie S. McPhee, Manchester Metropolitan University (UK)
**SA1-7: Saturday, December 19, 09:00 - 10:30**

**SA1-7**  
**Type:** Regular Session  
**Time:** Saturday, December 19, 09:00 - 10:30  
**Place:** Room Y512  
**Chairs:** Akira Hirabayashi, Ritsumeikan University (Japan), Kazushi Ikeda, Nara Institute of Science and Technology (Japan)

**SA1-7.1** Improving the quality of compressed sensing MRI that exploits adjacent slice similarity  
Norihito Inamuro, Akira Hirabayashi, Ritsumeikan University (Japan)

**SA1-7.2** FDA Radar Ambiguity Function Optimization With Simulated Annealing Algorithm  
Miaomiao Dai, Wen-Qin Wang, Huaizong Shao, University of Electronic Science and Technology of China (China)

**SA1-7.3** A spectrum sensing method based on fractional lower order moments in weakly correlated Laplace noise  
Yaping Bao, Yingdong Zhu, Xiaomei Zhu, Yuzhi Chu, Nanjing Tech University (China)

**SA1-7.4** Compressive Sensing-Based Range and Angle Estimation For Nested FDA Radar  
Jie Xiong, Wen-Qin Wang, Hui Chen, Huaizong Shao, University of Electronic Science and Technology of China (China)

**SA1-7.5** Evaluation of Compressive Sensing encoding on AR Drone  
Karan Shetti, Asha Vijayakumar, Airbus Group Innovations (Singapore)

**SA2-1: Saturday, December 19, 11:00 - 12:00**

**SA2-1** Invited Overview Session  
**Type:** Invited Session  
**Time:** Saturday, December 19, 11:00 - 12:00  
**Place:** Room Y301  
**Chair:** Ray K.J. Liu, University of Maryland (U.S.A.)

**SA2-1.1** Transfer Learning for Speech and Language Processing  
Dong Wang, Thomas Fang Zheng, Tsinghua University (China)

**SA2-1.2** Signal and Information Processing Applications for the Smart Grid  
Anthony Kuh, University of Hawaii (U.S.A.)
SA2-2: SATURDAY, DECEMBER 19, 11:00 - 12:45

SA2-2: Acoustic Modeling and Speech Quality Assessment
Type: Regular Session
Time: Saturday, December 19, 11:00 - 12:45
Place: Room Y302
Chairs: Haizhou Li, Institute of Infocomm Research A*Star (Singapore), Jianwu Dang, Japan Advanced Institute of Science and Technology (Japan)

SA2-2.1: Estimation of Binaural Intelligibility Using the Frequency-Weighted Segmental SNR of Stereo Channel Signals
Van Hai Do, Xiong Xiao, Eng Siong Chng, Nanyang Technological University (Singapore), Haizhou Li, Institute for Infocomm Research, A*Star (Singapore)

SA2-2.2: Distance Metric Learning for Kernel Density-Based Acoustic Model Under Limited Training Data Conditions
Jia Yu, Lei Xie, Northwestern Polytechnical University (China), Xiong Xiao, Eng Siong Chng, Nanyang Technological University (Singapore), Haizhou Li, Institute for Infocomm Research, A*Star (Singapore)

SA2-2.3: A Density Peak Clustering Approach to Unsupervised Acoustic Subword Units Discovery
Jingshu Zhang, Jianguo Wei, Wenhuan Lu, Tianjin University (China), Qiang Fang, Chinese Academy of Social Sciences (China), Kiyoshi Honda, Jianwu Dang, Tianjin University (China)

SA2-2.4: Vowel Normalization by Articulatory Information
Xiaozhen Wang, Kiyoshi Honda, Jianwu Dang, Hongcui Wang, Jianguo Wei, Tianjin University (China)

SA2-2.5: Influences of Auditory and Vibrotactile Information on Vocal F0 Responses
Xiaozhen Wang, Kiyoshi Honda, Jianwu Dang, Hongcui Wang, Jianguo Wei, Tianjin University (China)

SA2-2.6: Relationship between Speaker/Listener Similarity and Information Transmission Quality in Speech Communication
Bohan Chen, Nagoya University (Japan), Norihide Kitaoka, Tokushima University (Japan), Kazuya Takeda, Nagoya University (Japan)

SA2-2.7: Influences of Auditory and Vibrotactile Information on Vocal F0 Responses
Xiaozhen Wang, Kiyoshi Honda, Jianwu Dang, Hongcui Wang, Jianguo Wei, Tianjin University (China)

SA2-2.8: Relationship between Speaker/Listener Similarity and Information Transmission Quality in Speech Communication
Bohan Chen, Nagoya University (Japan), Norihide Kitaoka, Tokushima University (Japan), Kazuya Takeda, Nagoya University (Japan)

SA2-4: SATURDAY, DECEMBER 19, 11:00 - 12:30

SA2-4: Perceptual-based Texture Analysis and Application
Type: Special Session
Time: Saturday, December 19, 11:00 - 12:30
Place: Room Y304
Organizers: Junyu Dong, Muwei Jian, Ocean University of China (China), Hansheng Lei, University of Texas in Brownsville (USA), Florent Autrusseau, University of Nantes (France), Lin Qi, Ocean University of China (China), Hui Yu, University of Portsmouth (UK)
Chair: Junyu Dong, Ocean University of China (China)

SA2-4.1: Self-taught Recovery of Depth Data
Pan Yang, Haoran Zhao, Lin Qi, Guoqiang Zhong, Ocean University of China (China)

SA2-4.2: A Texture Retrieval Scheme Based on Perceptual Features
Yanhai Gan, Xiaoxu Cai, Ocean University of China (China), Jun Liu, Qingdao Agricultural University (China), Shengke Wang, Ocean University of China (China)

SA2-4.3: 3D Reconstruction from Single Texture Image Based on Patch Matching and Optimization
Yujuan Sun, Muwei Jian, Shengke Wang, Xin Sun, Ocean University of China (China)

SA2-4.4: Perceptual Texture Retrieval Using Spatial Distributions of Textons (SDoT)
Xinghui Dong, Heriot-Watt University (U.K.), Junyu Dong, Shengke Wang, Ocean University of China (China), Mike J. Chantler, Heriot-Watt University (U.K.)

SA2-4.5: Gabor Feature Based Discriminative Dictionary Learning for Period Order Detection in Fringe Projection Profilometry
B. Budianto, Daniel P.K. Lun, The Hong Kong Polytechnic University (Hong Kong)
SA2-5: **Saturday December 19, 11:00 - 12:30**

**SA2-5**

**Type:** Special Session  
**Time:** Saturday, December 19, 11:00 - 12:30  
**Place:** Room Y305  
**Organizers:** Supavadee Aramvith, Chulalongkorn University (Thailand), Rosanna Yuen-Yan Chan, The Chinese University of Hong Kong (Hong Kong), Lu Yonghe, Sun Yat-Sen University (China)  
**Chair:** Rosanna Yuen-Yan Chan, The Chinese University of Hong Kong (Hong Kong)

**SA2-5.1**  
**Web Page Segmentation Based on the Hough transform and Vision Cues**  
Tingting Wei, Yonghe Lu, Xuanjie Li, Jinglun Liu, Sun Yat-Sen University (China)

**SA2-5.2**  
**Image Smoothing Using Spatial Iterative Methods Based on Accelerated Iterative Shrinkage**  
Dabwitsa Kasauka, Hiroshi Tsutsui, Hokkaido University (Japan), Hiroyuki Okuhata, Synthesis Corporation (Japan), Takashi Imagawa, Yoshikazu Miyanaga, Hokkaido University (Japan)

**SA2-5.3**  
**Topic Extraction from Millions of Tweets using Singular Value Decomposition and Feature Selection**  
Takako Hashimoto, Chiba University of Commerce (Japan), Tetsuji Kuboyama, Gakushuin University (Japan), Basabi Chakraborty, Iwate Prefectural University (Japan)

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SA2-6: **Saturday December 19, 11:00 - 12:45**

**SA2-6**

**Type:** Special Session  
**Time:** Saturday, December 19, 11:00 - 12:45  
**Place:** Room Y521  
**Organizers:** Li-Wei Kang, National Yulin University of Science and Technology (Taiwan), Chih-Yang Lin, Asia University (Taiwan)  
**Chairs:** Pei-Yu Lin, Yuan Ze University (Taiwan), Yi-Hui Chen, Asia University (Taiwan)

**SA2-6.1**  
**An Efficient Sky Detection Algorithm Based on Hybrid Probability Model**  
Chi-Wei Wang, Jian-Jiun Ding, Po-Jen Chen, National Taiwan University (Taiwan)

**SA2-6.2**  
**Diverse Augmented Reality Exhibitions for Differential Users Based upon Private Quick Response Code**  
Pei-Yu Lin, Chin-Hung Teng, Yuan Ze University (Taiwan), Yi-Hui Chen, Asia University (Taiwan)

**SA2-6.3**  
**Joint SVD and QR Codes for Image Authentication**  
Wen-Chuan Wu, Aletheia University (Taiwan), Chi-Shiang Chan, Chih-Yang Lin, Asia University (Taiwan), Zi-Wei Lin, Aletheia University (Taiwan)

**SA2-6.4**  
**Multilayered Information Encryption Scheme with Fine-grained Authentication**  
Yi-Hui Chen, Asia University of M-Commerce and Multimedia Applications (Taiwan), Ching-Hu Lu, National Taiwan University of Science and Technology, Taiwan (Taiwan), Po-Yu Hsu, Asia University of M-Commerce and Multimedia Applications (Taiwan)

**SA2-6.5**  
**An Audio Watermarking Scheme Based on Automatic Parameterized Singular-Spectrum Analysis Using Differential Evolution**  
Jessada Karnjana, Pakinee Aimmanee, Thammasat University (Thailand), Masashi Unoki, Japan Advanced Institute of Science and Technology (Japan), Chai Wuttiwiwatchai, National Electronics and Computer Technology Center (Thailand)

**SA2-6.6**  
**An Analysis-by-Synthesis Encoding Approach for Multiple Audio Objects**  
Ziyu Yang, Maoshen Jia, Changchun Bao, Wenbei Wang, Beijing University of Technology (China)
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<td>SA2-7.1</td>
<td>Emotional speech synthesis system based on a three-layered model using a dimensional approach</td>
<td>Yawen Xue, Japan Advanced Institute of Science and Technology (Japan), Yasuhiro Hamada, Meiji University (Japan), Masato Akagi, Japan Advanced Institute of Science and Technology (Japan)</td>
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<td>SA2-7.2</td>
<td>A Probabilistic Interpretation for Artificial Neural Network-based Voice Conversion</td>
<td>Hsin-Te Hwang, National Chiao Tung University, Yu Tsao, Hsin-Min Wang, Academia Sinica (Taiwan), Yih-Ru Wang, Sin-Horng Chen, National Chiao Tung University (Taiwan)</td>
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<tr>
<td>SA2-7.3</td>
<td>A Waveform Representation Framework for High-quality Statistical Parametric Speech Synthesis</td>
<td>Bo Fan, Northwestern Polytechnical University (China), Siu Wa Lee, Institute for Infocomm Research (Singapore), Xiaohai Tian, Nanyang Technological University (Singapore), Lei Xie, Northwestern Polytechnical University (China), Minghui Dong, Institute for Infocomm Research A*Star (Singapore)</td>
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<td>SA2-7.4</td>
<td>Aliasing-free implementation of discrete-time glottal source models and their applications to speech synthesis and F0 extractor evaluation</td>
<td>Hideki Kawahara, Wakayama University (Japan), Ken-Ichi Sakakibara, Health Sciences University of Hokkaido (Japan), Hideki Banno, Meijo University (Japan), Masanori Morise, University of Yamanashi (Japan), Tomoki Toda, Nagoya University (Japan), Toshio Irino, Wakayama University (Japan)</td>
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<td>SA2-7.5</td>
<td>Mapping Frames with DNN-HMM Recognizer for Non-parallel Voice Conversion</td>
<td>Minghui Dong, Chenyu Yang, Yanfeng Lu, Jochen Walter Ehnes, Dongyan Huang, Huaiying Ming, Rong Tong, Siu Wa Lee, Haizhou Li, Institute for Infocomm Research, A*Star (Singapore)</td>
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<td>SA2-7.6</td>
<td>Chinese Syllable-to-Character Conversion with Recurrent Neural Network based Supervised Sequence Labelling</td>
<td>Yi Liu, Jing Hua, Xiangang Li, Tong Fu, Xihong Wu, Peking University (China)</td>
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<td><strong>Chair:</strong> Hitoshi Kiya, Tokyo Metropolitan University (Japan)</td>
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<td>Hitoshi Kiya, Tokyo Metropolitan University (Japan)</td>
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<td>Sanghoon Lee, (Video Participant) (Korea)</td>
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<td><strong>Chair:</strong> Jay C.C. Kuo, University of Southern California (U.S.A.)</td>
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<th><strong>SP1-1.1</strong></th>
<th>Sparse Adaptive Filters - an Overview and Some Emerging Trends</th>
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<td>Mrityunjoy Chakraborty, Indian Institute of Technology, Kharagpur (India)</td>
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<th><strong>SP1-1.2</strong></th>
<th>Biomedical signal processing and systems’ state of the arts and future research challenges</th>
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<td>Tomasz M. Rutkowski, University of Tsukuba (Japan)</td>
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<th>Face Recognition from Low-resolution to High-resolution</th>
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<td>Kenneth K.M. Lam, The Hong Kong Polytechnic University (Hong Kong)</td>
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**SP1-2**
- **Type:** Regular Session
- **Time:** Saturday, December 19, 14:00 - 15:45
- **Place:** Room Y302
- **Chair:** Sadaoki Furui, Toyota Technological Institute at Chicago (U.S.A.)

**SP1-2.1** Comparative Whisper Vowel Space for Singapore English and British English Accents
Hamid R. Sharifzadeh, Unitec Institute of Technology (New Zealand), Iman T. Ardekani, Unitec Institute of Technology (New Zealand), Ian V. McLoughlin, The University of Kent (United Kingdom)

**SP1-2.2** Investigation of Learning Trajectory of Mandarin for Tibetan Speakers
Huixia Wang, Jianwu Dang, Hui Feng, Hongcui Wang, Yang Yu, Tianjin University (China), Kiyoshi Honda, Japan Advanced Institute of Science and Technology (Japan)

**SP1-2.3** Pronunciation Modeling of Loanwords for Korean ASR Using Phonological Knowledge and Syllable-based Segmentation
Hyuksu Ryu, Minsu Na, Minhwa Chung, Seoul National University (Korea)

**SP1-2.4** A Corpus-Based Analysis of Korean Segments Produced by Chinese Learners
Seung Hee Yang, Hyuksu Ryu, Minhwa Chung, Seoul National University (Korea)

**SP1-2.5** Automatic Assessment of Non-native Accent Degrees using Phonetic Level Posterior and Duration Features from Multiple Languages
Shushan Chen, Sun Yat-Sen University (China), Yiming Zhou, Zhejiang University (China), Ming Li, Sun Yat-sen University (China)

**SP1-2.6** Scalable I-vector Concatenation for PLDA based Language Identification System
Saad Irtza, Haris Bavattichalil, Vidhyasaharan Sethu, Eliathamby Ambikairajah, UNSW (Australia)

### SP1-4: Saturday, December 19, 14:00 - 15:45

**SP1-4**
- **Type:** Regular Session
- **Time:** Saturday, December 19, 14:00 - 15:45
- **Place:** Room Y304
- **Chair:** Cheng Cai, Northwest A&F University (China)

**SP1-4.1** Image Classification Using Pairwise Local Observations Based Naive Bayes Classifier
Shih-Chung Hsu, I-Chieh Chen, National Tsing Hua University (Taiwan), Chung-Ling Huang, Asia University (Taiwan)

**SP1-4.2** Chinese Opera Genre Classification Based on Multi-feature Fusion and Extreme Learning Machine
JianRong Wang, ChenLiang Wang, JianGuo Wei, JianWu Dang, Tianjin University (China)

**SP1-4.3** Weed Seeds Classification Based on PCANet Deep Learning Baseline
Xinshao Wang, Cheng Cai, Northwest A&F University (China)

**SP1-4.4** Document Classification with Spherical Word Vectors
Yiqiao Pan, Chao Xing, Dong Wang, Tsinghua University (China)

**SP1-4.5** Rotation-invariant Histograms of Oriented Gradients for Local Patch Robust Representation
Zhaojie Luo, Jinhui Chen, Tetsuya Takiguchi, Yasuo Ariki, Kobe University (Japan)

**SP1-4.6** Design of Oversampled Cosine-Sine Modulated Filter Banks for Directional Image Representation
Ryutarou Ogawa, Seisuke Kyochi, The University of Kitakyushu (Japan), Taizo Suzuki, University of Tsukuba, (Japan)
### SP1-5: Saturday December 19, 14:00 - 15:45

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<th>Multimedia Forensics and Security</th>
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<td>Bin Li, Shenzhen University (China)</td>
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**SP1-5.1**

GOP Based Automatic Detection of Object-based Forgery in Advanced Video  
Shunquan Tan, Shenzhen University (China), Shengda Chen, Sun Yat-sen University (China), Bin Li, Shenzhen University (China)

**SP1-5.2**

HIGH CAPACITY REVERSIBLE DATA HIDING BASED ON MATRIX CODING AND BITMAP COMPRESSION  
Lingling Wan, Fan Chen, Hongjie He, Southwest Jiaotong University (China)

**SP1-5.3**

Perceptual Image Hashing Using Block Truncation Coding and Local Binary Pattern  
Xueqin Chen, Chuan Qin, Ping Ji, University of Shanghai for Science and Technology (China)

**SP1-5.4**

A New Detector of LSB Matching Steganography Based On Likelihood Ratio Test for Multivariate Gaussian Covers  
Guangyuan Yang, Xiaolong Li, Peking University (China), Bin Li, Shenzhen University (China), Zongming Guo, Peking University (China)

**SP1-5.5**

Hybrid Dictionary Learning for JPEG Steganalysis  
Zhihao Xu, Yanqing Guo, Jun Guo, Xiangwei Kong, Dalian University of Technology (China)

**SP1-5.6**

Reversible Steganography: Data Hiding for Covert Storage  
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### SP1-6: Saturday December 19, 14:00 - 15:30

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Multilayer Image Disparity Estimation and Blending for Light Field Cameras  
Shih-Chang Chuang, Jian-Jiun Ding, Po-Jen Chen, National Taiwan University (Taiwan)

**SP1-6.2**

Horizontal Adaptive Disparity Estimation Scheme for Stereoscopic Images  
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**SP1-6.3**

An Efficient VLSI Architecture for Discrete Wavelet Transform  
Chih-Hsien Hsia, Chinese Culture University (Taiwan)

**SP1-6.4**

A Near-Duplicate Video Retrieval Method Based on Zernike Moment  
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Content-Based Image Retrieval Using Direct Binary Search Block Truncation Coding Features  
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SP1-7 Speech Retrieval
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Time: Saturday, December 19, 14:00 - 15:30
Place: Room Y512
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Hiromitsu Nishizaki, Naoki Sawada, University of Yamanashi (Japan)

SP1-7.2 On the study of very low-resource language keyword search
Van Tung Pham, Haihua Xu, Van Hai Do, Tze Yuang Chong, Xiong Xiao, Eng Siong Chng, Haizhou Li, Nanyang Technological University (Singapore)

SP1-7.3 Multilingual Exemplar-Based Acoustic Model for the NIST Open KWS 2015 Evaluation
Van Hai Do, Xiong Xiao, Haihua Xu, Eng Siong Chng, Nanyang Technological University (Singapore), Haizhou Li, Institute for Infocomm Research A*STAR (Singapore)

SP1-7.4 CALIBRATION OF WORD POSTERIOR ESTIMATION IN CONFUSION NETWORKS FOR KEYWORD SEARCH
Zhiqiang Lv, Meng Cai, Wei-Qiang Zhang, Jia Liu, Tsinghua University (China)

SP1-7.5 Rescoring by a Deep Neural Network for Spoken Term Detection
Ryota Konno, Kazunori Kojima, Iwate Prefectural University (Japan), Kazuyo Tanaka, University of Tsukuba (Japan), Shi-wook Lee, National Institute of Advanced Industrial Science and Technology (Japan), Yoshiaki Itoh, Iwate Prefectural University (Japan)

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SP2-1: Saturday, December 19, 16:00 - 17:30

SP2-1 Virtual Reality and 3D Image Processing
Type: Regular Session
Time: Saturday, December 19, 16:00 - 17:30
Place: Room Y301
Chairs: Yo-Sung Ho, Gwangju Institute of Science and Technology (Korea, The Republic of), Yui-Lam Chan, The Hong Kong Polytechnic University (Hong Kong)

SP2-1.1 Early Determination of Intra Mode and Segment-wise DC Coding for Depth Map Based on Hierarchical Coding Structure in 3D-HEVC
Hong-Bin Zhang, Sik-Ho Tsang, Yui-Lam Chan, The Hong Kong Polytechnic University (Hong Kong), Chang-Hong Fu, Wei-Min Su, Nanjing University of Science and Technology (China)

SP2-1.2 3D Shape Retrieval from a Photo Using Intrinsic Image
Shoki Tashiro, Masaki Aono, Toyohashi University of Technology (Japan)

SP2-1.3 Temporal Stereo Disparity Estimation with Graph Cuts
Eu-Tteum Baek, Yo-Sung Ho, Gwangju Institute of Science and Technology (Korea)

SP2-1.4 LITTLEHELPER: AN AUGMENTED REALITY GLASS APPLICATION TO ASSIST INDIVIDUALS WITH AUTISM IN JOB INTERVIEWS
Qingguo Xu, Sen-ching Samson Cheung, University of Kentucky (U.S.A.), Neelkamal Soares, Geisinger Health System (U.S.A.)

SP2-1.5 A Real-time Virtual Dressing System with RGB-D Camera
Mingliang Chen, Weiyao Lin, Shanghai Jiao Tong University (China), Bing Zhou, Zhengzhou University (China)
| SP2-2 | **Deep Learning for Speech Processing**  
**Type:** Regular Session  
**Time:** Saturday, December 19, 16:00 - 17:30  
**Place:** Room Y302  
**Chairs:** Kazumasa Yamamoto, Toyohashi University of Technology (Japan), Man-Wai Mak, The Hong Kong Polytechnic University (Hong Kong) |
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Zhili TAN, Man-Wai MAK, The Hong Kong Polytechnic University (Hong Kong) |
| SP2-2.2 | **Feature-Space Structural MAPLR with Regression Tree-based Multiple Transformation Matrices for DNN**  
Hiroki Kanagawa, Yuuki Tachioka, Mitsubishi Electric Corporation (Japan), Shinji Watanabe, Mitsubishi Electric Research Laboratories (U.S.A.), Jun Ishii, Mitsubishi Electric Corporation (Japan) |
| SP2-2.3 | **Deep Neural Network-Based Speech Recognition with Combination of Speaker-Class Models**  
Tetsuo Kosaka, Kazuki Konno, Masaharu Kato, Yamagata University (Japan) |
| SP2-2.4 | **Deep Neural Network based Acoustic Model Using Speaker-Class Information for Short Time Utterance**  
Hiroshi Seki, Kazumasa Yamamoto, Seiichi Nakagawa, Toyohashi University of Technology (Japan) |

| SP2-4 | **Image Analysis, Representation and Classification II**  
**Type:** Regular Session  
**Time:** Saturday, December 19, 16:00 - 17:30  
**Place:** Room Y304  
**Chairs:** Stephen Cox, University of East Anglia (United Kingdom), Ke Bin Jia, Beijing University of Technology (China) |
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Jie Lin, Institute for Infocomm Research, A*STAR (Singapore), Zhe Wang, Yitong Wang, Peking University (China), Vijay Chandrasekhar, Liyuan Li, Institute for Infocomm Research, A*STAR (Singapore) |
| SP2-4.2 | **The Main Lighting Direction Estimation for the Uniform Texture Images**  
Yujuan Sun, Qingtang Su, Xiaofeng Zhang, Lu Dong University (China) |
| SP2-4.3 | **Interactive Segmentation for Manga using Lossless Thinning and Coarse Labeling**  
Yuji Aramaki, Yusuke Matsui, Toshihiko Yamasaki, Kiyoharu Aizawa, The University of Tokyo (Japan) |
| SP2-4.4 | **Detection of Anomalous Events in a Tennis Game Using Multimodal Information**  
Qiang Huang, University of Edinburgh (United Kingdom), Stephen Cox, University of East Anglia (United Kingdom) |
| SP2-4.5 | **Orientation and Scale Invariant Binary Descriptor Based on Haar Wavelet**  
Meng Yao, Ke-Bin Jia, Beijing University of Technology (China), Wan-Chi Siu, The Hong Kong Polytechnic University (Hong Kong) |
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**SP2-7**

Classification by Acoustic and Audio Signals

Type: Regular Session

Time: Saturday, December 19, 16:00 - 17:30

Place: Room Y512

Chair: Jia-Ching Wang, National Central University (Taiwan)

**SP2-7.1**

Music Emotion Recognition Using Deep Gaussian Process

Sih-Huei Chen, Yuan-Shan Lee, Wen-Chi Hsieh, Jia-Ching Wang, National Central University (Taiwan)

**SP2-7.2**

A Novel Codebook Representation Method and Encoding Strategy For Bag-of-Words Based Acoustic Event Classification

Jia Dai, Chinese Academy of Sciences (China), Chongjia Ni, Shandong University of Finance and Economics (China), Wei Xue, Wenju Liu, Chinese Academy of Sciences, China (China)

**SP2-7.3**

An i-vector GPLDA System for Speech based Emotion Recognition

Kalani Wataraka Gamage, Vidhyasaharan Sethu, Phu Ngoc Le, Eliathamby Ambikairajah, UNSW (Australia)

**SP2-7.4**

Daily Activity Recognition Based on Acoustic Signals and Acceleration Signals Estimated with Gaussian Process

Masafumi Nishida, Nagoya University (Japan), Norihide Kitaoka, Tokushima University (Japan), Kazuya Takeda, Nagoya University (Japan)

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**Tutorials**

**Time:** Wednesday December 16, 09:00-12:20

**Place:** Room Y302

**Assisted Listening for headphones and hearing aids: Signal Processing Techniques**

**Speakers:** Woon-Seng Gan, Digital Signal Processing Lab, School of EEE, Nanyang Technological University, (Singapore)

Jianjun He, The Hong Kong Polytechnic University (Hong Kong)

**Abstract**

With the strong growth of the mobile devices and emerging virtual reality (VR) and augmented reality (AR) applications, headsets are becoming more and more preferable in personal listening due to its convenience and portability. Assistive listening (AL) devices like hearing aids have seen much advancement. Creating a natural and authentic listening experience is the common objective of these VR, AR, and AL applications. In this tutorial, we will present state-of-the-art audio and acoustic signal processing techniques to enhance the sound reproduction in headsets and hearing aids.

This tutorial starts with an introduction of the recent examples of audio applications in VR, AR, and AL. To ensure the tutorial is understandable to the novice audience, some background on spatial hearing fundamentals and different classes of spatial audio reproduction techniques will be briefly introduced. This is followed by an outline of the three key parts of this tutorial that focuses on binaural techniques, especially their connections.

In part I, we will address recent advances in rendering natural sound in headphones. Based on a source-medium-receiver model, we analyze the differences between headphone sound reproduction and natural listening, which lead to five categories of signal processing approaches that could be employed to reduce the gap between the two. The five categories are virtualization, sound scene decomposition, individualization, equalization, and head-tracking. At last, an integration of these techniques are discussed and illustrated with an exemplar system (a.k.a., 3D audio headphones) developed at our lab.

In part II, we will discuss natural augmented reality audio. Natural listening in augmented reality requires listener to be aware of surrounding acoustic scene. In augmented reality, virtual sound sources are superimposed with the real world such that listeners are able to connect with the augmented sound sources seamlessly. Three typical headset systems for augmented reality audio will be presented, including a natural augmented reality (NAR) headset developed at our lab. The NAR headset employs adaptive filtering techniques to adapt to the listener's specific responses, environmental characteristics, and compensate for the headphone response to achieve natural listening in real-time.

In part III, other aspects to augment human listening, i.e., reducing unwanted noise and enhance speech perception, will be discussed. We will present active noise control (ANC) techniques for headsets and discuss how to integrate ANC with sound playback. Moreover, noise reduction and speech enhancement in hearing aids will be presented, with a focus on the spatial information. Furthermore,
ANC can also be incorporated in hearing aids to further reduce the ambient noise.

In the concluding part of the tutorial, we will provide some demonstrations (video and apps) to illustrate some of the advancements in assisted listening and natural sound rendering in headphones, and highlight new trends of signal processing approaches for natural and augmented listening in headsets.

This tutorial is an extension of the APSIPA 2014 Plenary Talk and also includes new work reported in recent publications published in the IEEE Signal Processing Magazine, March 2015 issue on Signal Processing Techniques for Assisted Listening.

Biographies

Woon-Seng Gan received his BEng (1st Class Hons) and PhD degrees, both in Electrical and Electronic Engineering from the University of Strathclyde, UK in 1989 and 1993, respectively. He is currently an Associate Professor and the Head of Information Engineering Division, School of Electrical and Electronic Engineering in Nanyang Technological University. His research interests span a wide and related areas of active noise control, adaptive signal processing, directional sound system, spatial sound processing, and real-time embedded systems.


Professor Gan is currently a Fellow of the Audio Engineering Society (AES), a Fellow of the Institute of Engineering and Technology (IET), a Senior Member of the IEEE, and a Professional Engineer of Singapore. In 2012, he has been the Series Editor of the new SpringerBriefs in Signal Processing. He is also an Associate Technical Editor of the Journal of Audio Engineering Society (JAES); Associate Editor of the IEEE Transactions on Audio, Speech, and Language Processing (ASLP); Editorial member of the Asia Pacific Signal and Information Processing Association (APSIPA) Transactions on Signal and Information Processing; and Associate Editor of the EURASIP Journal on Audio, Speech and Music Processing. He is a technical committee member of the Design and Implementation of Signal Processing Systems (DiSPS), and the Industry DSP Technology (IDSP) standing committee of the IEEE Signal Processing Society. Professor Gan is currently a member of the Board of Governor of the APSIPA (2013-2014) and also an APSIPA Distinguished Lecturer (2014-15).

Jianjun He received his B.ENG. degree in automation from Nanjing University of Posts and Telecommunications, China in 2011 and is currently pursuing his Ph.D. degree in electrical and electronic engineering at Nanyang Technological University (NTU), Singapore. In 2011, he was working as a general assistant in Nanjing International Center of Entrepreneurs (NICE), building platforms for start-ups from overseas Chinese scholars in Jiangning District, Nanjing, China. Since 2015, he has been a project officer with School of Electrical and Electronic Engineering in NTU.

His Ph.D. work has been published in IEEE Signal Processing Magazine, IEEE/ACM Transactions on Audio, Speech, and Language Processing (TASLP), IEEE Signal Processing Letters, and ICASSP, etc. He has been an active reviewer for IEEE TASLP, Journal of Audio Engineering Society, IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences, and IET Signal Processing, etc. Aiming at improving humans’ listening, his research interests include audio and acoustic signal processing, 3D audio (spatial audio), psychoacoustics, active noise control, source separation, and emerging audio and speech applications. Currently, He is a student member of IEEE and Signal Processing Society (SPS), a member of APSIPA, and an affiliate member of IEEE SPS audio and acoustic technical committee.
**Introduction to Deep Learning and its applications in Computer Vision**

*Speakers:* Wanli Ouyang, Xiaogang Wang, Department of Electronic Engineering, The Chinese University of Hong Kong (Hong Kong)

**Abstract**

Deep learning has become a major breakthrough in artificial intelligence and achieved amazing success on solving grand challenges in many fields including computer vision. Its success benefits from big training data and super parallel computational power emerging in recent years, as well as advanced model design and training strategies. In this talk, I will try to introduce deep learning and explain the magic behind it with laymen terms. Through concrete examples of computer vision applications, I will illustrate four key points about deep learning. (1) Different than traditional pattern recognition systems, which heavily rely on manually designed features, deep learning automatically learns hierarchical feature representations from data and disentangles hidden factors of input data through multi-level nonlinear mappings. (2) Different than existing pattern recognition systems which sequentially design or training their key components, deep learning is able to jointly optimize all the components and create synergy through close interactions among them. (3) While most machine learning tools can be approximated with neural networks with shallow structures, for some tasks, the expressive power of deep models increases exponentially as their architectures go deep. (4) Benefiting the large learning capacity of deep models, we also recast some classical computer vision challenges as high-dimensional data transform problems and solve them from new perspectives. The introduced applications of deep learning in computer vision will focus on object detection, segmentation, and recognition. Some open questions related to deep learning will also be discussed in the end.

**Biographies**

**Wanli Ouyang** received the PhD degree in the Department of Electronic Engineering, The Chinese University of Hong Kong, in which he is now a Research Assistant Professor. His research interests include image processing, deep learning, computer vision, and pattern recognition. He is a member of the IEEE. He served as the program chair in ACCV 2014 Workshop on deep learning on visual data. He is in the program committee for many prestigious conferences such as CVPR, ICCV, ECCV.

**Xiaogang Wang** received his Bachelor degree in Electrical Engineering and Information Science from the Special Class of Gifted Young at the University of Science and Technology of China in 2001, M. Phil. degree in Information Engineering from the Chinese University of Hong Kong in 2004, and PhD degree in Computer Science from Massachusetts Institute of Technology in 2009. He is an assistant professor in the Department of Electronic Engineering at the Chinese University of Hong Kong since August 2009. He received the Outstanding Young Researcher in Automatic Human Behaviour Analysis Award in 2011, Hong Kong RGC Early Career Award in 2012, and Young Researcher Award of the Chinese University of Hong Kong. He is the associate editor of the Image and Visual Computing Journal. He was the area chair of ICCV 2011, ECCV 2014 and ACCV 2014. His research interests include computer vision, deep learning, crowd video surveillance, object detection, and face recognition.
Graph Signal Processing for Image Compression & Restoration

Speakers: Prof. Gene Cheung, National Institute of Informatics, Tokyo, Japan
Prof. Xianming Liu, Department of Computer Science, Harbin Institute of Technology (HIT), Harbin, China

Abstract
Graph signal processing (GSP) is the study of discrete signals that live on structured data kernels described by graphs. By allowing a more flexible graphical description of the underlying data kernel, GSP can be viewed as a generalization of traditional signal processing techniques that target signals in regular kernels—e.g., an audio clip sampled periodically in time—while still providing a frequency domain interpretation of the observed signals. Though an image is a regularly sampled signal on a 2D grid, one can nonetheless consider an image patch as a graph-signal on a sparsely connected graph defined signal-dependently. Recent GSP works have shown that such approach can lead to a compact signal representation in the graph Fourier domain, resulting in noticeable gain in image compression and restoration. Specifically, in this tutorial we will overview recent advances in GSP as applied to image processing. We will first describe how a Graph Fourier Transform (GFT)—a generalization of known transforms like Discrete Fourier Transform (DFT) and Discrete Cosine Transform (DCT)—can be defined in a signal-dependent manner and leads to compression gain over traditional DCT for piecewise smooth images, outperforming H.264 intra by up to 6.8dB. We will then describe how suitable graph-signal smoothness priors can be constructed for a graph-based image denoising algorithm, outperforming state-of-the-art BM3D by up to 2dB for piecewise smooth images. Similar graph-signal smoothness priors can also be used for other image restoration problems, such as bit-depth enhancement of low-bit-depth images for HDR displays and de-quantization of compressed JPEG images. Finally, we will discuss how the graph Laplacian can be used as a contrast-enhancement booster for images captured in poorly lit environments that are also corrupted with noise.

Biographies
Gene Cheung received the B.S. degree in electrical engineering from Cornell University in 1995, and the M.S. and Ph.D. degrees in electrical engineering and computer science from the University of California, Berkeley, in 1998 and 2000, respectively.


Xianming Liu is an Associate Professor with the Department of Computer Science, Harbin Institute of Technology (HIT), Harbin, China. He also works as a project researcher at National Institute of Informatics (NII), Tokyo, Japan. He received the B.S., M.S., and Ph.D degrees in computer science from HIT, in 2006, 2008 and 2012, respectively. In 2007, he joined the Joint Research and Development Lab (JDL), Chinese Academy of Sciences, Beijing, as a research assistant. From 2009 to 2012, he was with National Engineering Lab for Video Technology, Peking University, Beijing, as a research assistant. In 2011, he spent half a year at the Department of Electrical and Computer Engineering, McMaster University, Canada, as a visiting student, where he then worked as a post-doctoral fellow from December 2012 to December 2013. He has published over 30 international conference and journal publications, including top IEEE journals, such as TIP, TCSVT, TIFS; and top conferences, such as CVPR, IJCAI and DCC.
Abstract
Automatic speaker verification (ASV) offers a low-cost and flexible biometric solution to person authentication. While the reliability of ASV systems is now considered sufficient to support mass-market adoption, there are concerns that the technology is vulnerable to spoofing, also referred to as presentation attacks. Spoofing refers to an attack whereby a fraudster attempts to manipulate a biometric system by masquerading as another, enrolled person. On the other hand, speaker adaptation in speech synthesis and voice conversion techniques attempt to mimic a target speaker’s voice automatically, and hence present a genuine threat to ASV systems.

The research community has responded to speech synthesis and voice conversion spoofing attacks with dedicated countermeasures which aim to detect and deflect such attacks. Even if the literature shows that they can be effective, the problem is far from being solved; ASV systems remain vulnerable to spoofing, and a deeper understanding of speaker verification, speech synthesis and voice conversion will be fundamental to the pursuit of spoofing-robust speaker verification.

While the level of interest is growing, the level of effort to develop spoofing countermeasures for ASV is lagging behind that for other biometric modalities. What’s more, the vulnerabilities of ASV to spoofing are now well acknowledged. A tutorial on spoofing and anti-spoofing from the combined perspective of speaker verification, speech synthesis and voice conversion is much needed. The tutorial will attract, not only members of the growing anti-spoofing research community, but also the broader community of general practitioners in speaker verification, speech synthesis and voice conversion.

The speakers have led the research community in anti-spoofing for ASV since 2013, have jointly authored a growing number of conference papers, book chapters and the latest survey paper published in Speech Communications in 2015. Between them they have organised two special sessions and one evaluation/challenge (http://www.spoofingchallenge.org/) on the same topic. The experience gained through these activities is be the foundation of this tutorial proposal for APSIPA ASC 2015.

Tutorials

Time: Wednesday December 16, 14:00-17:20
Place: Room Y304

Spoofing and Anti-Spoofing: A Shared View of Speaker Verification, Speech Synthesis and Voice Conversion

Speakers: Zhizheng Wu, University of Edinburgh, UK
Tomi Kinnunen, University of Eastern Finland, Finland
Nicholas Evans, EURECOM, France
Junichi Yamagishi, University of Edinburgh, UK

Biographies

Zhizheng Wu (University of Edinburgh, UK, zhizheng.wu@ed.ac.uk) is a research fellow in the Centre for Speech Technology Research (CSTR) at the University of Edinburgh since 2014, and he received the Ph.D. degree from Nanyang Technological University (NTU), Singapore. From 2007 to 2009, he was with Microsoft Research Asia as an intern researcher. He received the best paper award in APSIPA ASC 2012. His research interests include speech synthesis, voice conversion, spoofing and anti-spoofing, and speaker verification.

Tomi Kinnunen (University of Eastern Finland, Finland, tomi.kinnunen@uef.fi) received the Ph.D. degree in computer science from the University of Eastern Finland (UEF, formerly Univ. of Joensuu) in 2005. From 2005 to 2007, he was an associate scientist at the Institute for Infocom Research (I2R) in Singapore. Since 2007, he has been with UEF. In 2010-2012, his research was funded by the Academy of Finland in a post-doctoral project focusing on speaker recognition. He is the principal investigator of a 4-year Academy of Finland project focusing on speaker recognition, voice conversion and anti-spoofing techniques. Dr. Kinnunen's team is a regular participant to the NIST speaker recognition evaluations. He was the chair of Odyssey 2014: The Speaker and Language Recognition Workshop. He is a partner in a recently kicked-off, large Horizon 2020 funded “OCTAVE” project (octave-project.eu) that trials technology transfer of speaker verification technology to both logical and physical access control scenarios, involving integration of practical spoofing countermeasures.

Nicholas Evans (EURECOM, France, evans@eurecom.fr) is an Assistant Professor at EURECOM where he heads research in Speech and Audio Processing. In addition to other interests in speaker diarization, speech signal processing and multimodal biometrics, and in the scope of the EU FP7 ICT TABULA RASA project, he has studied the threat of spoofing to automatic speaker verification systems and developed new spoofing countermeasures. He serves as Lead Guest Editor for the IEEE T-IFS special issue on Biometric Spoofing and Countermeasures and the IEEE SPM special issue on Biometric Security and Privacy and is an Associate Editor of the EURASIP Journal on Audio, Speech, and Music Processing. He was general co-chair for IWAENC 2014 and will be technical co-chair for EUSIPCO 2015. He also contributed to the organisation of the TABULA RASA Spoofing Challenge held in conjunction with ICB 2013.

Junichi Yamagishi (University of Edinburgh, UK, jyamagis@inf.ed.ac.uk) is a senior research fellow and holds an EPSRC Career Acceleration Fellowship in the Centre for Speech Technology Research (CSTR) at the University of Edinburgh. He was awarded a Ph.D. by Tokyo Institute of Technology in 2006 for a thesis that pioneered speaker-adaptive speech synthesis and was awarded the Tejima Prize as the best Ph.D. thesis of Tokyo Institute of Technology in 2007. Since 2006, he has been in CSTR and has authored and co-authored about
100 refereed papers in international journals and conferences. His recent important work includes spoofing against speaker-verification systems using the adaptive speech synthesis and the development of its countermeasures. He is a scientific committee and area coordinator for Interspeech 2012.

**Recent Advances in Energy Harvesting Communications**

**Speakers:** M.L. Willy Ku, Yan Chen, K.J. Ray Liu  
University of Maryland, College Park, U.S.A.

**Abstract**

Energy harvesting from ambient energy sources can potentially reduce the dependence on the supply of grid or battery energy, providing many attractive benefits to the environment and deployment. However, unlike the conventional stable energy, the intermittent and random nature of the renewable energy makes it challenging in the realization of energy harvesting transmission schemes. Extensive research studies have been carried out in recent years to address this inherent challenge from several aspects. In this talk, we present an overview of the recent developments in energy harvesting communications.

**Biographies**

**K. J. Ray Liu** was named a Distinguished Scholar-Teacher of University of Maryland, College Park, in 2007, where he is Christine Kim Eminent Professor of Information Technology. He leads the Maryland Signals and Information Group conducting research encompassing broad areas of information and communications technology with recent focus on future wireless technologies, network science, and information forensics and security.

Dr. Liu was a recipient of the 2016 IEEE Leon K. Kirchmayer Technical Field Award on graduate teaching and mentoring, IEEE Signal Processing Society 2014 Society Award, and IEEE Signal Processing Society 2009 Technical Achievement Award. Recognized by Thomson Reuters as a Highly Cited Researcher, he is a Fellow of IEEE and AAAS.

Dr. Liu is a BoG member of APSIPA and a Director-Elect of IEEE Board of Director. He was President of IEEE Signal Processing Society, where he has served as Vice President - Publications and Board of Governor. He has also served as the Editor-in-Chief of IEEE Signal Processing Magazine.

He also received teaching and research recognitions from University of Maryland including university-level Invention of the Year Award; and college-level Poole and Kent Senior Faculty Teaching Award, Outstanding Faculty Research Award, and Outstanding Faculty Service Award, all from A. James Clark School of Engineering.
Perceptual Coding: Hype or Hope?

Speaker: C.-C. Jay Kuo, University of Southern California, U.S.A.

Abstract
There has been a significant progress in image/video coding in the last 50 years, and many visual coding standards have been established, including JPEG, MPEG-1, MPEG-2, H.264/AVC and H.265, in the last three decades. The visual coding research field has reached a mature stage, and the question “is there anything left for image/video coding?” arises in recent years. One emerging R&D topic is “perceptual coding”. That is, we may leverage the characteristics of the human visual system (HVS) to achieve a higher coding gain. For example, we may change the traditional quality/distortion measure (i.e., PSNR/MSE) to a new perceptual quality/distortion measure and take visual saliency and spatial-temporal masking effects into account. Recent developments in this area will be reviewed. Then, one may ask furthermore “Is it sufficient to keep visual coding research vibrant and prosperous for another decade with such a modification?” It is probably not. On the other hand, we may formulate the coding problem dramatically differently from the past - making it fundamentally different with an HVS centric approach. The notion of Just Noticeable Differences (JND) will be introduced in this context, and numerous new R&D opportunities will arise accordingly.

Biography
Dr. C.-C. Jay Kuo received his Ph.D. degree from the Massachusetts Institute of Technology in 1987. He is now with the University of Southern California (USC) as Director of the Media Communications Laboratory and Dean’s Professor in Electrical Engineering-Systems. His research interests are in the areas of digital media processing, compression, communication and networking technologies. Dr. Kuo was the Editor-in-Chief for the IEEE Trans. on Information Forensics and Security in 2012-2014. He was the Editor-in-Chief for the Journal of Visual Communication and Image Representation in 1997-2011, and served as Editor for 10 other international journals. Dr. Kuo received the National Science Foundation Young Investigator Award (NYI) and Presidential Faculty Fellow (PFF) Award in 1992 and 1993, respectively. He was an IEEE Signal Processing Society Distinguished Lecturer in 2006, and the recipient of the Electronic Imaging Scientist of the Year Award in 2010 and the holder of the 2010-2011 Fulbright-Nokia Distinguished Chair in Information and Communications Technologies. Dr. Kuo is a Fellow of AAAS, IEEE and SPIE. Dr. Kuo has guided 126 students to their Ph.D. degrees and supervised 23 postdoctoral research fellows. He is a co-author of about 230 journal papers, 870 conference papers and 13 books.

Learning Approach on Image Interpolation and Super-resolution

Speaker: Wan-Chi Siu, The Hong Kong Polytechnic University, Hong Kong

Abstract
Image interpolation and super-resolution are important topics in image and video signal processing. Their applications include ultra-HDTV, image coding, image resizing, image manipulation, face recognition and surveillance. The objective is to increase the resolution of an image/video through up-sampling, deblurring, and/or denoising. However the definitions of interpolation and super-resolution are very confusing, even among researchers. In this talk we start to clarify, as fast as possible, the definitions of interpolation and super-resolution. This is followed by a highlight of our most recent learning approach for image interpolation and super-resolution. This is done via random forest and tree structures, which is the fastest approach with the quality comparable to or even better than those obtained from deep-learning methods; hence represents one of the state-of-the-art approaches on image/video interpolation and super-resolution.

Biographies
Wan-Chi Siu, PhD DIC, FIEEE, received the PhD degree from Imperial College, London, in 1984, and is Fellow of the IEEE. He joined the Hong Kong Polytechnic University as a Lecturer in 1980 and has been Chair Professor since 1992. He was Head of Department (EIE) and subsequently Dean of Engineering Faculty between 1994 and 2002. Professor Siu is an expert in digital signal processing, fast algorithms, video coding, 3D videos, pattern recognition and visual surveillance. He has published over 490 research papers, and has 8 recent patents. Prof. Siu was an independent non-executive director of a listed video surveillance company in Hong Kong for over 15 years. His works are well received by peers with high citations, and have been ported into hi-tech industrial uses. Prof. Siu was a Vice President of the IEEE Signal Processing (SP) Society, Chairman of Conference Board and a core member of the Board of Governors (2012-2014). He initiated (together with other BoG members) and implemented successfully new conference series for the IEEE SP Society, and set up criteria and typical procedures for quality conference management. Recently, he has also been elected as the President-Elect (2015-2016) of the Asia-Pacific Signal and Information Processing Association (APSIPA). Prof. Siu is/was subject editor, guest Editor and associate editor of a number of IEEE and other journals, such as Electronics Letters, IEEE Transactions on Circuits & Systems for Video Technology, IEEE Transactions on Image Processing, and IEEE Transactions on Circuits and Systems. He is a very popular lecturing staff member within the University, while outside the University he has been a keynote speaker of over 12 international/national conferences in the recent 10 years. He received many awards, such as Distinguished Presenter Award, the Best Teacher Award, the Best Paper Award and IEEE Third Millennium Medal. He took up the leading role in organizing over 20 international conferences in Hong Kong, mainland China and overseas in these 30 years with high commendation, including say for example the prestigious conferences MMSP’2008 in Australia as a Co-General Chair, ICIP’2010 as General Chair, ICASSP’2003 as General Chair and ISCAS’1997 as TPC Chair, where the last three are IEEE Society-sponsored flagship international conferences. In 1992/3, he chaired the First Engineering/IT Panel of the Research Assessment Exercise (RAE) and initiated to set up a set of objective indicators to assess the basic research quality of academia, which gives substantial impact to the research culture in Hong Kong for the recent 22 years.
Virtual-View Based 3D Video Composition

Speaker: Hsueh-Ming HANG, National Chiao Tung University, Taiwan

Abstract
One interesting next-generation 3D research direction is the so-called virtual-view -point (or free-viewpoint) video system. It is also an on-going standardization item in the international ITU/MPEG Standards. Typically, a densely arranged camera array is used to acquire input images and a number of virtual view pictures are synthesized at the receiver using the depth-image based rendering (DIBR) technique. An interesting application of virtual-view system is 3D scene composition. It is an extension of the traditional chroma key technique but it now tries to merge two sets of 3D video scenes into one consistent 3D scene. However, these two sets of RGB-D sequences are taken independently by two different sets of cameras. Thus, the camera orientations and movements of these cameras may not match each other. We will discuss the challenges of this topic and summarize our progress on solving them.

Biography
Hsueh-Ming Hang received the B.S. and M.S. degrees from National Chiao Tung University, Hsinchu, Taiwan, in 1978 and 1980, respectively, and Ph.D. in Electrical Engineering from Rensselaer Polytechnic Institute, Troy, NY, in 1984. From 1984 to 1991, he was with AT&T Bell Laboratories, Holmdel, NJ, and then he joined the Electronics Engineering Department of National Chiao Tung University (NCTU), Hsinchu, Taiwan, in December 1991. From 2006 to 2009, he took a leave from NCTU and was appointed as Dean of the EECS College at National Taipei University of Technology (NTUT). He is currently the Dean of the ECE College, NCTU. He has been actively involved in the international MPEG standards since 1984 and his current research interests include multimedia compression, image/signal processing algorithms and architectures, and multimedia communication systems.

Dr. Hang holds 13 patents (Taiwan, US and Japan) and has published over 190 technical papers related to image compression, signal processing, and video codec architecture. He was an associate editor (AE) of the IEEE Transactions on Image Processing (1992-1994, 2008-2012) and the IEEE Transactions on Circuits and Systems for Video Technology (1997-1999). He is a co-editor and contributor of the Handbook of Visual Communications published by Academic Press in 1995. He was a Board Member of the Asia-Pacific Signal and Information Processing Association (APSIPA) (2013-2014) and currently an IEEE Circuits and Systems Society Distinguished Lecturer (2014-2015). He is a recipient of the IEEE Third Millennium Medal and is a Fellow of IEEE and IET and a member of Sigma Xi.

From Algorithm/Architecture Co-Exploration to Internet of Things

Speaker: Gwo Giun (Chris) Lee, National Cheng Kung University, Taiwan

Abstract
NIKLAUS EMIL WIRTH introduced the innovative idea that Programming = Algorithm + Data Structure. Inspired by this, the current talk advances the idea to the next level by stating that Design = Algorithm + Architecture. With concurrent exploration of both algorithm and architecture entitled Algorithm/Architecture Co-exploration (AAC), this methodology introduces a leading paradigm shift in advanced system design including cloud computing and Internet of Things.

As computing becomes exceedingly demanding and data becomes increasingly bigger, efficient parallel and flexible reconfigurable processing are crucial in the design of signal processing systems. Hence the analysis of algorithms for potential computing in parallel is crucial. AAC presents a technique which systematically lays out the full spectrum of potential parallel processing components eigen-decomposed into possible data granularities. With data dependency minimization, this spectrum of independent graph components is resolved from a particular data granularity into lower and mixed granularities within the design space. This makes possible the study of potentials for homogeneous or heterogeneous parallelization at different granularities as opposed to conventional systolic array for homogeneous designs at single fixed granularity with possible extensions to distributed computing on cloud platforms. Because AAC was targeted for SoC systems with versatile platforms, the scope of system is extensible to systems connected via signals in conveying information thus forming Internet of Things (IoT). This introduces a fundamental framework for general system design already with major impact to SoC systems and has been broadened to cloud computing, Deep Learning in machine learning, and even genomic and proteomic signal processing systems in bioinformatics.

Biography
Gwo Giun (Chris) Lee (S’91-M’97-SM’07) received his B.S. degree in Electrical Engineering from National Taiwan University and both his M.S. and Ph.D. degrees in Electrical Engineering from University of Massachusetts. Dr. Lee has held several technical and managerial positions in the industry including System Architect in former Philips Semiconductors, USA, DSP Architect in Micrel Semiconductors, USA, and Director of Quanta Research Institute, Taiwan before joining the faculty team of the Department of Electrical Engineering in National Cheng Kung University (NCKU) in Tainan, Taiwan where he established the Media SoC Laboratory. He was also a visiting Professor at “Swiss Federal Institute of Technology” (EPFL), Switzerland during 2007. Dr. Lee has authored more than 200 technical papers and is currently a member of the ISO/IEC MPEG standardization committee and was also the chief editor for the Reconfigurable Video Coding (RVC) Ad Hoc group. He was the Chair for the Complexity Analysis Ad HoC Group of ISO/
IEC ITU JVT-3 in 3D Video Coding. Dr. Lee also serves as the Associate Editor for both IEEE Transactions on Circuits and Systems for Video Technology from 2009 till 2013 and Journal of Signal Processing Systems since 2010.

He received the Best Associate Editor’s Award for IEEE Transactions on Circuits and Systems for Video Technology in 2010 and the Best Paper Award for the BioCAS track in ISCAS 2012. Dr. Lee was also the Guest Editor for IEEE TCSVT’s November, 2009 special issue on “Algorithm/Architecture Co-Exploration for Visual Computing on Emergent Platforms”. He is the Chair of the technical committee for “Visual Signal Processing & Communications” track and member of “Multimedia Systems Application” track for IEEE International Symposium on Circuits and Systems (ISCAS). Dr. Lee also serves as the technical committee member for both the Digital Implementation of Signal Processing Systems (DISPS) and the Industry Digital Signal Processing (IDSP) committees for IEEE Signal Processing Society and Circuits and Systems Society. Furthermore, he is currently the Chair of the Signal Processing Systems Track in Asia Pacific Signal and Information Processing Association (APSIPA). His research interests are focused on intelligent and biomedical algorithm, architecture, VLSI/SoC design, and Algorithm/Architecture Co-Exploration (AAC) for signal and information processing systems including cloud computing and Internet-of-Things.

A MIMO-OFDM System for High-Quality Video Communication

Speaker: Yoshikazu Miyanaga, Hokkaido University, Japan

Abstract

Currently, sophisticated wireless technologies have enabled high-speed data transmission in home and personal networks. As a wireless communication standard, IEEE802.11ac based wireless LAN supports the maximum throughput of 1.5 Gbps at a 40-MHz frequency band width (BW), 3.0 Gbps at 80-MHz BW and 6.0 Gbps at 160-MHz BW by using a multiple-input and multiple-out (MIMO) stream technique with orthogonal frequency division multiplexing (OFDM).

This high throughput can be in particular expected for the use of high quality video wireless communications. In this talk, new wireless systems “over 1G” bps throughput, “over 80MHz” bandwidth and “less than 6GHz” carrier are introduced. In addition, some results in the field experiments are introduced when such high speed wireless systems are applied for high quality video transmission. Our developed system has achieved the data rate of 3 Gbps by use of an 80-MHz baseband bandwidth and a 8 x 8 MIMO scheme. This talk describes the VLSI implementation of the 8 x 8 MIMO-OFDM system. A low-latency and the optimum pipelined architecture are employed for all processing blocks to provide the real-time operations on OFDM modulation and MIMO detection. The proposed architecture also realizes low power consumption. This system has been applied for High-Quality Video communication. With some of results on field experiments, the system performance for video communications is described.

Biography

Yoshikazu Miyanaga is the dean and a professor of Graduate School of Information Science and Technology, Hokkaido University. His research interests are in the areas of speech signal processing, wireless communications and low-power consumption VLSI design. He is an associate editor of Journal of Signal Processing, RISP Japan (2005-present). He was President-elect, IEICE Engineering Science (ES) Society (2014-2015) and currently President (2015-present). He is a fellow member of IEICE. He was a vice-President (2009-2013), Asia-Pacific Signal and Information Processing Association (APSIPA) and now a member of the APSIPA advisory committee. He was a distinguished lecture (DL) of IEEE CAS Society (2010-2011), an associate editor of IEEE CAS Transaction on TCAS-II (2011-2013) and he was a Board of Governor (BoG) of IEEE CAS Society (2011-2013).
Transfer Learning for Speech and Language Processing

Speakers: Dong Wang, Thomas Fang Zheng, Tsinghua University, China

Abstract
Transfer learning is a vital technique that generalizes models trained for one setting or task to other settings or tasks. For example in speech recognition, an acoustic model trained for one language can be used to recognize speech in another language, with little or no re-training data. Transfer learning is closely related to multi-task learning (cross-lingual vs. multilingual), and is traditionally studied in the name of ‘model adaptation’. Recent advance in deep learning shows that transfer learning becomes much easier and more effective with high-level abstract features learned by deep models, and the ‘transfer’ can be conducted not only between data distributions and data types, but also between model structures (e.g., shallow net and deep net) or even model types (e.g., Bayesian model and neural model). This review paper summarizes some recent prominent research towards this direction, particularly for speech and language processing. We also report some results from our group and highlight the potential of this very interesting research field.

Biography
Dr. Dong Wang received the B.Sc. and M.Sc. degrees in computer science from Tsinghua University in 1999 and 2002. He then joined Oracle China during 2002-2004 and IBM China during 2004-2006. He joined CSTR, University of Edinburgh, in 2006 as a Marie Curie Research Fellow, where he received the PhD degree in 2010. From 2010 to 2011, he was with EURECOM as a Postdoctoral Fellow, and from 2011 to 2012, was a Senior Research Scientist with Nuance. He is now an Assistant Professor with Tsinghua University, Beijing, China. Dr. Wang works on speech processing, language processing and finance signal processing. The collaborative work with several commercial partners leads to the open Lingyun AI cloud service used by millions of people every day.

Signal and Information Processing Applications for the Smart Grid

Speaker: Anthony Kuh, University of Hawaii, U.S.A.

Abstract
This talk discusses using signal processing to assist in processing of information for the smart grid. This consists of getting information about the electrical grid and environment via sensor networks, interpreting information received via signal processing and machine learning, and then using the information to make intelligent decisions about the grid using control and optimization algorithms. The focus is on the electrical grid beyond the last substation, the distribution grid. For the smart distribution grid there is an increasing amount of distributed renewable energy sources and possible distributed storage. This necessitates gathering more information about the electrical grid, environment data, and building energy usage. With this information we can forecast distributed renewable energy sources and develop algorithms for distributed state information. We can then develop demand response algorithms to control loads (e.g. appliances, thermostats, air conditioners, hot water heaters). While this talk is an overview talk we discuss some details of our research efforts in these areas.

Biography
Anthony Kuh received his B.S. in Electrical Engineering and Computer Science at the University of California, Berkeley in 1979, an M.S. in Electrical Engineering from Stanford University in 1980, and a Ph.D. in Electrical Engineering from Princeton University in 1987. Dr. Kuh previously worked at AT&T Bell Laboratories and has been on the faculty in Electrical Engineering at the University of Hawai‘i since 1986. He is currently a Professor in the Department and is also currently serving as director of the interdisciplinary renewable energy and island sustainability (REIS) group. Previously, he served as Department Chair of Electrical Engineering. Dr. Kuh’s research is in the area of neural networks and machine learning, adaptive signal processing, sensor networks, communication networks, and renewable energy and smart grid applications.

Dr. Kuh won a National Science Foundation Presidential Young Investigator Award and is an IEEE Fellow. He was also a recipient of the Boeing A. D. Welliver Fellowship and received a Distinguished Fulbright Scholar’s Award working at Imperial College in London. Dr. Kuh was an Associate Editor for the IEEE Transactions on Circuits and Systems, served on the IEEE Neural Networks Administrative Committee, served on the IEEE Neural Networks for Signal Processing Committee, and was a Distinguished Lecturer for the IEEE Circuits and Systems Society. Dr. Kuh co-chaired the 1993 International Symposium on Nonlinear Theory and Its Applications (NOLTA) and served as the technical co-chair for the 2007 IEEE ICASSP both held in Honolulu. He was serving as the IEEE Signal Processing Society Regions 1-6 Director at Large (2013-2014). He is currently on the Board of Governors of the Asia Pacific Signal and Information Processing Association, and as a senior editor of the IEEE Journal of Selected Topics in Signal Processing.
Sparse Adaptive Filters -an Overview and Some Emerging Trends

Speaker: Mrityunjoy Chakraborty, Indian Institute of Technology, Kharagpur, India

Abstract
In practice, one often encounters systems that have a sparse impulse response (IR), with the degree of sparseness varying over time. Examples of such systems include network echo channels in voice and data communication, wireless multipath channels in mobile communication, echo channels in HDTV, acoustic channels in underwater communication etc. The a priori information about sparseness of the system IR, if exploited properly, can significantly improve the identification performance of the algorithm deployed to identify it. In recent years, several sparse adaptive filters have been proposed that cleverly incorporate the a priori knowledge about sparseness of the system in the coefficient adaptation relations and thus perform better. The first and foremost in this category is the proportionate normalized LMS (PNLMS) algorithm and its variants like the improved PNLMS (IPNLMS) and the ?-law PNLMS (MPNLMS). In the PNLMS category of algorithms, the step size for each coefficient is made proportional to the magnitude of the corresponding coefficient update, thereby making it large for active taps (leading to faster rate of convergence initially) and small for inactive taps (leading to lesser steady state excess mean square error (EMSE)). Apart from the PNLMS family, another powerful class of sparse adaptive filters has come up in recent years, inspired by the recent advent of compressive sensing in general and LASSO in particular. The primary development in this is the so-called zero attracting LMS (ZA-LMS) algorithm, obtained by adding a norm penalty (of the filter coefficient vector) to the LMS cost function. Minimization of the cost function introduces certain zero attractors in the weight update formula which pull the coefficient updates towards zero. The ZA-LMS was later modified to reweighted zero attracting LMS (RZA-LMS) where the shrinkage is restricted only to the inactive taps. The ZA-LMS and the RZA-LMS algorithms offer lesser steady state EMSE as compared to the PNLMS family while enjoying a convergence rate that is reasonably good though not as high as that of the PNLMS. In addition to the PNLMs family and the ZA-based algorithms, there have been several other approaches also to realize a sparse adaptive filter, notably, the partial update LMS, convex combination of adaptive filters etc. Further, sparse adaptive filters have been used as nodes in a distributed network deployed to identify the unknown sparse system and diffusion strategies have been devised for sharing of information within the neighborhood of each node, resulting in refined estimates.

The purpose of this talk is to present the basics of some of the major recent developments in the context of sparse adaptive filters. No background knowledge in this area will be assumed though some familiarity with basic adaptive filtering will be helpful. It is expected that participants will gain some useful input from this talk, enabling them to pursue further studies in this area in future.

Biography
Mrityunjoy Chakraborty obtained Bachelor of Engg. from Jadavpur university, Calcutta, Master of Technology from IIT, Kanpur and Ph.D. from IIT, Delhi. He joined IIT, Kharagpur as a faculty member in 1994, where he currently holds the position of a professor in Electronics and Electrical Communication Engg. The teaching and research interests of Prof. Chakraborty are in Digital and Adaptive Signal Processing, VLSI Signal Processing, Linear Algebra and Compressive Sensing. In these areas, Prof. Chakraborty has supervised several graduate theses, carried out independent research and has several well cited publications.

Prof. Chakraborty has been an Associate Editor of the IEEE Transactions on Circuits and Systems, part I (2004-2007, 2010-2012) and part II (2008-2009), apart from being an elected member (also currently the chair elect) of the DSP Technical Committee (TC) of the IEEE Circuits and Systems Society, a guest editor of the EURASIP JASP (special issue), track co-chair (DSP track) of ISCAS 2015 & 2016, Gabor track chair of DSP 15, and a TPC member of ISCAS (2011-2014), ICC (2007-2011) and Globecom (2008-2011). Prof. Chakraborty is a co-founder of the Asia Pacific Signal and Information Processing Association (APSIPA), is currently a member of the APSIPA BOG and also, served as the chair of the APSIPA TC on Signal and Information Processing Theory and Methods (SIPTM). He has also been the general chair and also the TPC chair of the National Conference on Communications - 2012.

Prof. Chakraborty is a fellow of the Indian National Academy of Engineering (INAE) and also a fellow of the IETE. During 2012-2013, he was selected as a distinguished lecturer of the APSIPA.
Biomedical signal processing and systems’ state of the arts and future research challenges

Speaker: Tomasz M. Rutkowski, University of Tsukuba, Japan

Abstract
The lecture will summarize the state research and current activities of the Biomedical Signal Processing and Systems (BioSiPS) Technical Committee member labs from Asia-Pacific. The talk is addressed to biomedical and general signal processing audience, since biomedical monitoring studies cover a wide range of signal analysis and machine learning related problems. Majority of recent hot BioSiPS applications are related to the brain data processing and online interfacing (brain-computer or brain-to-brain interfaces, etc.). There is also a growing interest in sleep studies, which are based on a fusion of biomedical signal processing methods comprising brain (EEG) and body peripheral electrophysiological (EOG, EMG, EKG, etc.), acoustic (breath and snoring sounds), body movements and temperature, skin conductance, etc. The multimodality of the above signals recorded at different scales creates new challenges for BioSiPS applications. There is also a growing interest in biomedical wearables for which energy efficient data processing and storage using Internet-of-Things (IoT) technologies will be also reviewed. The lecture will conclude with an outline of the future BioSiPS research challenges.

Biography
Tomasz M. RUTKOWSKI received his M.Sc. in Electronics and Ph.D. in Telecommunications and Acoustics from Wroclaw University of Technology, Poland, in 1994 and 2002, respectively. He received a postdoctoral training at the Multimedia Laboratory, Kyoto University, and in 2005-2010 he worked as a research scientist at RIKEN Brain Science Institute, Japan. Currently he serves as an assistant professor at the University of Tsukuba and as a visiting scientist at RIKEN Brain Science Institute. Professor Rutkowski’s research interests include computational neuroscience, especially brain-computer interfacing technologies, computational modeling of brain processes, neurobiological signal and information processing, multimedia interfaces and interactive technology design. He received The Annual BCI Research Award 2014 for the best brain-computer interface project. He is a senior member of IEEE, a member of the Society for Neuroscience, and the Asia-Pacific Signal and Information Processing Association (APSIPA) where he serves as BioSiPS Technical Committee Chairman. He is a member of the Editorial Board of Frontiers in Fractal Physiology and serves as a reviewer for “IEEE TNNLS, IEEE TSMC - Part B, Cognitive Neurodynamics, and the Journal of Neural Engineering, PLOS One, Nature Scientific Reports, etc.

Face Recognition from Low-resolution to High-resolution

Speaker: Kenneth K.M. Lam, The Hong Kong Polytechnic University, Hong Kong

Abstract
A lot of research on face recognition has been conducted over the past two decades or more. Various face recognition methods have been proposed, but investigations are still underway to tackle different problems and challenges for face recognition. The existing algorithms can only solve some of the problems, and their performances degrade in real-world applications. In this talk, we will first discuss the performances of face recognition techniques on face images at different resolutions. To perform face recognition, image features from a query image are first extracted and then matched to those features in a gallery set. The amount of information and the effectiveness of the features used will determine the recognition performance. To improve the performance, we will present a face recognition approach using information about face images at higher and lower resolutions, which can enhance the information content of the features that are extracted and combined at different resolutions. As the features from different resolutions should closely correlate with each other, we introduce the cascaded generalized canonical correlation analysis (GCCA) to fuse the information to form a single feature vector for face recognition. To further improve the performance and efficiency, “Gabor-Feature Hallucination” is used to predict the high-resolution (HR) Gabor features from the Gabor features of a face image directly by using local linear regression. We also describe how the algorithm is extended for low-resolution (LR) face recognition.

For recognition of HR face images, we will show that pore-scale facial features can be explored when the resolution of faces is greater than 700x600 pixels. We will describe the use of the facial features for recognition under conditions of different facial expressions, lighting, poses and captured times. We will also present the minimum area in face images that can retain a high recognition level. Experiment results indicate that the facial pores can be used as a new biometric for recognition, even distinguishing between identical twins.

Biography
Kin-Man Lam received the Associateship in Electronic Engineering with distinction from The Hong Kong Polytechnic University (formerly called Hong Kong Polytechnic) in 1986, the M.Sc. degree in communication engineering from the Department of Electrical Engineering, Imperial College of Science, Technology and Medicine, London, U.K., in 1987, and the Ph.D. degree from the Department of Electrical Engineering, University of Sydney, Sydney, Australia, in August 1996. From 1990 to 1993, he was a Lecturer at the Department of Electronic Engineering, The Hong Kong Polytechnic University. He joined the same department as an Assistant Professor in October 1996, became an Associate Professor in 1999, and has been a Professor since 2010. He has been a member of the organizing committee and program committee of many international conferences. Dr. Lam was also the
Chairman of the IEEE Hong Kong Chapter of Signal Processing between 2006 and 2008. Between 2009 and 2013, he was an Associate Editor of IEEE Trans. on Image Processing.

Currently, Dr. Lam is VP-Member Relations and Development of the Asia-Pacific Signal Processing Association (APSIPA), and the Director-Membership Services of the IEEE Signal Processing Society. He serves as an Associate Editor of Digital Signal Processing, APSIPA Trans. on Signal and Information Processing, and EURASIP Journal on Image and Video Processing. He is also an Editor of HKIE Transactions, and an Area Editor of IEEE Signal Processing Magazine. He is a General Co-Chair of the 2015 APSIPA Annual Summit and Conference and the 2017 IEEE International Conference on Multimedia Expo, both to be held in Hong Kong. His current research interests include human face recognition, image and video processing, and computer vision.
Welcome Reception & Banquet (Map & Assembly Point)

Date: 16 December 2015, 18:00-20:00
Welcome Reception Address: (All are welcome)
Colour Crystal Restaurant, 彩晶轩 (尖东)
2/F, Harbour Crystal Centre, 100 Granville Road,
Tsim Sha Tsui East, Kowloon, Hong Kong

Date: 18 December 2015, 18:30-21:30
Banquet Address: (Banquet ticket holders only)
Star Seafood Floating Restaurant, 明星海鲜舫
55-57 Tai Chung Kiu Road,
Sha Tin, New Territories, Hong Kong

九龍尖沙咀東部加連威老道100號港晶中心2/F
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