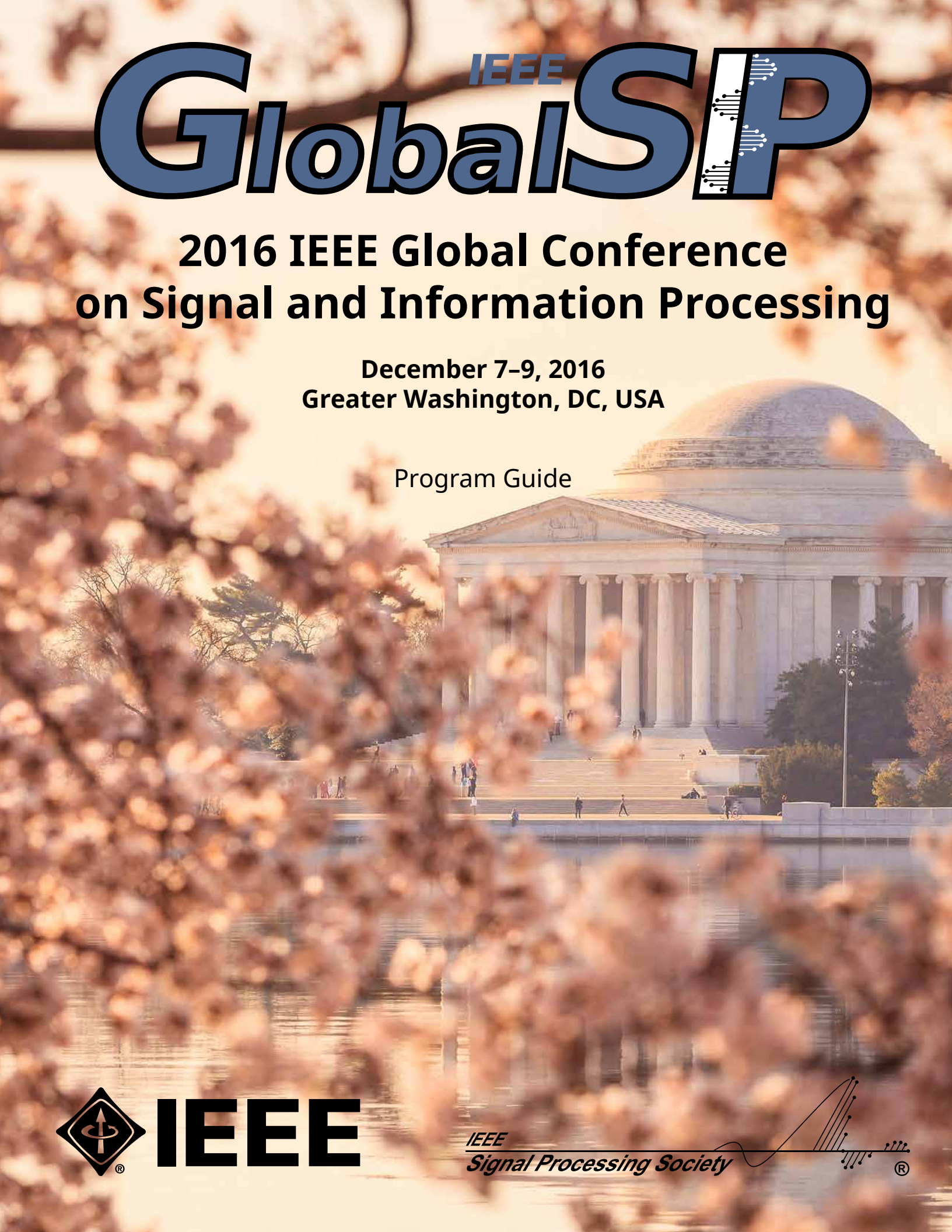


2016 IEEE Global Conference on Signal and Information Processing

December 7–9, 2016
Greater Washington, DC, USA

Program Guide

IEEE

IEEE Signal Processing Society

Schedule at a Glance

Tue - Dec. 6				
13:30 - 17:00	Tutorial: Graph Signal Processing: Fundamentals and Applications to Diffusion Processes			Rosslyn I (2nd floor)
Wed - Dec. 7	**Salon A**	**Salon B**	**Salon C**	**Salon H**
08:30 - 09:30	PLEN-1: Ben Vigoda - Deep Bayesian Program Learning			Salon ABC
10:00 - 11:00	RMN-K1: Angelia Nedic - Distributed Hypothesis Testing on Graphs	ITSP-K1: H. Vincent Poor - Secure Broadcasting with Independent Secret Keys	SGI-K1: Georgios B. Giannakis - Online Learning and Management of Future Cyber-Physical Networks	SPBD-K1: Jelena Kovačević - Sampling on Graphs
11:00 - 12:20	RMN-K2: Pramod Varshney - On Optimization of Sensor Management Policies for Distributed Estimation	ITSP-1: Information Theoretic Approaches to Security and Privacy I	SGI-1: State Estimation	SPBD-1: Signal Processing of Big Data I
12:30 - 14:00	Lunch			Salon 1
14:00 - 17:00	Workshop: WS-MW: Signal Processing for Sensing and Machine Learning			Salon 2
14:00 - 15:40	RMN-1: Distributed Information Processing, Optimization, and Resource Management over Networks I	ITSP-K2: Ashish Khisti - The MIMOME Channel ITSP-2: Information Theoretic Approaches to Security and Privacy II	SGI-2: Measurement-based Smart Grid Analytics	SPBD-2: Signal Processing of Big Data II
16:10 - 17:30	GS-1: General Symposium: Optical and Visible Light Communications		SGI-3: Cyber-physical Attacks and Forensics	SPBD-3: Signal Processing of Big Data III
17:45 - 19:15	Welcome Reception			Grand Foyer
Thur - Dec. 8	**Salon A**	**Salon B**	**Salon C**	**Salon H**
08:30 - 09:30	PLEN-2: Danielle S. Bassett – Network Dynamics and Control in the Human Brain			Salon ABC
10:00 - 12:00	Associate Editors Best Practices Discussion			Rosslyn I (2nd floor)
10:00 - 11:00	BDMI-K1: Dimitri Van De Ville - The Big Neuroimaging Data Extraction: How Advanced Signal Processing Can Unravel the Brain's Functional Organization	SPN-K1: Antonio Ortega - Learning Graphs from Data	DT5G-K1: Robert W. Heath Jr - Signal Processing Challenges in Broadband mmWave	SGI-K2: Joshua Taylor - Power Systems Without Fuel
11:00 - 12:20	BDMI-1: Big Data Analysis and Challenges in Medical Imaging I	SPN-1: Signal and Information Processing Over Networks I	DT5G-K2: Joseph Cavallaro - Algorithms, Architectures, and Testbeds for 5G Wireless Communication Systems DT5G-1: Transceiver Implementations and Architectures	SGI-4: Smart Grid Control
12:30 - 14:00	Lunch			Salon 1
	Ethics for Authors and Volunteers - Things You Should Know Before Submitting Your Next Paper			Rosslyn II (2nd floor)
13:00 - 13:45	PANEL: Perspectives on Machine Learning			Salon 2
14:00 - 15:40	RMN-2: Distributed Information Processing, Optimization, and Resource Management over Networks II	SPN-2: Signal and Information Processing Over Networks II	DT5G-2: Millimeter Wave Technologies	SGI-5: Optimal Power Flow and Power Markets
16:10 - 17:30	BDMI-K2: Tulay Adali - Data-Driven Analysis of Medical Imaging Data: Overview, Challenges, and Prospects BDMI-2: Big Data Analysis and Challenges in Medical Imaging II	CSDL-5: Compressed Sensing, Deep Learning V	DT5G-3: Cellular 5G Systems	
17:30 - 19:00	Young Professionals Event			Salon 2
17:45 - 19:15	Evening Reception			Grand Foyer
Fri - Dec. 9	**Salon A**	**Salon B**	**Salon C**	**Salon H**
08:30 - 09:30	PLEN-3: Stéphane Mallat – High Dimensional Learning with Deep Neural Networks			Salon ABC
10:00 - 11:00	SPN-K2: Alejandro Ribeiro - Statistical Signal Processing on Graphs	DT5G-K3: Thomas L. Marzetta - Massive MIMO: It Really Works!	SSPC-K1: Georgios B. Giannakis - Sparsity and Low Rank for Inference of Cognitive Network States	CCR-K2: Sejong Yoon - Decentralized Probabilistic Learning for Sensor Network
11:00 - 12:20	SPN-3: Signal and Information Processing Over Networks III	DT5G-4: Transceiver Algorithms	SGI-6: Power Line and Smart Grid Communications	CCR-2: Machine Learning for Characterization of Cognitive Communications and Radar II
11:30 - 14:00	Meeting: GlobalSIP to GlobalSIP			Rosslyn I (2nd floor)
12:30 - 14:00	Lunch			Salon 2
14:00 - 15:40	SPN-4: Signal and Information Processing Over Networks IV	DT5G-5: Massive MIMO Systems	SGI-7: Electric Vehicles	CCR-3: Machine Learning for Characterization of Cognitive Communications and Radar III
16:10 - 17:30		DT5G-6: Full Duplex, Transceiver and RF Technologies		

Plenary Talk | Keynote Talk | Lecture Session | Poster Session | Event | Break

Schedule at a Glance

Tue - Dec. 6		
13:30 - 17:00		
Wed - Dec. 7	**Salon J**	**Salon K**
08:30 - 09:30		
10:00 - 11:00	UCD-K1: Nuno Vasconcelos - Understanding Video of Crowded Environments	
11:00 - 12:20	UCD-1: Signal Processing for Understanding Crowd Dynamics I	CSDL-1: Compressed Sensing, Deep Learning I
12:30 - 14:00		
14:00 - 17:00		
14:00 - 15:40	UCD-2: Signal Processing for Understanding Crowd Dynamics II	CSDL-2: Compressed Sensing, Deep Learning II
16:10 - 17:30	CCR-K1: Maria Sabrina Greco - Cognitive Radars: Some Applications CCR-1: Machine Learning for Characterization of Cognitive Communications and Radar I	CSDL-3: Compressed Sensing, Deep Learning III
18:00 - 19:30		
Thur - Dec. 8	**Salon J**	**Salon K**
08:30 - 09:30		
10:00 - 12:00		
10:00 - 11:00	ESP-K1: Behzad Shahraray - Multimedia Signal Processing: From Feature Engineering to Deep Learning	SPBD-K2: Aleksandra Mojsilovic - Data 4 Good
11:00 - 12:20	ESP-1: Emerging Signal Processing Applications I	CSDL-4: Compressed Sensing, Deep Learning IV
12:30 - 14:00		
13:00 - 13:45		
14:00 - 15:40	ESP-K2: Robert Pack - Signals, Information & Systems In Consumer Robot Products ESP-2: Emerging Signal Processing Applications II	SSPC-1: Sparse Signal Processing for Communications I
16:10 - 17:30		SSPC-2: Sparse Signal Processing for Communications II
17:30 - 19:00		
17:45 - 19:15		
Fri - Dec. 9	**Salon J**	**Salon K**
08:30 - 09:30		
10:00 - 11:00	BDMI-K3: Yoram Bresler - Adventures in Learning and Sparse Modeling for Bio-imaging	NCTA-K1: Al Hero - Non-commutativity in Signal Processing
11:00 - 12:20	BDMI-3: Big Data Analysis and Challenges in Medical Imaging III	GS-2: General Symposium: Statistical Signal Processing and Estimation
12:30 - 14:00		
14:00 - 15:40	GS-3: General Symposium: Speech Processing	NCTA-1: Non-Commutative Theory and Applications I
16:10 - 17:30	BDMI-4: Big Data Analysis and Challenges in Medical Imaging IV	NCTA-2: Non-Commutative Theory and Applications II

Poster Sessions
Salon DEFG
Wed - Dec. 7
14:00 - 15:40
GS-P1: General Symposium Poster: Source Separation and Deconvolution
16:10 - 17:30
ITSP-P1: Information Theoretic Approaches to Security and Privacy Poster
RMN-P1: Distributed Information Processing, Optimization, and Resource Management over Networks Poster
UCD-P1: Signal Processing for Understanding Crowd Dynamics Poster
Thu - Dec. 8
14:00 - 15:40
CSDL-P1: Compressed Sensing, Deep Learning Poster I
GS-P2: General Symposium Poster: Signal Decomposition
16:10 - 17:30
DT5G-P1: Transceivers and Signal Processing for 5G Wireless Systems
ESP-P1: Emerging Signal Processing Applications Poster
GS-P3: General Symposium Poster: Detection and Tracking
SGI-P1: Storage Management and Demand Response
SPN-P1: Signal and Information Processing Over Networks Poster I
Fri - Dec. 9
14:00 - 15:40
CSDL-P2: Compressed Sensing, Deep Learning Poster II
DT5G-P2: Massive MIMO and mmWave
SSPC-P1: Sparse Signal Processing for Communications Poster I
16:10 - 17:30
CSDL-P3: Compressed Sensing, Deep Learning Poster III
GS-P4: General Symposium Poster: Signal Processing for Communications
SPN-P2: Signal and Information Processing Over Networks Poster II

General Chairs' Welcome

On behalf of the IEEE Global Conference on Signal and Information Processing (GlobalSIP) Organizing Committee, we would like to cordially welcome you to the Greater Washington DC area. The nation's capital has a rich and vibrant cultural, educational and scientific identity. It is home to many national monuments, museums, art centers, federal agencies, international organizations, professional associations, and fantastic restaurants, attracting a global population. The greater Washington-Baltimore area has a number of research universities, where research excellence and innovative programs in cutting-edge topical areas have been their tradition. In addition, there are a large number of research labs and government contract companies, that have a long-standing practice of employing signal and information processing techniques as part of their core business. Washington DC cordially invites you to share this global spirit of scientific collaboration by participating in GlobalSIP 2016!

The conference venue is Marriott Crystal Gateway at Crystal City, Arlington, Virginia. It allows convenient access to Washington's numerous cultural attractions and fine restaurants from a safe and pedestrian-friendly milieu. Several landmarks are within three metro stops through the Metropolitan Metrorail system, including Capitol Hill, Smithsonian at the National Mall, Pentagon city, Arlington Cemetery, Reagan Airport and Old Town Alexandria.

A flagship conference of the IEEE Signal Processing Society, GlobalSIP is structured around coherent symposia that explore new and emerging developments in the field, while maintaining a format that encourages accessibility to interested researchers and fosters interaction and cross-pollination of ideas. This year, GlobalSIP 2016 will feature a government panel, a tutorial, keynote lectures, oral and poster sessions on signal and information processing, with an emphasis on up-and-coming themes.

It takes a village to organize a conference. Our sincere gratitude goes to our technical program chairs, Phil Regalia, Brian Mark and Trac Tran for all the heavy lifting in putting together a strong technical program. We are indebted to Joel Goodman, whose leadership led to a unique government panel for this year. We particularly thank our finance chair Jill Nelson for dealing with the various uncertainties in the flowing conference organization. Our two publicity chairs, Piya Pal and Seuing-jun Kim, worked enthusiastically to publicize and promote the event at various stages of the conference development. Special mention also goes to Nathalia Peixoto for local arrangements, Kathleen Wage for publication, Kristine Bell as an industrial liaison and Win Mu for the Mathworks workshop. Finally, Billene Cannon and CMS were essential for the smooth operation of GlobalSIP. The entire team deserves our deep appreciation for being so patient with us. We also gratefully acknowledge the financial support from our Bronze Sponsor, the Mathworks, as well as the National Science Foundation and the IEEE Signal Processing Society for offering student travel grants.

We hope that you will not only enjoy the technical and social programs of the conference, but also take advantage of the dynamic location of Washington DC that offers ample opportunities for engaging social and entertainment activities.

Zhi (Gerry) Tian
George Mason University

Brian M. Sadler
Army Research Laboratory

Technical Program Overview

Welcome to Washington, DC for the fourth annual IEEE Global Conference on Signal and Information Processing! GlobalSIP has emerged as a flagship IEEE Signal Processing Society conference that targets hot topics and up-and-coming themes in signal and information processing. GlobalSIP is organized differently from other IEEE SPS meetings to encourage new SPS research directions and to foster emerging areas.

GlobalSIP is comprised of symposia selected to span a diverse range of exciting and important topics in signal and information processing. Each symposium listed below was organized separately by independent technical committees. The symposia are tied together through co-location, common timing, shared plenaries, and parallel poster sessions. While Big Data and Machine Learning underscore recent advances throughout the symposia, traditional signal processing themes also figure prominently in the symposia titles:

- Symposium on Compressed Sensing, Deep Learning
- Symposium on Signal and Information Processing Over Networks
- Symposium on Distributed Information Processing, Optimization, and Resource Management over Networks
- Symposium on Transceivers and Signal Processing for 5G Wireless and mm-Wave Systems
- Symposium on Signal and Information Processing for Smart Grid Infrastructures
- Symposium on Information Theoretic Approaches to Security and Privacy
- Symposium on Emerging Signal Processing Applications
- Symposium on Machine Learning for Characterization of Cognitive Communications and Radar
- Symposium on Big Data Analysis and Challenges in Medical Imaging
- Symposium on Signal Processing for Understanding Crowd Dynamics
- Symposium on Signal Processing of Big Data
- Symposium on Non-Commutative Theory and Applications
- Symposium on Sparse Signal Processing for Communications
- General Symposium

In addition, we are proud to host a government panel offering a leadership view of machine learning, thanks to the following technical leaders from the DoD: David Aha, Charles Clancy, Jill Crisman, Tom Rondeau, and Paul Tilghman.

The symposia program committees have done an amazing job of bringing researchers together on these exciting themes and carefully reviewing submitted papers to ensure a high quality conference. Special thanks go to the symposia organizers: John Apostolopoulos, Selin Aviyente, Necdet Serhat Aybat, Masoumeh Azghani, Umit Batur, Holger Boche, Jani Boutellier, Sang Peter Chin, Nicola Conci, Abdallah Farraj, Nikolaos Gatsis, Mazin Gilbert, Anubha Gupta, Mingyi Hong, Yuan-Hao Huang, Markku Juntti, Vassilis Kekatos, Seung-Jun Kim, Silvija Kokalj-Filipovic, Negar Kiyavash, Deepa Kundur, Qing Ling, Fa-Long Luo, Zhi-Quan Luo, Lucio Marcenaro, Antonio G. Marques, Farokh Marvasti, Gonzalo Mateos, Piya Pal, Mike Polley, H. Vincent Poor, Michael G. Rabbat, Russell Rodrigues, Rafael F. Schaefer, Gaurav Sharma, George Stantchev, Peter Tu, Mikko Valkama, Lav R. Varshney, Namrata Vaswani, Meng Wang, and Patrick Wolfe.

We are especially pleased with the outstanding set of plenary speeches and keynote talks at GlobalSIP. Many of the symposia target new theory, methods and applications. The plenary talks are common to all symposia, offered by three outstanding researchers: Ben Vigoda, Danielle S. Bassett, and Stéphane Mallat. The keynotes will help to introduce the themes of each symposium and have been alternately scheduled between morning and afternoon slots. We would like to thank the keynote speakers for their important contributions to GlobalSIP: Tulay Adali, Yoram Bresler, Joe Cavallaro, Georgios B. Giannakis, Maria Sabrina Greco, Robert W. Heath, Jr., Al Hero, Ashish Khisti, Jelena Kovačević, Thomas L. Marzetta, Aleksandra Mojsilović, Angelia Nedic, Antonio Ortega, Robert Pack, H. Vincent Poor, Alejandro Ribeiro, Behzad Shahraray, Josh Taylor, Dimitri Van De Ville, Pramod K. Varshney, Nuno Vasconcelos, and Sejong Yoon.

Finally we wish to thank all the authors for their efforts. Their papers are the key to the exceptionally high quality of GlobalSIP. We appreciate their participation and look forward to learning about their research. Finally, we express our gratitude to Lance Cotton from Conference Management Services, whose prompt and professional assistance was invaluable in putting together the technical program.

Phillip Regalia
Catholic University of America

Brian Mark
George Mason University

Trac D. Tran
Johns Hopkins University

Conference Organizing Committee

General Chairs

Zhi Tian
George Mason University

Brian M. Sadler
Army Research Laboratory

Technical Program Chairs

Phillip Regalia
Catholic University of America

Trac D. Tran
Johns Hopkins University

Brian Mark
George Mason University

Finance Chair

Jill Nelson
George Mason University

Local Arrangements Chair

Nathalia Peixoto
George Mason University

Publications Chair

Kathleen Wage
George Mason University

Publicity Chairs

Piya Pal
University of California, San Diego

Seung-Jun Kim
University of Maryland, Baltimore Cty

Technical Workshop Liaison Chair

Min Wu
University of Maryland, College Park

Government Panel Chair

Joel Goodman
US Naval Research Laboratory

Student Travel Committee

Piya Pal
University of California, San Diego

Hang Liu
Catholic University

Phillip Regalia
Catholic University of America

Industrial Liaison Chairs

Kristine Bell
Metron Inc.

Hang Liu
Catholic University

International Liaison Chairs

Chengyang Yang
Beihang University(BUAA), China

Mounir Ghogho
University of Leeds, UK

Advisory Committee

Monson Hayes
George Mason University

Symposia Organizers

General Symposium
Zhi Tian, George Mason University
Brian M. Sadler, Army Research Laboratory

Symposium on Compressed Sensing, Deep Learning
Sang Peter Chin, Boston University and Draper Laboratory

Symposium on Signal and Information Processing Over Networks
Michael G. Rabbat, McGill University
Antonio G. Marques, King Juan Carlos University
Gonzalo Mateos, University of Rochester

Symposium on Distributed Information Processing, Optimization, and Resource Management over Networks
Zhi-Quan Luo, University of Minnesota

Symposium on Transceivers and Signal Processing for 5G Wireless and mm-Wave Systems
Mikko Valkama Tampere University of Technology
Yuan-Hao Huang National Tsing Huang University

Symposium on Signal and Information Processing for Smart Grid Infrastructures
Deepa Kundur, University of Toronto
Nikolaos Gatsis, University of Texas at San Antonio
Vassilis Kekatos, Virginia Tech
Meng Wang, Rensselaer Polytechnic Institute
Abdallah Farraj, University of Toronto

Symposium on Information Theoretic Approaches to Security and Privacy
Rafael F. Schaefer, Technische Universität Berlin
Holger Boche, Technische Universität München

Symposium on Emerging Signal Processing Applications
Mike Polley, Samsung
Mazin Gilbert, ATT Labs

Symposium on Machine Learning for Characterization of Cognitive Communications and Radar
Silvija Kokalj-Filipovic, Naval Research Laboratory
George Stantchev, Naval Research Laboratory

Symposium on Big Data Analysis and Challenges in Medical Imaging
Anubha Gupta, IIIT-Delhi
Namrata Vaswani, Iowa State University
Selin Aviyente, Michigan State University

Symposium on Signal Processing for Understanding Crowd Dynamics
Lucio Marcenaro, University of Genova

Symposium on Signal Processing of Big Data
Patrick Wolfe, University College London
Lav R. Varshney, University of Illinois at Urbana-Champaign

Symposium on Non-Commutative Theory and Applications
Negar Kiyavash, University of Illinois-Urbana Champaign

Symposium on Sparse Signal Processing for Communications
Masoumeh Azghani, Sahand University of Technology
Farokh Marvasti, Sharif University of Technology

Symposia Technical Program Chairs

General Symposium
Brian Mark, George Mason University
Phillip Regalia, Catholic University of America
Trac D. Tran, Johns Hopkins University

Symposium on Compressed Sensing, Deep Learning
Trac D. Tran, Johns Hopkins University
Seung-Jun Kim, University of Maryland, Baltimore County
Piya Pal, University of California, San Diego

Symposium on Signal and Information Processing Over Networks
Gonzalo Mateos, University of Rochester
Antonio G. Marques, King Juan Carlos University
Michael Rabbat, McGill University

Symposium on Distributed Information Processing, Optimization, and Resource Management over Networks
Necdet Serhat Aybat, The Pennsylvania State University
Mingyi Hong, Iowa State University
Qing Ling, University of Science and Technology of China

Symposium on Transceivers and Signal Processing for 5G Wireless and mm-Wave Systems
Markku Juntti, University of Oulu
Jani Boutellier, Tampere University of Technology
Mikko Valkama, Tampere University of Technology

Symposium on Signal and Information Processing for Smart Grid Infrastructures
Abdallah Farraj, University of Toronto
Nikolaos Gatsis, University of Texas at San Antonio
Vassilis Kekatos, Virginia Tech
Meng Wang, Rensselaer Polytechnic Institute

Symposium on Information Theoretic Approaches to Security and Privacy
Rafael Schaefer, Technische Universität Berlin
Holger Boche, Technische Universität München

Symposium on Emerging Signal Processing Applications
Umit Batur, Faraday Future
Fa-Long Luo, Element CXI
Mazin Gilbert, AT&T Labs
Mike Polley, Samsung USA
John Apostolopoulos, Cisco
Gaurav Sharma, University of Rochester

Symposium on Machine Learning for Characterization of Cognitive Communications and Radar
Silvija Kokalj-Filipovic, Naval Research Laboratory
George Stantchev, Naval Research Laboratory
H. Vincent Poor, Princeton University

Symposium on Big Data Analysis and Challenges in Medical Imaging
Anubha Gupta, IIIT-Delhi
Namrata Vaswani, Iowa State University
Selin Aviyente, Michigan State University

Symposium on Signal Processing for Understanding Crowd Dynamics
Nicola Conci, Universitá degli Studi di Trento
Lucio Marcenaro, University of Genova
Peter Tu, GE Global Research

Symposium on Signal Processing of Big Data
Patrick Wolfe, University College London
Lav R. Varshney, University of Illinois at Urbana-Champaign
Russell Rodrigues, University College London

Symposium on Non-Commutative Theory and Applications
Negar Kiyavash, Univ. Illinois Urbana-Champaign

Symposium on Sparse Signal Processing for Communications
Masoumeh Azghani, Sahand University of Technology

Reviewers

Azra Abtahi, Sharif University of Technology
Crystal Acosta, Naval Research Laboratory
Shuchin Aeron, Tufts University
Fauzia Ahmad, Temple University
Abdollah Ajorloo, Sharif University of Technology
Murat Akcakaya, University of Pittsburgh
Miltiadis Alamaniotis, Purdue University
Tansu Alpcan, University of Melbourne
Yiannis Andreopoulos, University College London
Lauri Anttila, Tampere University of Technology
Vikram Appia, Texas Instruments
João Ascenso, Instituto Superior Técnico - Instituto de Telecomunicações
Selin Aviyente, Michigan State University
Sergul Aydore, JP Morgan
Brian Baingana, University of Minnesota
Waheed Bajwa, Rutgers University
Marco Baldi, Università Politecnica delle Marche
Emilia I. Barakova, Technische Universiteit Eindhoven
Umit Batur, Faraday Future
Gerhard Bauch, Hamburg University of Technology
Sebastian Baur, Technische Universität München
Mariano Beguerisse-Diaz, University of Oxford
Mats Bengtsson, KTH Royal Institute of Technology
Randall Berry, Northwestern University
Alexander Bertrand, KU Leuven, University of Leuven
Shuvra Bhattacharyya, University of Maryland
Pascal Bianchi, Telecom ParisTech
Rakesh Bobba, Oregon State University
Giuseppe Boccignone, Università degli Studi di Milano
Paul Bogdan, University of Southern California
Mahdi Boloursaz Mashhadi, Sharif University of Technology
Pierre Borgnat, Centre National de la Recherche Scientifique
Nikolaos V. Boulgouris, Brunel University London
Andreas Burg, EPFL
Danijela Cabric, University of California, Los Angeles
Simone Calderara, University of Modena and Reggio Emilia
Andrea Cavallaro, Queen Mary University of London
Joseph Cavallaro, Rice University
Ediz Cetin, University of New South Wales
Chaitali Chakrabarti, Arizona State University
Aranya Chakrabotry, North Carolina State University
Jonathon Chambers, Newcastle University
Chung-Fu Chang, Johns Hopkins University Applied Physics Laboratory
Tsung-Hui Chang, The Chinese University of Hong Kong, Shenzhen
Saikat Chatterjee, KTH - Royal Institute of Technology
Biao Chen, Syracuse University
Chen Chen, Argonne National Laboratory
Homer Chen, National Taiwan University
Kwang-Cheng Chen, University of South Florida
Lijun Chen, University of Colorado at Boulder
Samuel Cheng, University of Oklahoma
Sundeep Chepuri, TU Delft
Chong-Yung Chi, National Tsing Hua University
Jen-Tzung Chien, National Chiao Tung University
Mark Coates, McGill University
Emiliano Dall'Anese, National Renewable Energy Laboratory
Ali Davoudi, University of Texas at Arlington
Matthieu De Mari, Singapore University of Technology and Design
Deepjyoti Deka, Los Alamos National Lab
Giuseppe Destino, University of Oulu
Sairaj Dhople, University of Minnesota
Paolo Di Lorenzo, University di Perugia
Peter Djuric, Stony Brook University
Minh Do, University of Illinois at Urbana-Champaign
Octavia Dobre, Memorial University
Liang Dong, Baylor University
Min Dong, University of Ontario Institute of Technology
Pier Luigi Dragotti, Imperial College London
Jean-Luc Dugelay, Eurecom
Ceyhun Eksin, Georgia Institute of Technology
Thomas Eriksson, Chalmers University
Ashkan Esmaeili, Sharif University of Technology
Inaki Esnaola, University of Sheffield
Joao F. C. Mota, University College London
Abdallah Farraj, University of Toronto
Carlos Fernandez-Granda, Courant Institute of Mathematical Sciences
Xavier Fernando, Ryerson University
Marcelo Fiori, UdelaR
Pascal Frossard, EPFL
Lin Fu, Argonne National Laboratory
Francesco Fusco, IBM Research, Ireland
Nikolaos Gatsis, University of Texas at San Antonio
Hans Georg Feichtinger, University of Vienna
Mohammad Ghavami, London South Bank University
Fatemeh Ghayyem, Sharif University of Technology
Maksym Girnyk, Ericsson
Mario Goldenbaum, Princeton University
Daniel Grzonka, Cracow University of Technology
Anubha Gupta, IIIT-Delhi
Mert Gurbuzbalaban, Massachusetts Institute of Technology
Martin Haardt, TU Ilmenau
Amirhossein Hadavi, Sharif University of Technology
Alex Haimovich, New Jersey Institute of Technology
Justin Haldar, University of Southern California
Eman Hammad, University of Toronto
Zhu Han, University of Houston
Jarvis Haupt, University of Minnesota
Miao He, Texas Tech University
Gustavo Hernández-Abrego, Microsoft
Mingyi Hong, Iowa State University
Yao-Win Peter Hong, National Tsing Hua University
Yiguang Hong, Chinese Academy of Sciences

Yuan-Hao Huang, National Tsing Hua University
Jenq-Neng Hwang, University of Washington
Tanya Ignatenko, Eindhoven University of Technology
Mathews Jacob, University of Iowa
Dusan Jakovetic, University of Novi Sad
Janne Janhunen, University of Oulu
Michael Johnson, Marquette University
Jhi-Young Joo, Missouri University of Science & Technology
Eduard Jorswieck, Technische Universität Dresden
Markku Juntti, University of Oulu
Kimmo Kansanen, Norwegian University of Science and Technology
Soumya Kar, CMU
Vassilis Kekatos, Virginia Tech
Jinsub Kim, Oregon State University
Seung-Jun Kim, University of Maryland, Baltimore County
Kittipong Kittichokechai, Technische Universität Berlin
Silvija Kokalj-Filipovic, Naval Research Laboratory
Farinaz Koushanfar, University of California San Diego (UCSD)
Jelena Kovacevic, Carnegie Mellon University
Ioannis Krikidis, University of Cyprus
Hamid Krim, North Carolina State University
Brian M. Kurkoski, Japan Advanced Institute of Science and Technology
Lifeng Lai, Worcester Polytechnic Institute
Lutz Lampe, University of British Columbia
Guanghui Lan, Georgia Tech
Charlotte Langlais, Telecom Bretagne
Javad Lavaei, University of California Berkeley
Geert Leus, Delft University of Technology
Marco Levorato, University of California at Irvine
Chunshu Li, Marvell
Min Li, NXP Semiconductor
Na Li, Harvard University
Zhu Li, University of Missouri
Qilian Liang, University of Texas at Arlington
Pin-Hsun Lin, Technische University Dresden
Qihang Lin, University of Iowa
Kai Liu, Sichuan University
Roberto López-Valcarce, Universidad de Vigo
Alexander C. Loui, Kodak Alaris Inc.
Fa-Long Luo, Element CXI and Anyka, Inc.
Bing Ma, University of Nevada, Las Vegas
Shiqian Ma, The Chinese University of Hong Kong
Behrouz Maham, Nazarbayev University
Ali Makhdoumi, Massachusetts Institute of Technology
Vishnu Makkapati, Myntra Designs Pvt. Ltd.
Ahmed Mansour, Technische Universität München
Hassan Mansour, Mitsubishi Electric Research Laboratories
Brian Mark, George Mason University
Antonio G. Marques, King Juan Carlos University
Farokh Marvasti, Sharif University of Technology
Gonzalo Mateos, University of Rochester
Sellathurai Mathini, Heriot-Watt University
Vincenzo Matta, University of Salerno
Riccardo Mazzon, Queen Mary University of London
John McAllister, Queen's University Belfast
Benjamin Miller, MIT Lincoln Laboratory
Kazushi Mimura, Hiroshima City University
Elaheh Mohammadi, Sharif University of Technology
Mohammadali Mohammadi, Shahrekord University
Daniel Molzahn, Argonne National Lab
Vishal Monga, The Pennsylvania State University
Inmaculada Mora, King Juan Carlos University
Pietro Morerio, Istituto Italiano di Tecnologia (IIT)
Martin Mueller, Texas Instruments
Christopher Mueller-Smith, SRI International
Chandra Murthy, University of California, San Diego
Eric Nassor, Canon Research
Derrick Wing Kwan Ng, The University of New South Wales
Francesca Odone, Università degli Studi di Genova
Tobias Oechtering, KTH Royal Institute of Technology
Alex Oleshevsky, University of Illinois at Urbana-Champaign
Antonio Ortega, USC
Piya Pal, University of California, San Diego
Vishal M Patel, Rutgers University
Maxime Pelcat, INSA Rennes
Ana Isabel Perez, Universitat Politecnica de Catalonia
Fernando Perez-Cruz, Bell Laboratories
Samir Perlaza, INRIA
Marius Pesavento, Technische Universität Darmstadt
Athina Petropulu, Rutgers University
Claudio Piciarelli, Università degli Studi di Udine
Jorge Plata, KU Leuven
Mike Polley, Samsung USA
Sofie Pollin, KU Leuven
Fatih Porikli, Australian National University
Victor Preciado, University of Pennsylvania
Zheng Qu, University of Hong Kong
Michael Rabbat, McGill University
Vasanthan Raghavan, Qualcomm Flarion Technologies
Nandana Rajatheva, University of Oulu
David Ramirez, Universidad Carlos III de Madrid
Shantanu Rane, Palo Alto Research Center (PARC)
Phillip Regalia, Catholic University of America
Carlo S. Regazzoni, Università degli Studi di Genova
Paolo Remagnino, Kingston University London
Markku Renfors, Tampere University of Technology
Alejandro Riberio, University of Pennsylvania
Cédric Richard, Université de Nice Sophia Antipolis
Peter Richtarik, University of Edinburgh
Taneli Riihonen, Aalto University
Bernhard Rinner, Universität Klagenfurt
Jana Rittwik, AT&T Labs
Mohammad Robatmili, Azad University
Andrew Robertson, Naval Research Laboratory
Daniel Romero, University of Minnesota
Walid Saad, Virginia Tech
Ravishankar Saiprasad, University of Michigan
Saeed Sanei, University of Surrey

Lalitha Sankar, Arizona State University
Murat Saraclar, Bogaziçi University
Anand Sarwate, Rutgers, The State University of New Jersey
Ali H Sayed, University of California, Los Angeles
Anna Scaglione, Arizona State University
Rafael Schaefer, Technische Universität Berlin
Patrick Schaumont, Virginia Tech
Ioannis Schizas, University of Texas at Arlington
Jessica Schrouff, Stanford University
Gesualdo Scutari, Purdue University
Farnaz Sedighin, Sharif University of Technology
Santiago Segarra, University of Pennsylvania
Erchin Serpedin, Texas A&M University
Aydin Sezgin, Ruhr University Bochum
Aydin Sezgin, Ulm University
Farhana Sheikh, Intel
Cong Shen, University of Science and Technology of China
Wei Shi, University of Illinois at Urbana-Champaign
David Shuman, Macalester College
Nikolaos Sidiropoulos, University of Minnesota
Georg Sigl, Technische Universität München
Olli Silvén, University of Oulu
Osvaldo Simeone, New Jersey Institute of Technology
Andrea Simonetto, UC Louvain
Elaheh Sobhani, Sharif University of Technology
Leonel Sousa, INESC-ID
Predrag Spasojevic, Rutgers University
Pirathayini Srikantha, University of Toronto
George Stantchev, Naval Research Laboratory
Christoph Studer, Cornell University
Yang Sun, Qualcomm
Himal Suraweera, University of Peradeniya
Ananthram Swami, ARL
Ali Tajer, Rensselaer Polytechnic Institute
Gongguo Tang, Colorado School of Mines
Ivan Tashev, Microsoft
Nima Tavangaran, Technische Universität München
Joshua Taylor, University of Toronto
Cem Tekin, Bilkent University
Valtteri Tervo, University of Oulu
Dorina Thanou, EPFL
Nikolaos Thomos, University of Essex
Gerry Tian, George Mason University
Olav Tirkkonen, Aalto University
Ehsan Tohidi, Sharif University of Technology
Laurissa Tokarchuk, Queen Mary University of London
Antti Tölli, University of Oulu
Stefano Tomasin, University of Padova
Behrouz Touri, University of Colorado at Boulder
LeNam Tran, Maynooth University
Trac D. Tran, Johns Hopkins University
Pei-Yun Tsai, National Central University
Stefano Tubaro, Politecnico di Milano
Jitendra Tugnait, Auburn University
Sennur Ulkulus, University of Maryland at College Park
Wolfgang Utschick, TU Munich
Mikko Valkama, Tampere University of Technology
Jaap van de Beek, Luleå University of Technology
Jagannadan Varadarajan, Advanced Digital Sciences Center
Pramod Varshney, Syracuse University
Namrata Vaswani, Iowa State University
Mikko Vehkapera, University of Sheffield
Sergio A Velastin, University Carlos III de Madrid
Christos Verikoukis, Centre Tecnològic Telecomunicacions Catalunya
Giuseppe Vizzari, Università degli Studi di Milano-Bicocca
Hoi-To Wai, Arizona State University
Liming Wang, The Ohio State University
Meng Wang, Rensselaer Polytechnic Institute
Yun Wang, Princeton University, Amazon.com, Inc.
Z. Jane Wang, University of British Columbia
Zhengdao Wang, Iowa State University
Zhongfeng Wang, Broadcom
Ermin Wei, Northwestern University
Jin Wei Kocsis, University of Akron
Stefan Werner, Aalto University
Risto Wichman, Aalto University
Gang Wu, University of Electronic Science and Technology of China
Sau-Hsuan Wu, National Chiao Tung University
Gerhard Wunder, Fraunhofer Heinrich Hertz Institute
Pengfei Xia, InterDigital
Yuanzhang Xiao, Northwestern University
Yao Xie, Georgia Institute of Technology
Jie Xu, University of Miami
Zhiyuan Yan, Lehigh University
Zaiyue Yang, Zhejiang University
Roy Yates, Rutgers University
Anastasia Yendiki, Harvard Medical School
Shingo Yoshizawa, Kitami Institute of Technology
Hojatollah Zamani, Sharif University of Technology
Nematollah Zarmehi, Sharif University of Technology
Hadi Zayyani, Qom University of technology
Baosen Zhang, University of Washington
Chuan Zhang, Southeast University
Haijun Zhang, University of British Columbia
June Zhang, Centers for Disease Control and Prevention
Wei Zhang, Ohio State University
Wenyi Zhang, University of Science and Technology of China
Xinmiao Zhang, Western Digital Corporation
Yimin Zhang, Temple University
Yu Zhang, UC Berkeley
Zhengya Zhang, University of Michigan
Ming Zhao, Arizona State University
Yue Zhao, Stony Brook University
Yuanqing Zheng, The Hong Kong Polytechnic University
Ning Zhou, Binghamton University
Hao Zhu, University of Illinois at Urbana-Champaign
Minghui Zhu, Pennsylvania State University
Saman Zonouz, Rutgers University
Michele Zorzi, University of Padova, Italy

GRAPH SIGNAL PROCESSING: FUNDAMENTALS AND APPLICATIONS TO DIFFUSION PROCESSES

Tuesday, December 6, 13:30–17:00, Rosslyn I (2nd floor)

Instructors

Prof. Antonio G. Marques, King Juan Carlos University, Spain; **Dr. Santiago Segarra**, Massachusetts Institute of Technology, USA; and **Prof. Gonzalo Mateos**, University of Rochester, USA

The tutorial consists of two parts of similar length: an introduction to the basics of Graph Signal Processing (GSP), which will review and illustrate main existing results, and the application of GSP-tools to distributed network processing and diffusion processes over networks. The first part introduces the field of GSP, motivates its usefulness via meaningful applications, and presents in a didactic yet concise manner its foundational concepts, which have been derived over the past five years. The second part focuses on contemporary results. We will first illustrate that GSP is well suited to model and study diffusion processes over networks. With this premise in mind, we revisit classical SP problems such as sampling, interpolation, system identification, and filtering. We first present the theoretical results and then discuss their implications for distributed and dynamic processing. Furthermore, we illustrate the utility of applying GSP to analyze dynamics on networks through a diverse gamut of applications from social sciences to biology, spanning well-established problems like consensus and emerging neuroscience challenges like brain state induction.

Antonio G. Marques received the Telecommunications Engineering degree and the Doctorate degree, both with highest honors, from the Carlos III University of Madrid, Spain, in 2002 and 2007, respectively. In 2007, he became a faculty of the Department of Signal Theory and Communications, King Juan Carlos University, Madrid, Spain, where he currently develops his research and teaching activities as an Associate Professor. From 2005 to 2015, he held different visiting positions at the University of Minnesota, Minneapolis. In 2015 and 2016 he was a Visiting Scholar at the University of Pennsylvania. His research interests lie in the areas of communication theory, signal processing, and networking. His current research focuses on stochastic resource allocation wireless networks and smart grids, nonlinear network optimization, and signal processing for graphs. Dr. Marques has served the IEEE and the EURASIP in a number of posts (currently, he is an Associate Editor of the IEEE Signal Process. Letters and of the EURASIP J. on Advances in Signal Process.), and his work has been awarded in several conferences and workshops.

Santiago Segarra received the B.Sc. degree in industrial engineering with highest honors (Valedictorian) from the Instituto Tecnológico de Buenos Aires (ITBA), Argentina, in 2011 and the M.Sc. and Ph.D. degrees in electrical and systems engineering from the University of Pennsylvania, Philadelphia, in 2014 and 2016. Since 2016, he has been working as a postdoctoral researcher with the Institute for Data, Systems, and Society at the Massachusetts Institute of Technology. His research interests include network theory, data analysis, machine learning, and graph signal processing. Dr. Segarra received the ITBA's 2011 Best Undergraduate Thesis Award in industrial engineering, the 2011 Outstanding Graduate Award granted by the National Academy of Engineering of Argentina, the Best Student Paper Awards at the 2015 Asilomar Conference and the 2016 Statistical Signal Processing Workshop, and the Best Paper Award at the 2016 Sensor Array and Multichannel Signal Processing Workshop.

Gonzalo Mateos received the B.Sc. degree from Universidad de la República, Uruguay, in 2005, and the M.Sc. and Ph.D. degrees from the University of Minnesota, Twin Cities, in 2009 and 2011, all in electrical engineering. He joined the University of Rochester, Rochester, NY, in 2014, where he is currently an Assistant Professor with the Department of Electrical and Computer Engineering, as well as a member of the Goergen Institute for Data Science. During the 2013 academic year, he was a visiting scholar with the Computer Science Department at Carnegie Mellon University. From 2004 to 2006, he worked as a Systems Engineer at Asea Brown Boveri (ABB), Uruguay. Dr. Mateos received the Best Student Paper Award at the 2012 IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), and was also a finalist of the Student Paper Contest at the 2011 IEEE DSP/SPE Workshop. His doctoral work has been recognized with the 2013 University of Minnesota's Best Dissertation Award (Honorable Mention) across all Physical Sciences and Engineering areas. His research interests lie in the areas of statistical learning from Big Data, network science, decentralized optimization, and graph signal processing, with applications in dynamic network health monitoring, social, power grid, and Big Data analytics. Dr. Mateos currently serves as Associate Editor for the IEEE Trans. on Signal Process. and the EURASIP J. on Advances on Signal Process.

PLEN-1: Deep Bayesian Program Learning

Wednesday, December 7, 08:30 – 09:30, Salon ABC

Ben Vigoda, *Gamalon Machine Intelligence*

Before founding Gamalon Machine Intelligence, **Ben Vigoda** was technical co-founder and CEO of Lyric Semiconductor, a startup that created the first integrated circuits and processor architectures for statistical machine learning and signal processing. The company was named one of the 50 Most Innovative Companies by Technology Review and was featured in the Wall Street Journal, New York Times, EE Times, Scientific American, Wired, and other media. Lyric was successfully acquired by Analog Devices, and Lyric's products and technology are being deployed in leading smart phones and consumer electronics, medical devices, wireless base stations, and automobiles.

Ben completed his PhD at MIT developing circuits for implementing machine learning algorithms natively in hardware. He has won entrepreneurship competitions at MIT and Harvard, fellowships from Intel and the Kavli Foundation/National Academy of Sciences, and has held research appointments at MIT, HP, Mitsubishi, and the Santa Fe Institute. He has authored over 120 patents and academic publications. He currently serves on the DARPA Information Science and Technology (ISAT) steering committee.

Ben also co-founded Design That Matters, a not-for-profit that for the past decade has helped solve engineering and design problems in under-served communities and has saved thousands of infant lives by developing low-cost, easy-to-use medical technology such as infant incubators, UV therapy, pulse oximeters, and IV drip systems that have been fielded in 20 countries.

PLEN-2: Network Dynamics and Control in the Human Brain

Thursday, December 8, 08:30 – 09:30, Salon ABC

Danielle S. Bassett, *University of Pennsylvania*

The human brain is a complex organ characterized by heterogeneous patterns of interconnections. New non-invasive imaging techniques now allow for these patterns to be carefully and comprehensively mapped in individual humans, paving the way for a better understanding of how wiring supports our thought processes. While a large body of work now focuses on descriptive statistics to characterize these wiring patterns, a critical open question lies in how the organization of these networks constrains the potential repertoire of brain dynamics. In this talk, I will describe an approach for understanding how perturbations to brain dynamics propagate through complex writing patterns, driving the brain into new states of activity. Drawing on a range of disciplinary tools – from graph theory and graph signal processing to network control theory and optimization – I will identify control points in brain networks, characterize trajectories of brain activity states following perturbation to those points, and propose a mechanism for how network control evolves in our brains as we grow from children into adults. Finally, I will describe how these computational tools and approaches can be used to better understand how the brain controls its own dynamics (and we in turn control our own behavior), but also how we can inform stimulation devices to control abnormal brain dynamics, for example in patients with severe epilepsy.

Danielle S. Bassett is an Associate Professor in the Department of Bioengineering at the University of Pennsylvania. She is most well-known for her work blending neural and systems engineering to identify fundamental mechanisms of cognition and disease in human brain networks. She received a B.S. in physics from the Pennsylvania State University and a Ph.D. in physics from the University of Cambridge, UK. Following a postdoctoral position at UC Santa Barbara, she was a Junior Research Fellow at the Sage Center for the Study of the Mind. In 2012, she was named American Psychological Association's `Rising Star' and given an Alumni Achievement Award from the Schreyer Honors College at Pennsylvania State University for extraordinary achievement under the age of 35. In 2014, she was named an Alfred P Sloan Research Fellow and received the MacArthur Fellow Genius Grant. In 2015, she received the IEEE EMBS Early Academic Achievement Award, and was named an ONR Young Investigator. In 2016, she received an NSF CAREER award and was named one of Popular Science's Brilliant 10. She is the founding director of the Penn Network Visualization Program, a combined undergraduate art internship and K-12 outreach program bridging network science and the visual arts. Her work has been supported by the National Science Foundation, the National Institutes of Health, the Army Research Office, the Army Research Laboratory, the Alfred P Sloan Foundation, the John D and Catherine T MacArthur Foundation, and the Office of Naval Research. She lives with her husband and two sons in Wallingford, Pennsylvania.

PLEN-3: High Dimensional Learning with Deep Neural Networks

Friday, December 9, 08:30 – 09:30, Salon ABC

Stéphane Mallat, *Ecole Normale Superieure, France*

Deep convolutional networks have obtained spectacular results for image understanding, audio and medical signal analysis, natural languages... We review their architecture, and analyze their mathematical properties, with many open questions. These architectures seem to linearize important non-linear transformations, while reducing dimensionality with appropriate invariants. They are computed with non-linear contractions, and multiscale linear operators, where wavelets play an important role. Applications are shown for image and audio classification as well as regressions of quantum molecular energies.

Stéphane Mallat received the Ph.D. from the University of Pennsylvania, in 1988. He was then Professor at the Courant Institute of Mathematical Sciences, until 1994. In 1995, he became Professor in Applied Mathematics at Ecole Polytechnique, Paris and Department Chair in 2001. From 2001 to 2007 he was co-founder and CEO of a semiconductor start-up company. In 2012 he joined the Computer Science Department of Ecole Normale Supérieure, in Paris.

Stéphane Mallat's research interests include learning, signal processing, and harmonic analysis. He is a member of the French Academy of sciences, an IEEE Fellow and an EUSIPCO Fellow. In 1997, he received the Outstanding Achievement Award from the SPIE Society and was a plenary lecturer at the International Congress of Mathematicians in 1998. He also received the 2004 European IST Grand prize, the 2004 INIST-CNRS prize for most cited French researcher in engineering and computer science, the 2007 EADS grand prize of the French Academy of Sciences, the 2013 Innovation medal of the CNRS, and the 2015 IEEE Signal Processing best sustaining paper award.

Panel Session

Perspectives on Machine Learning

Thursday, December 8, 13:00 - 13:45, Salon 2

Machine learning and artificial intelligence can be found in everyday applications ranging from autonomous navigation, to extracting information from 'Big Data'. The application of machine learning raises a number of interesting and diverse questions. For example, how have aspects of machine learning positively and/or adversely impacted our everyday lives (e.g., smart phones), and is it someday possible for machine learning to provide a comprehensive framework for knowledge representation and reasoning? An expert panel made up of program managers and researchers from multiple government agencies will discuss these topics and more, as well as where future investments may lead.

Moderator

Brian Sadler, ARL

Brian M. Sadler is the Army Senior Scientist for Intelligent Systems, and General Co-Chair of GlobalSIP'16. He is a Fellow of IEEE, and a Fellow of the Army Research Laboratory. He is an IEEE Signal Processing Society Distinguished Lecturer for 2017-2018, and his lecture topics include distributed collaborative intelligent systems, human-autonomy querying and interaction, and autonomous networking.

Panelists

David Aha, U.S. Naval Research Laboratory
Charles Clancy, Virginia Tech
Jill Crisman, Intelligence Advanced Research Projects Activity (IARPA)
Tom Rondeau, Defense Advanced Research Projects Agency (DARPA)
Paul Tilghman, Defense Advanced Research Projects Agency (DARPA)

Dr. David W. Aha (UCI, 1990) leads the Adaptive Systems Section within the U.S. Naval Research Laboratory's Navy Center for Applied Research in Artificial Intelligence. His research interests include goal reasoning, case-based reasoning, mixed-initiative interaction, machine learning, planning, text analysis, and related topics pertaining to intelligent decision aids. He was a AAAI Councilor, founded the UCI Repository of Machine Learning Databases, co-founded the AI Video Competitions, and has received three Best Paper awards. David has (co)organized 24 international research events, (co)edited three special journal issues on AI topics, participated on 14 dissertation committees, serves on the editorial boards for three journals, and serves annually on the PCs for several conferences, workshops, and doctoral symposiums.

Dr. Charles Clancy is an Associate Professor of Electrical and Computer Engineering at Virginia Tech and directs of the Hume Center for National Security and Technology. Prior to joining Virginia Tech in 2010, he served as a senior researcher at the Laboratory for Telecommunications Sciences, a defense research lab at the University of Maryland, where he led research programs in software-defined and cognitive radio. Dr. Clancy received his B.S. in Computer Engineering from the Rose-Hulman Institute of Technology, M.S. in Electrical Engineering from the University of Illinois, and his Ph.D. in Computer Science from the University of Maryland. He is a Senior Member of the IEEE and has over 150 peer-reviewed technical publications. His current research interests include cognitive communications and spectrum security.

From December 2010-September 2016, **Dr. Jill Crisman** was a Program Manager at Intelligence Advanced Research Projects Activity (IARPA) in the Incisive Analysis Office. She created and directed the Finder Program which developed technologies to geolocate where a query image or video was taken based on the query's content alone. She also directed the Aladdin Video program which developed technologies that can quickly search massive video collections for a user's events-of-interest. She is currently Chief Scientist at Next Century Corporation.

Dr. Jill Crisman came to IARPA after over 20 years in academia and industry. Dr. Crisman participated in both DARPA Grand and Urban Challenges and developed algorithms for 3D reconstruction while at SAIC. She was a founding faculty member of the Franklin W. Olin College of Engineering where she created project courses to help reinforce learning in co-taught physics and mathematics courses. Dr. Crisman was Director of the Robotics and Vision Systems Laboratory at Northeastern University where she collaborated with colleagues on many projects including development of a robot hand, wheelchair, and lobster. She received her Ph.D.in Electrical and Computer Engineering from Carnegie Mellon University and has authored over 50 academic publications.

Dr. Tom Rondeau joined DARPA as a program manager in the Microsystems Technology Office in May 2016. His research interests include adaptive and reconfigurable radios, improving the development cycle for new signal-processing techniques, and creating general purpose electromagnetic systems.

Prior to joining DARPA, Dr. Rondeau was the maintainer and lead developer of the GNU Radio project and a consultant on signal processing and wireless communications. He worked as a visiting researcher with the University of Pennsylvania and as an Adjunct with the IDA Center for Communications Research in Princeton, NJ. In these roles, he helped push forward architectures and algorithms in signal processing for communications, signal analysis, and spectrum monitoring and usage.

Dr. Rondeau is active in many conferences and workshops around the world to help further research and technology in these areas, and he has consulted with many companies and government organizations on new techniques in wireless signal processing. He has published widely in the fields of wireless communications, software radio, and cognitive radio. Dr. Rondeau holds a Ph.D. in electrical engineering from Virginia Tech and won the 2007 Outstanding Dissertation Award in math, science, and engineering from the Council of Graduate Schools for his work in artificial intelligence in wireless communications.

Mr. Paul Tilghman joined DARPA in December 2014 as a Program Manager in the Microsystems Technology Office. His research interests include intelligent and adaptive RF systems, digital signal processing, machine learning, wireless communications and electronic warfare. Prior to joining DARPA, Mr. Tilghman was a senior research engineer at Lockheed Martin's Advanced Technology Laboratories where he led programs in adaptive electronic warfare, signals intelligence and non-cooperative geolocation. While at Lockheed Martin, Tilghman led the development of a real-time cognitive electronic warfare system, which used machine learning techniques to characterize and counter previously unknown radio emitters on the battlefield. He is a recipient of Lockheed Martin's highest award, the NOVA award, and was also previously honored as the company's Engineer of the Year. Mr. Tilghman received a bachelor of science in computer engineering from the Rochester Institute of Technology and a master of science in electrical engineering from Drexel University.

Workshop by The MathWorks

Signal Processing for Sensing and Machine Learning

Wednesday, December 7, 14:00–17:00, Salon 2

Presenter: Kirthi K. Devleker

In the past few years we have witnessed an explosion in embedded sensors and the sheer volume of signal data generated across a range of industry segments. Applications that utilize the signal data must be able to acquire, process and derive insights from the signal data efficiently. They usually require the joint use of signal processing and machine learning techniques on the time series and sensor data sent by wearable devices to classify activities and identify any abnormal physiological conditions.

In this workshop you will learn how you can accelerate the development of such data analytics and sensor processing systems in a single environment with a full range of modeling, classification, and design capabilities. Specifically we will focus on these topics in detail:

- Exploring different classification algorithms and identifying physical activity from accelerometer signals generated by a smartphone
- Processing real world ECG signals and computing heart rate accurately using feature extraction algorithms in MATLAB
- Exploring the fundamentals of deep learning and its use to solve computer vision problems (e.g. object detection and object recognition using convolutional neural networks)
- Noise and vibration signal processing and feature extraction for machine health monitoring
- Accelerating the processing of large datasets using parallel computing

Kirthi K. Devleker is a product manager in the area of Signal Processing and Communications at MathWorks. Kirthi regularly interacts with customers to help them adopt MATLAB & Signal Processing tools and has been with MathWorks for 6 years. He has a Masters in Electrical Engineering from San Jose State University.

Registration Hours

The GlobalSIP 2016 Registration Desk is located in the Grand Foyer. Hours of operation are:

Tuesday, December 6..... 12:00 - 17:00
Wednesday, December 7 ..... 07:00 - 19:15
Thursday, December 8 ..... 07:30 - 19:15
Friday, December 9 ..... 08:00 - 17:00

Getting Around in Washington, DC

Metro During the Conference

The Crystal Gateway Marriott is conveniently located on the DC Metro (WMATA) routes. Take the Yellow or Blue line to the Crystal City Station. The hotel lobby is connected to the Crystal City Station through an interior pedestrian concourse within the complex of Crystal City Shops, without going outdoors.

The Metro is an excellent way to explore all of Washington, D.C. and the surrounding communities. Use the Trip Planner to create a customized route from your location to anywhere else in the D.C. Metro area. Consider purchasing a MetroRail Pass for a day or a week with unlimited travel on the Metro during your visit to Washington.

Trip Planner: http://www.wmata.com/rider_tools/tripplanner/tripplanner.cfm

Parking

The cost to park at the hotel is either US$ 29/day (self parking) or US$34/day (valet parking).

Car Rental at the Hotel

Hertz tel. +1-703-271-5245

Bicycling

When weather permits, biking is a good way to beat the traffic or enjoy the riding pleasure. CapitalBikeShare is available in the metropolitan area. We suggest you look at the details here: http://www.capitalbikeshare.com/. The area around the hotel has several racks and bikes are usually available.

Restaurants

The hotel is connected to the Crystal City Metro Station through the Crystal City Shops, where you can find markets, shops, restaurants without going outdoors.

Yelp: how to see which good restaurants that people are talking about: yelp it. Download the yelp app if you do not have it yet. People in DC yelp a lot.

Groceries: If you prefer to go to the grocery store, there are convenient stores within Crystal City Shops that can be accessed from hotel lobby. For more options, there is a Costco, a Seven-eleven, and a Harris Teeter (grocery store near the Pentagon City metro station) nearby.

Delivery: If you want your food delivered to the hotel then one option (that is different from pizza) is UberEats: https://eats.uber.com/. Make sure you enter "1700 Jefferson Davis Highway, Arlington, VA". The delivery times range from 30 to 55 minutes, and the number of restaurants available is around 100 (depending on which ones are open at the time).

Food trucks are hot (and yummy) in DC right now. And, it turns out, on Thursday they park 0.2 miles from the hotel. Check here when we are closer to the conference week to see which truck will be there! (from 11 am to 2 pm): http://www.crystalcity.org/do/food-truck-thursdays1

Restaurants: Two shopping areas in Crystal City are nearby where you can find plenty of restaurants from fast casual to fine dining. They are: *Crystal City Shops* to the southeast and *Pentagon Row* to the northwest of the hotel. Of course, dining options abound when you take metro to downtown DC.

Southeast *(within 0.5 miles of the hotel)*: go southeast (0.5 miles) to find restaurants within walking distance. Many of them are connected to the hotel through interior pedestrian concourses of Crystal City Shops. See the map and directory at http://www.thecrystalcityshops.com. You can also find bars and restaurants to the south along the 23rd Street.

Northwest *(approx. 1 mile)*: if you prefer to walk closer to 1 mile, you may go northwest from the hotel towards the direction of the Pentagon City metro station.

You can take the metro to the Pentagon City Station. Within walking distance (less than 0.2 miles) of that station there are many restaurants, some spas, and spots to drink and chat with colleagues. Check out their site here: http://pentagonrow.com/. If you prefer to walk there, it should take less than 20 min.

Venue

Crystal Gateway Marriott
1700 Jefferson Davis Highway
Arlington, VA 22202, US
Phone: +1-703-920-3230

URL: http://www.marriott.com/hotels/travel/wasgw-crystal-gateway-marriott/

Internet Access

GlobalSIP 2016 attendees staying at the Crystal Gateway Marriott have free WiFi Internet access in the guest rooms. Follow the instructions provided to you when you checked into your hotel room.

Free WiFi Internet access is also available to all attendees in the hotel foyer area, as well as the session & meeting rooms. Connect to network "**IEEE**" and use the password "**globalsip**" to join the network.

Social Events

Welcome Reception

Wednesday, December 7, 17:45 - 19:15, Grand Foyer

Catch up on news from long-time colleagues and make new friends at the opening reception. Enjoy a selection of hors'd'voures along with your choice of wine, beer or soda.

Evening Reception

Thursday, December 8, 17:45 - 19:15, Grand Foyer

Light hors'd'voures and soft drinks.

Young Professionals Event

Thursday, December 8, 17:30 - 19:00, Salon 2

Other Events

Associate Editors Best Practices Discussion

Thursday, December 8, 10:00 - 12:00, Rosslyn I (2nd floor)

Ethics for Authors and Volunteers - Things You Should Know Before Submitting Your Next Paper

Thursday, December 8, 12:30 - 14:00, Rosslyn II (2nd floor)

This presentation and discussion will focus on what to do–and what not to do–for successfully publishing a technical paper (and avoiding common mistakes that can result in a quick rejection). Navigate the review process more smoothly with insider information about peer-review and by better understanding the ethics and etiquette standards that authors are expected to uphold and that reviewers and editors are looking for.

GlobalSIP to GlobalSIP Meeting

Friday, December 9, 11:30 - 14:00, Rosslyn I (2nd floor)

Presentations on SigPort

Many GlobalSIP 2016 presenters have provided their presentation notes on IEEE Signal Processing Society's SigPort system. The GlobalSIP 2016 page on SigPort is https://www.sigport.org/events/documents/GlobalSIP-2016

GlobalSIP 2016 Supporters

GlobalSIP 2016 thanks the following for their support of the conference and student travel grants!

IEEE Signal Processing Society®

Technical Sponsor and Student Travel Support

MathWorks®

Bronze Supporter

NSF

Student Travel Support

Secure Broadcasting with Independent Secret Keys

H. Vincent Poor, Princeton University

Information Theoretic Security (ITS) was introduced by Claude Shannon in 1948. In Shannon's setting the legitimate parties share a common secret key but communicate over a public noiseless channel, which can be wiretapped by an eavesdropper. Shannon's main result was to establish the minimum key-rate necessary to guarantee ITS against the eavesdropper. Wyner introduced the wiretap channel in 1975, where the legitimate parties communicate over a (possibly) noisy channel, which could be wiretapped by an eavesdropper over another noisy channel. Wyner established the maximum communication rate in this setting, while guaranteeing ITS (in an asymptotic sense) against the eavesdropper.

In this talk we will review the above results and then introduce a new setting where a single (common) message must be transmitted to two receivers over a wiretap channel. In addition we assume that the transmitter shares an independent secret key with each of the two receivers not known to the eavesdropper. We will explain how the coding techniques developed by Shannon and Wyner can be unified in this setting. By focusing on the "degraded" channel model, we will discuss conditions under which the following approaches are optimal (i) using secret-keys as one-time pads and ignoring the contribution of the noisy channel (ii) ignoring the secret-keys and only relying on the noisy channel (iii) hybrid schemes that combine both approaches.

Distributed Hypothesis Testing on Graphs

Angelia Nedic, Arizona State University

We will consider the problem of distributed cooperative non-Bayesian learning in a network of agents, where the agents are repeatedly gaining partial information about an unknown random variable whose distribution is to be jointly estimated. The joint objective of the agent system is to globally agree on a hypothesis (distribution) that best describes the observed data by all agents in the network. Interactions between agents occur according to an unknown sequence of time-varying graphs. We highlight some interesting aspects of Bayesian learning and stochastic approximation approach for the case of a single agent, which has not been observed before and it allows for a new connection between optimization and statistical learning. Then, we discuss and analyze the general case where subsets of agents have conflicting hypothesis models, in the sense that the optimal solutions are different if the subset of agents were isolated. Additionally, we provide a new non-Bayesian learning protocol that converges an order of magnitude faster than the learning protocols currently available in the literature for arbitrary fixed undirected graphs. Our results establish consistency and a non-asymptotic, explicit, geometric convergence rate for the learning dynamics.

Online Learning and Management of Future Cyber-Physical Networks

Georgios B. Giannakis, University of Minnesota

Cyber-physical systems (CPS) are engineered systems with built-in seamless integration of computational and physical components. Fundamental advances in sensing, learning, control, and information technologies, are well motivated to endow CPS with resilience, adaptability, scalability, and sustainability. In this context, the present talk will start with online convex optimization algorithms for estimating the state of future power grids. A framework will be then introduced for joint active and reactive power control in distribution grids, which also accounts for stochastic constraints of voltages and inverters to reduce losses. Efficacy of the novel approaches will be assessed using standard IEEE power grid benchmark distribution feeders. Leveraging statistical inference and stochastic optimization tools, the final topic will deal with state-of-the-art learning-aided management for sustainable data centers. Both analytical and empirical results will demonstrate how valuable insights from big data analytics can lead to markedly improved management policies by learning from historical user and network patterns.

Sampling on Graphs

Jelena Kovačević, Carnegie Mellon University

With the explosive growth of information and communication, signals are generated at an unprecedented rate from various sources, including social, citation, biological, and physical infrastructure, among others.

Unlike time-series signals or images, these signals possess complex, irregular structure, which requires novel processing techniques leading to the emerging field of signal processing on graphs.

Signal processing on graphs extends classical discrete signal processing to signals with an underlying complex, irregular structure. The framework models that underlying structure by a graph and signals by graph signals, generalizing concepts and tools from classical discrete signal processing to graph signal processing. I will talk about graph signal processing, and, in particular, the classical signal processing task of sampling and interpolation within the framework of signal processing on graphs. As the bridge connecting sequences and functions, classical sampling theory shows that a bandlimited function can be perfectly recovered from its sampled sequence if the sampling rate is high enough. I will follow up with a number of applications where sampling on graphs is of interest.

Understanding Video of Crowded Environments

Nuno Vasconcelos, University of California, San Diego

Classical work in computer vision has emphasized the study of individual objects, e.g. object recognition or tracking. More recently, it has been realized that most of these approaches do not scale well to scenes that depict crowded environments. These are scenes with many objects, which are imaged at low resolution, and interact in complex ways. Solving vision problems in these environments requires the ability to model and reason about a crowd as a whole. I will review recent work in my lab in this area, including the design of statistical models for the appearance and dynamics of crowd video with multiple flows, and their application to the solution of problems such as crowd counting, dynamic background subtraction, anomaly detection, domain adaptation, and crowd activity analysis.

On Optimization of Sensor Management Policies for Distributed Estimation

Pramod K. Varshney, Syracuse University

Wireless Sensor Networks (WSNs) often operate in environments where available energy and bandwidth are limited. It is imperative that suitable resource management policies be adopted to maximize system performance while prolonging the lifetime of the WSN. This talk will provide a review of the current state-of-the-art of sensor management approaches for distributed estimation problems. This will be followed by a more detailed discussion on optimization of sensor management policies for distributed estimation including sensor selection, sensor scheduling and sensor collaboration. Sensor management for distributed estimation in crowdsourcing based WSNs will also be discussed.

Compressed Sensing, Deep Learning I

CSDL-1.1 11:00 **COMPRESSIVE CODING VIA RANDOM REPLICATE MIRROR**
Dung Tran, Luoluo Liu, Trac Tran, Johns Hopkins University, United States; Sang Chin, Boston University, United States; Jeffrey Korn, Eric Hoke, Draper laboratory, United States

CSDL-1.2 11:20 **APPROXIMATE SUPPORT RECOVERY OF ATOMIC LINE SPECTRAL ESTIMATION: A TALE OF RESOLUTION AND PRECISION**
Qiuwei Li, Gongguo Tang, Colorado School of Mines, United States

CSDL-1.3 11:40 **ITERATIVE ULTRASONIC IMAGE RECONSTRUCTION BY QUADTREE MESHES USING TARGET SPARSITY**
Yuanwei Jin, University of Maryland Eastern Shore, United States; Chengdong Dong, Shanghai University of Finance and Economics, China; Enyue Lu, Salisbury University, United States

CSDL-1.4 12:00 **COUPLED DICTIONARY LEARNING FOR MULTIMODAL IMAGE SUPER-RESOLUTION**
Pingfan Song, Joao Mota, University College London, United Kingdom; Nikos Deligiannis, Vrije Universiteit Brussel, Belgium; Miguel Rodrigues, University College London, United Kingdom

Information Theoretic Approaches to Security and Privacy I

Session Chair: Onur Günlü, Technical University of Munich

ITSP-1.1 11:00 **THE CAPACITY OF PRIVATE INFORMATION RETRIEVAL WITH COLLUDING DATABASES**
Hua Sun, Syed Jafar, University of California Irvine, United States

ITSP-1.2 11:20 **ON DETERMINISTIC IC WITH COMMON AND PRIVATE MESSAGE UNDER SECURITY CONSTRAINTS**
Hendrik Vogt, Zohaib Hassan Awan, Aydin Sezgin, Ruhr-Universität Bochum, Germany

ITSP-1.3 11:40 **ON THE DUALITY BETWEEN STATE-DEPENDENT CHANNELS AND WIRETAP CHANNELS**
David Kibloff, Samir M. Perlaza, INRIA, France; Guillaume Villemaud, Leonardo Cardoso, INSA de Lyon, France

ITSP-1.4 12:00 **THE MISO WIRETAP CHANNEL WITH CHANNEL UNCERTAINTY: ASYMPTOTIC PERSPECTIVES**
Anas Chaaban, King Abdullah University of Science and Technology, Saudi Arabia; Zouheir Rezki, University of Idaho, United States; Basel Alomair, KACST, Saudi Arabia; Mohamed-Slim Alouini, King Abdullah University of Science and Technology, Saudi Arabia

Wednesday, December 7 | 11:00 - 12:20

Lecture Session | SGI-1 | Salon C

State Estimation

Session Chair: Vassilis Kekatos, Virginia Tech

SGI-1.1 11:00 **POWER SYSTEM STATE ESTIMATION VIA FEASIBLE POINT PURSUIT**
Gang Wang, Ahmed S. Zamzam, Georgios B. Giannakis, Nicholas D. Sidiropoulos, University of Minnesota, United States

SGI-1.2 11:20 **DISTRIBUTED ESTIMATION OF THE OPERATING STATE OF A SINGLE-BUS DC MICROGRID WITHOUT AN EXTERNAL COMMUNICATION INTERFACE**
Marko Angjelichinoski, Aalborg University, Denmark; Anna Scaglione, Arizona State University, United States; Petar Popovski, Cedomir Stefanovic, Aalborg University, Denmark

SGI-1.3 11:40 **ON IDENTIFIABILITY OF SPARSE GROSS ERRORS IN POWER SYSTEM MEASUREMENTS**
Jinsub Kim, Sharmin Kibria, Oregon State University, United States

SGI-1.4 12:00 **AUTOMATIC REGIONALIZATION ALGORITHM FOR DISTRIBUTED STATE ESTIMATION IN POWER SYSTEMS**
Dexin Wang, Liuqing Yang, Colorado State University, United States; Anthony Florita, S M Shafiul Alam, Tarek Elgindy, Bri-Mathias Hodge, National Renewable Energy Laboratory, United States

Wednesday, December 7 | 11:00 - 12:20

Lecture Session | SPBD-1 | Salon H

Signal Processing of Big Data I

Session Chair: Lav R. Varshney, University of Illinois at Urbana-Champaign

SPBD-1.1 11:00 **NEAR-OPTIMALITY OF GREEDY SET SELECTION IN THE SAMPLING OF GRAPH SIGNALS**
Luiz F. O. Chamon, Alejandro Ribeiro, University of Pennsylvania, United States

SPBD-1.2 11:20 **MONITORING MANHATTAN'S TRAFFIC AT 5 INTERSECTIONS?**
Siheng Chen, Yaoqing Yang, Christos Faloutsos, Jelena Kovacevic, Carnegie Mellon University, United States

SPBD-1.3 11:40 **NEW YORK CITY TAXI ANALYSIS WITH GRAPH SIGNAL PROCESSING**
Joya A. Deri, José M.F. Moura, Carnegie Mellon University, United States

SPBD-1.4 12:00 **PARAFAC-BASED MULTILINEAR SUBSPACE CLUSTERING FOR TENSOR DATA**
Panagiotis Traganitis, Georgios B. Giannakis, University of Minnesota, United States

Signal Processing for Understanding Crowd Dynamics I

Session Chair: Lucio Marcenaro, University of Genova

UCD-1.1 11:00 **CROWD ANALYTICS VIA ONE SHOT LEARNING AND AGENT BASED INFERENCE**
Peter Tu, Ming-Ching Chang, Tao Gao, General Electric, United States

UCD-1.3 11:40 **MODELING CROWDS AS SINGLE-MINDED ENTITIES**
Oscar J. Urizar, Emilia I. Barakova, Eindhoven University of Technology, Netherlands; Carlo S. Regazzoni, University of Genova, Italy; Matthias Rauterberg, Eindhoven University of Technology, Netherlands

The MIMOME Channel

Ashish Khisti, University of Toronto

While multiple antennas provide a natural mechanism for securing wireless communications at a physical layer, both the fundamental limits and practical coding schemes for the Multi-Input-Multi-Output-Multi-Eavesdropper (MIMOME) channel have only been developed in the last few years.

We first discuss how to design a layered coding scheme for the MIMOME channel that achieves the secrecy capacity. Our scheme only uses codes for the scalar wiretap channel, and successive interference cancellation at the receiver, as in traditional V-Blast schemes. Our approach is based on simultaneous joint unitary triangularization of the channel matrices of the legitimate user and the eavesdropper. As a byproduct it also provides a more transparent understanding of the structure of the optimal covariance matrix for the MIMOME channel.

In the second part of the talk we will consider the case when there are only a limited number of RF chains in the MIMOME system. We will discuss how Artificial Noise based Secure-MIMO schemes can be used in such systems, and discuss the constraints on the beam-forming vectors, and propose some novel solutions to these.

Wednesday, December 7 14:00 - 15:40

Lecture Session CSDL-2 Salon K

Compressed Sensing, Deep Learning II

CSDL-2.1 14:00 **A FAST ITERATIVE ALGORITHM FOR DEMIXING SPARSE SIGNALS FROM NONLINEAR OBSERVATIONS**
Mohammadreza Soltani, Chinmay Hegde, Iowa State University, United States

CSDL-2.2 14:20 **ACTIVE REGRESSION WITH COMPRESSIVE-SENSING BASED OUTLIER MITIGATION FOR BOTH SMALL AND LARGE OUTLIERS**
Jian Zheng, Xiaohua Li, State University of New York at Binghamton, United States

CSDL-2.3 14:40 **BURN SCAR DETECTION USING CLOUDY MODIS IMAGES VIA LOW-RANK AND SPARSITY-BASED MODELS**
Minh Dao, The Johns Hopkins University, United States; Chiman Kwan, Bulent Ayhan, Applied Research LLC, United States; Trac Tran, The Johns Hopkins University, United States

CSDL-2.4 15:00 **SPARSITY-BASED FUSION OF MULTIPLE SENSORS AND MULTIPLE FEATURES FOR ACOUSTIC TRANSIENTS CLASSIFICATION**
Minh Dao, Tung-Duong Tran-Luu, U.S. Army Research Laboratory, United States; Nasser Nasrabadi, West Virginia University, United States

Wednesday, December 7 14:00 - 15:40

Keynote + Lecture Session ITSP-2 Salon B

Information Theoretic Approaches to Security and Privacy II

Session Chair: David Kibloff, INRIA

ITSP-K2 14:00 **Keynote: SECURE BROADCASTING OVER A WIRETAP CHANNEL USING SHARED SECRET KEYS**
Ashish Khisti, University of Toronto

ITSP-2.4 15:00 **ACHIEVING SEMANTIC SECURITY WITHOUT KEYS THROUGH CODING AND ALL-OR-NOTHING TRANSFORMS OVER WIRELESS CHANNELS**
Marco Baldi, Linda Senigagliesi, Franco Chiaraluce, Università Politecnica delle Marche, Italy

ITSP-2.5 15:20 **ON THE INPUT DISTRIBUTION AND OPTIMAL BEAMFORMING FOR THE MISO VLC WIRETAP CHANNEL**
Mohamed Amine Arfaoui, Texas A&M University at Qatar, Qatar; Zouheir Rezki, University of Idaho, United States; Ali Ghrayeb, Texas A&M University at Qatar, Qatar; Mohamed-Slim Alouini, King Abdullah University of Science and Technology, Saudi Arabia

Distributed Information Processing, Optimization, and Resource Management over Networks I

Session Chair: Alejandro Ribeiro, University of Pennsylvania

RMN-1.1 14:00 **A PROJECTION-FREE DECENTRALIZED ALGORITHM FOR NON-CONVEX OPTIMIZATION**
Hoi-To Wai, Anna Scaglione, Arizona State University, United States; Jean Lafond, Telecom ParisTech, France; Eric Moulines, Ecole Polytechnique, France

RMN-1.2 14:20 **DISTRIBUTED FIRST AND SECOND ORDER METHODS WITH INCREASING NUMBER OF WORKING NODES**
Dusan Jakovetic, Natasa Krklec Jerinkic, Natasa Krejic, Dragana Bajovic, University of Novi Sad, Serbia

RMN-1.3 14:40 **LINEARLY CONVERGENT DECENTRALIZED CONSENSUS OPTIMIZATION OVER DIRECTED NETWORKS**
Angelia Nedich, Alex Olshevsky, Wei Shi, University of Illinois at Urbana-Champaign, United States

RMN-1.4 15:00 **ROBUST GROUP LASSO OVER DECENTRALIZED NETWORKS**
Manxi Wang, Yongcheng Li, State Key Laboratory of Complex Electromagnetic Environment Effects on Electronics and Information System, China; Xiaohan Wei, University of Southern California, United States; Qing Ling, University of Science and Technology of China, China

RMN-1.5 15:20 **DISTRIBUTED FICTITIOUS PLAY FOR MULTI-AGENT SYSTEMS WITH UNCERTAINTY**
Ceyhun Eksin, Georgia Institute of Technology, United States; Alejandro Ribeiro, University of Pennsylvania, United States

Measurement-based Smart Grid Analytics

Session Chair: Abdallah Farraj, University of Toronto

SGI-2.1 14:00 **COHERENCE FUNCTION ESTIMATION WITH A DERIVATIVE CONSTRAINT FOR POWER GRID OSCILLATION DETECTION**
Mohammadreza Ghorbaniparvar, Ning Zhou, Xiaohua Li, Binghamton University, United States

SGI-2.2 14:20 **PERSISTENT-HOMOLOGY-BASED DETECTION OF POWER SYSTEM LOW-FREQUENCY OSCILLATIONS USING PMUS**
Yang Chen, PJM Interconnection, United States; Harish Chintakunta, Florida Polytechnic University, United States; Le Xie, Texas A&M University, United States; Yuliy Baryshnikov, University of Illinois at Urbana-Champaign, United States; P. R. Kumar, Texas A&M University, United States

SGI-2.3 14:40 **MULTIVARIATE EMPIRICAL MODE DECOMPOSITION BASED SIGNAL ANALYSIS AND EFFICIENT-STORAGE IN SMART GRID**
Liu Liu, University of Tennessee, United States; Austin Albright, Oak Ridge National Laboratory, United States; Alireza Rahimpour, Jiahui Guo, Hairong Qi, Yilu Liu, University of Tennessee, United States

SGI-2.4 15:00 **ANTICIPATORY SYSTEM FOR DETECTION OF HIDDEN FACILITIES UTILIZING NODAL LOAD CONSUMPTION INFORMATION IN SMART GRIDS**
Miltiadis Alamaniotis, Lefteri Tsoukalas, Purdue University, United States

SGI-2.5 15:20 **EFFICIENT NEURAL NETWORK ARCHITECTURE FOR TOPOLOGY IDENTIFICATION IN SMART GRID**
Yue Zhao, Stony Brook University, United States; Jianshu Chen, Microsoft Research, United States; H. Vincent Poor, Princeton University, United States

Signal Processing of Big Data II

Session Chair: Patrick Wolfe, University College London

SPBD-2.1 14:00 **THE BRAIN STRATEGY FOR ONLINE LEARNING**
Stefan Vlaski, Bicheng Ying, Ali Sayed, University of California, Los Angeles, United States

SPBD-2.2 14:20 **STABLE ESTIMATION OF GRANGER-CAUSAL FACTORS OF COUNTRY-LEVEL INNOVATION**
Aurelie Lozano, Prasanna Sattigeri, Aleksandra Mojsilovic, Kush Varshney, IBM Thomas J. Watson Research Center, United States

SPBD-2.3 14:40 **SUBMODULAR MAXIMIZATION WITH MULTI-KNAPSACK CONSTRAINTS AND ITS APPLICATIONS IN SCIENTIFIC LITERATURE RECOMMENDATIONS**
Qilian Yu, University of California, Davis, United States; Easton Li Xu, Texas A&M University, United States; Shuguang Cui, University of California, Davis, United States

SPBD-2.4 15:00 **EXTRACTING SIGNALS FROM NEWS STREAMS FOR DISEASE OUTBREAK PREDICTION**
Sunandan Chakraborty, Lakshminarayanan Subramanian, New York University, United States

Signal Processing for Understanding Crowd Dynamics II

Session Chair: Peter Tu, GE Global Research

UCD-2.1 14:00 **AN ANALYSIS OF THE ROBUSTNESS OF DEEP FACE RECOGNITION NETWORKS TO NOISY TRAINING LABELS**
Christopher Reale, University of Maryland, United States; Nasser Nasrabadi, West Virginia University, United States; Rama Chellappa, University of Maryland, United States

UCD-2.2 14:20 **A GAME-THEORETIC MODELING OF POPULARITY DYNAMICS**
Xuanyu Cao, University of Maryland, United States; Yan Chen, University of Electronic Science and Technology of China, China; K.J. Ray Liu, University of Maryland, United States

UCD-2.3 14:40 **DATA MINING THE UNDERLYING TRUST IN THE US CONGRESS**
Xiaoxiao Wu, Hoi-To Wai, Anna Scaglione, Arizona State University, United States

UCD-2.4 15:00 **ACTIVE SPEAKER DETECTION IN HUMAN MACHINE MULTIPARTY DIALOGUE USING VISUAL PROSODY INFORMATION**
Fasih Haider, Trinity College Dublin, Ireland; Saturnino Luz, University of Edinburgh, United Kingdom; Nick Campbell, Trinity College Dublin, Ireland

UCD-2.5 15:20 **THE CROWD CONGESTION LEVEL - A NEW MEASURE FOR RISK ASSESSMENT IN VIDEO-BASED CROWD MONITORING**
Sebastian Bek, Eduardo Monari, Fraunhofer Institute of Optronics, System Technologies and Image Exploitation (IOSB), Germany

General Symposium Poster: Source Separation and Deconvolution

Session Chair: Brian Mark, George Mason University

GS-P1.1 DEFLATIONARY BLIND SOURCE EXTRACTION USING AN EXACT SOLUTION SUBSPACE SEARCHING SCHEME
Mingjian Zhang, Hunan Police Academy, China; Xiaohua Li, State University of New York at Binghamton, United States

GS-P1.2 PROJECTIONS ONTO THE EPIGRAPH SET OF THE FILTERED VARIATION FUNCTION BASED DECONVOLUTION ALGORITHM
Mohammad Tofighi, The Pennsylvania State University, United States; A. Enis Cetin, Bilkent University, Turkey

GS-P1.3 ROBUST REGULARIZED LEAST-SQUARES BEAMFORMING APPROACH TO SIGNAL ESTIMATION
Mohamed Suliman, Tarig Ballal, Tareq Y. Al-Naffouri, King Abdullah University of Science and Technology, Saudi Arabia

GS-P1.4 ROBUST PCA: LOW RANK MATRIX ESTIMATION WITH HARD OR SOFT THRESHOLDING-BASED OUTLIER REJECTION
Brian Moore, Raj Rao Nadakuditi, University of Michigan, United States

Cognitive Radars: Some Applications

Maria Sabrina Greco, University of Pisa

This paper focuses on some applications of cognitive radars. Cognitive radars are systems based on a perception-action cycle that sense the environment and learn from it important information on the target and its background, then adapt the transmitted waveform to optimally satisfy the needs of their mission according to a desired goal. Both active and passive radars are considered, highlighting the limits and the path forward. In particular, we here consider cognitive active radars that work in spectrally dense environments and change the transmitted waveform on-the-fly to avoid interference with the primary user of the channel, such as broadcast or communication systems.

We also describe cognitive passive radars, which contrary to the active ones cannot directly change the transmitted waveforms on-the-fly but can instead select the best source of opportunity to improve the detection and tracking performance.

Machine Learning for Characterization of Cognitive Communications and Radar I

Session Chair: George Stantchev, Naval Research Laboratory

CCR-K1 16:10 **Keynote: COGNITIVE RADARS: SOME APPLICATIONS**
Maria S. Greco, Fulvio Gini, Pietro Stinco, University of Pisa, Italy

CCR-1.3 16:50 **TARGET DETECTION AND RCS AMPLITUDE ESTIMATION IN LARGE-SCALE MIMO RADAR USING FREE PROBABILITY THEORY**
Hong Jiang, Wenbo Zhang, Yin Li, Jilin University, China

CCR-1.4 17:10 **OPTIMAL EXPLOITATION OF FLUCTUATING TARGET MEASUREMENTS**
Chris Kreucher, Paul Bierdz, IAI, United States; Kristine Bell, Metron Scientific Solutions, United States

Compressed Sensing, Deep Learning III

Session Chair: Piya Pal, University of California, San Diego

CSDL-3.1 16:10 **PAIRWISE INTERACTION ANALYSIS OF LOGISTIC REGRESSION MODELS**
Easton Li Xu, Xiaoning Qian, Tie Liu, Texas A&M University, United States; Shuguang Cui, University of California, Davis, United States

CSDL-3.2 16:30 **RECONSTRUCTION OF SPARSE VECTORS IN COMPRESSIVE SENSING WITH MULTIPLE MEASUREMENT VECTORS USING BIDIRECTIONAL LONG SHORT-TERM MEMORY**
Hamid Palangi, Rabab Ward, University of British Columbia, Canada; Li Deng, Microsoft Research, United States

CSDL-3.3 16:50 **GHOSTING SUPPRESSION FOR INCREMENTAL PRINCIPAL COMPONENT PURSUIT ALGORITHMS**
Paul Rodriguez, PUCP, Peru; Brendt Wohlberg, LANL, United States

CSDL-3.4 17:10 **SYMMETRIC POLYNOMIAL & CRT BASED ALGORITHMS FOR MULTIPLE FREQUENCY DETERMINATION FROM UNDERSAMPLED WAVEFORMS**
Hanshen Xiao, MIT, United States; Cas Cremers, University of Oxford, United Kingdom; Hari Krishna Garg, National University of Singapore, Singapore

General Symposium: Optical and Visible Light Communications

Session Chair: Brian Mark, George Mason University

GS-1.1 16:10 **DOWNLINK RESOURCE ALLOCATION FOR MULTICHANNEL TDMA VISIBLE LIGHT COMMUNICATIONS**
Amr M. Abdelhady, Osama Amin, Anas Chaaban, Mohamed-Slim Alouini, King Abdullah University of Science and Technology, Saudi Arabia

GS-1.2 16:30 **INTER-CELL INTERFERENCE COORDINATION FOR MULTI-COLOR VISIBLE LIGHT COMMUNICATION NETWORKS**
Kaixiong Zhou, Chen Gong, Qian Gao, Zhengyuan Xu, University of Science and Technology of China, China

GS-1.3 16:50 **OPTICAL WIRELESS SCATTERING COMMUNICATION SYSTEM WITH A NON-IDEAL PHOTON-COUNTING RECEIVER**
Difan Zou, Chen Gong, Zhengyuan Xu, University of Science and Technology of China, China

GS-1.4 17:10 **ACHIEVABLE RATE AND OPTIMAL SIGNALING FOR AN OPTICAL WIRELESS DECODE-AND-FORWARD RELAYING CHANNEL**
Guangtao Zheng, Qian Gao, Cheng Gong, Zhengyuan Xu, University of Science and Technology of China, China

Cyber-physical Attacks and Forensics

Session Chair: Meng Wang, Rensselaer Polytechnic Institute

SGI-3.1 16:10 **ONLINE ROBUST SUBSPACE CLUSTERING FOR ANALYZING INCOMPLETE SYNCHROPHASOR MEASUREMENTS**
Young-hwan Lee, Seung-Jun Kim, University of Maryland, Baltimore County, United States

SGI-3.3 16:50 **LOAD OSCILLATING SMART METER ATTACK**
Carter Lassetter, Eduardo Cotilla-Sanchez, Jinsub Kim, Oregon State University, United States

SGI-3.4 17:10 **ADAPTIVE STATISTICAL DETECTION OF FALSE DATA INJECTION ATTACKS IN SMART GRIDS**
Michael Kallitsis, Merit Network, Inc., United States; Shrijita Bhattacharya, Stilian Stoev, University of Michigan, United States; George Michailidis, University of Florida, United States

Signal Processing of Big Data III

Session Chair: Georgios B. Giannakis, University of Minnesota

SPBD-3.1 16:10 **SPARSE LINEAR REGRESSION VIA GENERALIZED ORTHOGONAL LEAST-SQUARES**
Abolfazl Hashemi, Haris Vikalo, The University of Texas at Austin, United States

SPBD-3.2 16:30 **FAST AND COST-EFFECTIVE GREEDY ALGORITHM FOR COMPRESSIVE SENSING OF LARGE-SCALE SIGNALS**
Sung-Hsien Hsieh, Chun-Shien Lu, Academia Sinica, Taiwan; Soo-Chang Pei, National Taiwan University, Taiwan

SPBD-3.3 16:50 **A DICTIONARY BASED GENERALIZATION OF ROBUST PCA**
Sirisha Rambhatla, Xingguo Li, Jarvis Haupt, University of Minnesota - Twin Cities, United States

SPBD-3.4 17:10 **SCALABLE AND ROBUST PCA APPROACH WITH RANDOM COLUMN/ROW SAMPLING**
Mostafa Rahmani, George Atia, University of Central Florida, United States

Information Theoretic Approaches to Security and Privacy Poster

Session Chair: Ana Chabaan, King Abdullah University of Science and Technology

ITSP-P1.1 **A MINORIZATION-MAXIMIZATION ALGORITHM FOR AN-BASED MIMOME SECRECY RATE MAXIMIZATION**
Mudassir Masood, Ali Ghrayeb, Texas A&M University at Qatar, Qatar; Prabhu Babu, CARE, IIT Delhi, India; Issa Khalil, QCRI, Qatar; Mazen Hasna, Qatar University, Qatar

ITSP-P1.2 **ROBUST ENERGY-EFFICIENT TRANSMIT DESIGN FOR MISOME WIRETAP CHANNELS**
Weidong Mei, Zhi Chen, Jun Fang, University of Electronic Science and Technology of China, China

ITSP-P1.3 **RELIABLE SECRET-KEY BINDING FOR PHYSICAL UNCLONABLE FUNCTIONS WITH TRANSFORM CODING**
Onur Günlü, Technical University of Munich, Germany; Onurcan Iscan, Huawei Technologies Duesseldorf GmbH, Germany; Vladimir Sidorenko, Gerhard Kramer, Technical University of Munich, Germany

ITSP-P1.4 **PHYSICAL LAYER SECURITY GAME WITH FULL-DUPLEX PROACTIVE EAVESDROPPER**
Wei Huang, Wei Chen, Bo Bai, Shidong Zhou, Tsinghua University, China; Zhu Han, University of Houston, United States

ITSP-P1.5 **ACHIEVING FULL SECURE DEGREES-OF-FREEDOM FOR THE MISO WIRETAP CHANNEL WITH AN UNKNOWN EAVESDROPPER**
Mohaned Chraiti, Concordia University, Canada; Ali Ghrayeb, Texas A&M University at Qatar, Qatar; Chadi Assi, Concordia University, Canada

ITSP-P1.6 **STRONG SECRECY CAPACITY OF ARBITRARILY VARYING WIRETAP CHANNELS WITH FINITE COORDINATION RESOURCES**
Ahmed Mansour, Holger Boche, Technische Universität München, Germany

ITSP-P1.7 **PRIVACY PROTECTION: A COMMUNITY-STRUCTURED EVOLUTIONARY GAME APPROACH**
Jun Du, Chunxiao Jiang, Tsinghua University, China; Shui Yu, Deakin University, Australia; Kwang-Cheng Chen, National Taiwan University, Taiwan; Yong Ren, Tsinghua University, China

Distributed Information Processing, Optimization, and Resource Management over Networks Poster

Session Chair: Qing Ling, University of Science and Technology of China

RMN-P1.1 SENSOR PLACEMENT FOR FIELD ESTIMATION VIA POISSON DISK SAMPLING
Sijia Liu, University of Michigan, United States; Nianxia Cao, Pramod K. Varshney, Syracuse University, United States

RMN-P1.2 A ROBUST STATE-TRANSFER ARCHITECTURE FOR DISTRIBUTED AND ASYNCHRONOUS OPTIMIZATION
Tarek Lahlou, Tom Baran, MIT, United States

RMN-P1.3 ON LEADER-FOLLOWER MULTI-AGENT SYSTEMS IN DIRECTED LATTICES
Fu Lin, United Technologies Research Center, United States

RMN-P1.4 DISTRIBUTED LEARNING FOR RESOURCE ALLOCATION UNDER UNCERTAINTY
Panayotis Mertikopoulos, French National Center for Scientific Research, France; E. Veronica Belmega, École Nationale Supérieure de l'Electronique et de ses Applications, France; Luca Sanguinetti, University of Pisa, Italy

RMN-P1.5 DISTRIBUTED REGULARIZED PRIMAL-DUAL METHOD
Masoud Badiei Khuzani, Na Li, Harvard University, United States

RMN-P1.6 SAMPLING AND DISTORTION TRADEOFFS FOR INDIRECT SOURCE RETRIEVAL
Elaheh Mohammadi, Alireza Fallah, Farokh Marvasti, Sharif University of Technology, Iran

RMN-P1.7 A DISTRIBUTED SOLUTION FOR PROPORTIONAL FAIRNESS OPTIMIZATION IN LOAD COUPLED OFDMA NETWORKS
Miguel Angel Gutierrez-Estevez, Renato Luis Garrido Cavalcante, Slawomir Stanczak, Fraunhofer Heinrich Herz Institute, Germany; Jietao Zhang, Hongcheng Zhuang, Huawei Technologies Co., China

RMN-P1.8 DISTRIBUTED SPARSITY-BASED BEARING ESTIMATION WITH A SWARM OF COOPERATIVE AGENTS
Dmitriy Shutin, Siwei Zhang, German Aerospace Center (DLR), Germany

RMN-P1.9 OPPORTUNISTIC SENSING FOR JOINT ENERGY HARVESTING AND CHANNEL ACCESS
Fahira Sangare, University of Houston, United States; Duy Huu Ngoc Nguyen, The University of Texas at Austin, United States; Yong Xiao, Zhu Han, University of Houston, United States

RMN-P1.10 DECENTRALIZED CONSTRAINED CONSENSUS OPTIMIZATION WITH PRIMAL DUAL SPLITTING PROJECTION
Han Zhang, University of Science and Technology of China, China; Wei Shi, University of Illinois at Urbana-Champaign, United States; Aryan Mokhtari, Alejandro Ribeiro, University of Pennsylvania, United States; Qing Ling, University of Science and Technology of China, China

RMN-P1.11 AN ASYNCHRONOUS QUASI-NEWTON METHOD FOR CONSENSUS OPTIMIZATION
Mark Eisen, Aryan Mokhtari, Alejandro Ribeiro, University of Pennsylvania, United States

RMN-P1.12 DISTRIBUTED RAN AND BACKHAUL OPTIMIZATION FOR ENERGY EFFICIENT WIRELESS NETWORKS
Daniyal Amir Awan, Technische Universitaet Berlin, Germany; Renato Luis Garrido Cavalcante, Slawomir Stanczak, Fraunhofer Heinrich Hertz Institute, Germany

RMN-P1.13 IN-NETWORK LINEAR REGRESSION WITH ARBITRARILY SPLIT DATA MATRICES
Francois Cote, Ioannis Psaromiligkos, Warren J. Gross, McGill University, Canada

RMN-P1.14 DISTRIBUTED NETWORK RESOURCE ALLOCATION WITH INTEGER CONSTRAINTS
Yujiao Cheng, Houfeng Huang, Gang Wu, Qing Ling, University of Science and Technology of China, China

Signal Processing for Understanding Crowd Dynamics Poster

Session Chair: Eduardo Monari, Fraunhofer IOSB

UCD-P1.1 SURFACE-BASED BACKGROUND COMPLETION IN 3D SCENE
Po-Jen Lai, Yung-Lin Huang, Shao-Yi Chien, National Taiwan University, Taiwan

UCD-P1.2 A HIERARCHICAL APPROACH TO EVENT DISCOVERY FROM SINGLE IMAGES USING MIL FRAMEWORK
Kashif Ahmad, Francesco De Natale, Giulia Boato, Andrea Rosani, University of Trento, Italy

UCD-P1.3 THE IMPACT OF PHASE TRANSITION ON QUALITY ASSESSMENT OF NATURAL IMAGES
Ning Liu, Guangtao Zhai, Shanghai Jiao Tong University, China

UCD-P1.4 EMPLOYING VECTOR QUANTIZATION ON DETECTED FACIAL PARTS FOR FACE RECOGNITION
Ahmed Aldhahab, Taif Al Obaidi, Wasfy B. Mikhael, University of Central Florida, United States

UCD-P1.5 TRACKING HIERARCHICAL STRUCTURE OF WEB VIDEO GROUPS BASED ON SALIENT KEYWORD MATCHING INCLUDING SEMANTIC BROADNESS ESTIMATION
Ryosuke Harakawa, Takahiro Ogawa, Miki Haseyama, Hokkaido University, Japan

UCD-P1.6 A TRAFFIC CONGESTION PREDICTION AND RELIEF MODEL BASED ON THE MARKOV CHAIN
Yang Bao, Yan Zheng, Jesse Jin, Yanran Li, Youpeng Deng, Tianjin University, China; Lei Gao, Liping Xiao, Beijing Aerospace Institute, China

UCD-P1.7 CROWD ANALYSIS USING VISUAL AND NON-VISUAL SENSORS, A SURVEY
Muhammad Irfan, University of Genova, Italy; Laurissa Tokarchuk, Queen Mary University of London, United Kingdom; Lucio Marcenaro, University of Genova, Italy

UCD-P1.8 DYNAMIC SCENE CLASSIFICATION USING CONVOLUTIONAL NEURAL NETWORKS
Aalok Gangopadhyay, Shivam Mani Tripathi, Ishan Jindal, Shanmuganathan Raman, IIT Gandhinagar, India

UCD-P1.9 ACTION CLASSIFICATION FROM MOTION CAPTURE DATA USING TOPOLOGICAL DATA ANALYSIS
Alireza Dirafzoon, Namita Lokare, Edgar Lobaton, North Carolina State University, United States

The Big Neuroimaging Data Extraction: How Advanced Signal Processing Can Unravel the Brain's Functional Organization

Dimitri Van De Ville, EPFL

Observing and analyzing human brain function is a truly interdisciplinary endeavor combining engineering, neurosciences, and medicine. State-of-the-art technologies such as functional magnetic resonance imaging (fMRI) allow to non-invasively acquire a sequence of whole-brain snapshots that indirectly measure neuronal activity. Recent ``big data'' initiatives (e.g., Human Connectome Project) provide us with large datasets reflecting the complex structure of human brain activity. Advanced signal processing plays a major role to extract meaningful and interpretable features. Here we present one such example to characterize dynamics of resting-state fMRI. Using state-of-the-art sparsity-driven deconvolution [1,2], we extract innovation-driven co-activation patterns (iCAPs) from resting-state fMRI [3]. The iCAPs' maps are spatially overlapping and their activity-inducing signals temporally overlapping. Decomposing resting-state fMRI in terms of iCAPs reveals the rich spatiotemporal structure of functional components that dynamically assemble known resting-state networks. The temporal overlap between iCAPs is substantial, which confirms crosstalk happening at the fMRI timescale; on average, three to four iCAPs occur simultaneously in specific combinations that are consistent with their behaviour profiles according to BrainMap. Intriguingly, in contrast to conventional connectivity analysis, which suggests a negative correlation between fluctuations in the default-mode network (DMN) and task-positive networks, we instead find evidence for two DMN-related iCAPs consisting the posterior cingulate cortex that differentially interact with the attention network. These findings illustrate how conventional correlational approaches might be misleading in terms of how task-positive and -negative networks interact, and suggest that more detailed, dynamical decompositions can give more accurate descriptions of functional components of spontaneous activity.

Signal Processing Challenges in Broadband mmWave

Robert W. Heath, Jr., University of Texas at Austin

Millimeter wave is the future of cellular and local area networks. Though the main motivation for mmWave is large spectral channels, most signal processing work has focused on tractable narrowband signal models. In this talk I review the challenges associated with signal processing in broadband millimeter wave channels. Then I review recent developments on two important topics. First, I explain the design of hybrid precoding and combing algorithms, which use a mixture of frequency-flat analog and frequency-selective digital precoding and combining. Second, I show how to formulate the hybrid frequency selective channel estimation algorithm to exploiting sparsity in the delay and angular domains. The hybrid precoders and combiners can then be configured based on the channel estimates, to achieve high spectral efficiency in broadband MIMO channels.

Thursday, December 8		10:00 - 11:00
Keynote Session	ESP-K1	Salon J

Multimedia Signal Processing: From Feature Engineering to Deep Learning

Behzad Shahraray, AT&T Labs

Driven by the Internet and the Web, an increasing amount of multimedia data is generated and shared by a variety of sources including Internet of Things (IoT) and mobile devices. The enormous amount of available multimedia data has created new challenges for management and effective discovery and utilization of this data. Fortunately, the same drivers have also enabled and facilitated the generation of accompanying auxiliary descriptive information through social networks and crowdsourcing. This combination of the large annotated datasets and high performance computing resources has given rise to a new generation of data-driven algorithms. Deep convolutional neural networks have generated impressive results in multimedia signal processing problems such as image classification, face processing, and speech recognition. This talk will mainly focus on visual information processing and will present the progress in the last decade or so in feature-based algorithms and data-driven algorithms based on deep learning that have surpassed previous algorithms, and in some cases even human performance on these visual tasks.

Thursday, December 8		10:00 - 11:00
Keynote Session	SGI-K2	Salon H

Power Systems Without Fuel

Josh Taylor, University of Toronto

Renewable integration is a century-long project. Over the past decade we have made impressive progress in integrating renewables, energy storage, and demand response into the existing power infrastructure. In this talk, we jump forward to a hypothetical final destination: power systems without fuel. In power systems without fuel, small, modular, renewable sources supply all power. In addition to sustainability and environmental benevolence, power systems without fuel offer superior operation to current power systems due to, for example, the obsolescence of unit commitment, the decreased importance of frequency, and the increased viability of direct current. We motivate several research problems under this umbrella, including electricity markets without fuel costs, decentralized control of direct current systems, and machine learning for demand response.

Data 4 Good

Aleksandra Mojsilović, IBM Research

The social good movement has taken root with many a corporation, entrepreneur and big thinker, with the simple aim of using technology to help create a better world. Data analytics, signal processing and related disciplines present one increasingly important way in which social good can be made possible and new communities are growing around it, fueled in large part by the fact that we are no longer constrained by data. Everything from Internet activity, satellite imagery, social media, health records, news, scientific publications, economic data, weather data, and government records is at our fingertips, giving us an unprecedented opportunity to change the world for the better using data sciences. From reducing or eliminating inequalities, to improving access to health care and education, to reducing pollution and our carbon footprint, the opportunities are endless. In this talk, Saška will give an overview of the emerging area of data science for social good. She will illustrate how the state of the art signal processing toolkit (e.g. prediction, classification, optimization, visualization, NLP) is driving new social good applications, and will present a broad range of innovative examples of doing good with data. She will explore the interdisciplinary nature of social good projects, and highlight data and algorithmic challenges that might call for new research directions.

Learning Graphs from Data

Antonio Ortega, University of Southern California

There has been significant recent progress in the development of tools for graph signal processing, including methods for sampling and transforming graph signals. In many applications, a graph needs to be learned from data before these graph signal processing methods can be applied. A standard approach for graph learning is to estimate the empirical covariance from the data and then compute an inverse covariance (precision) matrix under desirable structural constraints. We present recent results that allow us to solve these problems under constraints that encompass a broad class of generalized graph Laplacians. These methods are computationally efficient, can incorporate sparsity constraints, and can also be used to optimize weights for a given known topology. We illustrate these ideas with examples in image processing and other areas.

Algorithms, Architectures, and Testbeds for 5G Wireless Communication Systems

Joe Cavallaro, Rice University

Wireless communication system concepts for 5G include a variety of advanced physical layer algorithms to provide high data rates and increased efficiency. Each of these algorithms provide different challenges for real-time performance based on the tradeoffs between computation, communication, and I/O bottlenecks and area, time, and power complexity. In particular, Massive MIMO systems can provide many benefits for both uplink detection and downlink beamforming as the number of base station antennas increases. Similarly, channel coding, such as LDPC, can support high data rates in many channel conditions. At the RF level, limited available spectrum is leading to noncontiguous channel allocations where digital pre-distortion (DPD) can be used to improve power amplifier efficiency. Each of these schemes impose complex system organization challenges in the interconnection of multiple RF transceivers with multiple memory and computation units with multiple data rates within the system. Parallel numerical methods can be applied to tradeoff computational complexity with minimal effect on error rate performance. Simulation acceleration environments can be used to provide thorough system performance analysis. In this talk, we will focus on design tools for high level synthesis (HLS) to capture and express parallelism in wireless algorithms. This also includes the mapping to GPU and multicore systems for high speed simulation. HLS can also be applied to FPGA and ASIC synthesis, however, there exist tradeoffs in area with flexibility and reuse of designs. Heterogeneous system architectures as expressed by Systems on Chip (SoC) attempt to address these system issues. The talk will conclude with a discussion of computation testbeds from supercomputers through desktop GPU to single board systems. The integration with radio testbeds from WARP and USRP to NI and Argos prototype massive MIMO systems will be explored.

Big Data Analysis and Challenges in Medical Imaging I

Session Chair: Selin Aviyente, Michigan State University

BDMI-1.1 11:00 **COMPLEXITY REDUCTION TECHNIQUES IN MUSIC-BASED EEG SOURCE LOCALIZATION**
Seyedemahya Safavi, SeungJae Lee, Beth Lopour, Pai Chou, University of California, Irvine, United States

BDMI-1.2 11:20 **GRAPH INFORMATION THEORETIC MEASURES ON FUNCTIONAL CONNECTIVITY NETWORKS BASED ON GRAPH-TO-SIGNAL TRANSFORM**
Marisel Villafane-Delgado, Selin Aviyente, Michigan State University, United States

BDMI-1.3 11:40 **SUM OF OUTER PRODUCTS DICTIONARY LEARNING FOR INVERSE PROBLEMS**
Saiprasad Ravishankar, Raj Rao Nadakuditi, Jeffrey A. Fessler, University of Michigan, United States

Thursday, December 8 11:00 - 12:20

Lecture Session CSDL-4 Salon K

Compressed Sensing, Deep Learning IV

Session Chair: Farhad Pourkamali-Anaraki, University of Colorado, Boulder

CSDL-4.1 11:00 **A RANDOMIZED APPROACH TO EFFICIENT KERNEL CLUSTERING**
Farhad Pourkamali-Anaraki, Stephen Becker, University of Colorado at Boulder, United States

CSDL-4.2 11:20 **INVARIANT HIERARCHICAL SPARSE CODING FOR OBJECT RECOGNTION VIA BAGS OF ATOMS**
Xiaoxia Sun, Johns Hopkins University, United States; Nasser Nasrabadi, West Virginia University, United States; Trac Tran, Johns Hopkins University, United States

CSDL-4.3 11:40 **AXIOMATIC HIERARCHICAL CLUSTERING FOR INTERVALS OF METRIC DISTANCES**
Weiyu Huang, Alejandro Ribeiro, University of Pennsylvania, United States

CSDL-4.4 12:00 **EFFICIENT LEARNING OF DICTIONARIES WITH LOW-RANK ATOMS**
Saiprasad Ravishankar, Brian Moore, Raj Rao Nadakuditi, Jeffrey A. Fessler, University of Michigan, United States

Thursday, December 8 11:00 - 12:20

Keynote + Lecture Session DT5G-1 Salon C

Transceiver Implementations and Architectures

Session Chair: Liang Dong, Baylor University

DT5G-K2 11:00 **Keynote: ALGORITHMS, ARCHITECTURES, AND TESTBEDS FOR 5G WIRELESS COMMUNICATION SYSTEMS**
Joe Cavallaro, Rice University

DT5G-1.3 11:40 **DECENTRALIZED BEAMFORMING FOR MASSIVE MU-MIMO ON A GPU CLUSTER**
Kaipeng Li, Rice University, United States; Rishi Sharan, Cornell University, United States; Yujun Chen, Joseph R. Cavallaro, Rice University, United States; Tom Goldstein, University of Maryland, United States; Christoph Studer, Cornell University, United States

DT5G-1.4 12:00 **COMPACT MODELING AND MANAGEMENT OF RECONFIGURATION IN DIGITAL CHANNELIZER IMPLEMENTATION**
Adrian Sapio, University of Maryland, United States; Marilyn Wolf, Georgia Institute of Technology, United States; Shuvra Bhattacharyya, University of Maryland, United States

Thursday, December 8 11:00 - 12:20

Lecture Session ESP-1 Salon J

Emerging Signal Processing Applications I

Session Chair: Umit Batur, Faraday Future

ESP-1.1 11:00 **FROM CELLULAR NETWORKS TO THE GARDEN HOSE: ADVANCES IN RAINFALL MONITORING VIA CELLULAR POWER MEASUREMENTS**
Hagit Messer, Lior Gazit, Tel Aviv University, Israel

ESP-1.2 11:20 **HIDDEN MARKOV MODEL-BASED GESTURE RECOGNITION WITH FMCW RADAR**
Greg Malysa, Dan Wang, Lorin Netsch, Murtaza Ali, Texas Instruments, United States

ESP-1.3 11:40 **TIME-REVERSAL INDOOR POSITIONING WITH CENTIMETER ACCURACY USING MULTI-ANTENNA WIFI**
Chen Chen, Yi Han, University of Maryland College Park, United States; Yan Chen, School of Electronic Engineering, University of Electronic Science and Technology of China, China; Feng Zhang, K.J. Ray Liu, University of Maryland College Park, United States

ESP-1.4 12:00 **I-LOVIT: INDOOR LOCALIZATION BY VIBRATION TRACKING**
Jeffrey Poston, Virginia Tech, United States

Thursday, December 8 11:00 - 12:20

Lecture Session SGI-4 Salon H

Smart Grid Control

Session Chair: Abdallah Farraj, University of Toronto

SGI-4.1 11:00 **WIDE-AREA CONTROL OF POWER SYSTEMS USING CLOUD-IN-THE-LOOP FEEDBACK**
Matthew Weiss, Jianhua Zhang, Aranya Chakrabortty, North Carolina State University, United States

SGI-4.2 11:20 **SPARSITY-PROMOTING CONTROLLER DESIGN FOR VSC-BASED MICROGRIDS**
Yanhua Tian, Joshua A. Taylor, University of Toronto, Canada

SGI-4.3 11:40 **CYBER-RESILIENT CONTROL OF INVERTER BASED MICROGRIDS**
Martine Chlela, Diego Mascarella, Geza Joos, McGill University, Canada; Marthe Kassouf, Hydro-Québec (IREQ), Canada

Signal and Information Processing Over Networks I

Session Chair: Santiago Segarra, University of Pennsylvania

SPN-1.1 11:00 **DISTRIBUTED SEQUENCE PREDICTION: A CONSENSUS + INNOVATIONS APPROACH**
Anit Kumar Sahu, Soummya Kar, Carnegie Mellon University, United States

SPN-1.2 11:20 **MULTILAYER SPECTRAL GRAPH CLUSTERING VIA CONVEX LAYER AGGREGATION**
Pin-Yu Chen, Alfred Hero, University of Michigan, United States

SPN-1.3 11:40 **CONSTRUCTION OF UNDERSAMPLED GRAPH FILTER BANKS VIA ROW SUBSET SELECTION**
Akie Sakiyama, Yuichi Tanaka, Tokyo University of Agriculture and Technology, Japan

SPN-1.4 12:00 **SHANNON SAMPLING AND AN INVERSE PROBLEM FOR THE SCHRODINGER EQUATION ON COMBINATORIAL GRAPHS**
Isaac Pesenson, Temple University, United States

Signals, Information & Systems In Consumer Robot Products

Robert Pack, Jibo, Inc.

The application space of robotics sparks the imagination and provides a daunting set of challenges for any product developer. What was once fiction is now in our homes and where fear of rejection once dominated the thoughts of robotics visionaries, the amazing reality is that we are not delivering new products fast enough into a diverse and growing market. This talk will provide some background about the consumer robotics market and outline the challenges that robot product developers face by describing the architecture and elements of a modern robot product. It will touch on hardware, sensing and processors up through the many interacting ayers of signal and information processing that breathe life into a consumer robot system.

By illustrating key signal processing and information processing challenges that arise in such an integrated system, the talk will provide insights and feedback from the trenches of product development to the signal and information processing community on technical enablers that can help developers address the growing market of consumer robot products worldwide.

Thursday, December 8 14:00 - 15:40

Lecture Session DT5G-2 Salon C

Millimeter Wave Technologies

Session Chair: Shengqian Han, Beihang University

DT5G-2.1 14:00 **DYNAMIC SUBARRAY ARCHITECTURE FOR WIDEBAND HYBRID PRECODING IN MILLIMETER WAVE MASSIVE MIMO SYSTEMS**
Sungwoo Park, Ahmed Alkhateeb, Robert W. Heath Jr., The University of Texas at Austin, United States

DT5G-2.2 14:20 **JOINT SPATIALLY SPARSE CHANNEL ESTIMATION FOR MILLIMETER-WAVE CELLULAR SYSTEMS**
Cheng-Rung Tsai, Chiang-Hen Chen, Yu-Hsin Liu, An-Yeu (Andy) Wu, National Taiwan University, Taiwan

DT5G-2.3 14:40 **PROGRESSIVE CHANNEL ESTIMATION FOR ULTRA-LOW LATENCY MILLIMETER-WAVE COMMUNICATIONS**
Hung-Yi Cheng, Ching-Chun Liao, An-Yeu (Andy) Wu, National Taiwan University, Taiwan

DT5G-2.4 15:00 **ANALYSIS OF BEAM SWEEP CHANNEL ESTIMATION IN MMWAVE MASSIVE MIMO NETWORKS**
Tianyang Bai, Robert W. Heath Jr., The University of Texas at Austin, United States

DT5G-2.5 15:20 **COMPRESSIVE SENSING BASED INITIAL BEAMFORMING TRAINING FOR MASSIVE MIMO MILLIMETER-WAVE SYSTEMS**
Han Yan, Danijela Cabric, University of California, Los Angeles, United States

Thursday, December 8 14:00 - 15:40

Lecture Session ESP-2 Salon J

Emerging Signal Processing Applications II

Session Chair: Mike Polley, Samsung USA

ESP-K2 14:00 **Keynote: SIGNALS, INFORMATION & SYSTEMS IN CONSUMER ROBOT PRODUCTS**
Robert Pack, Jibo, Inc.

ESP-2.4 15:00 **CASCADED REGRESSION FOR 3D POSE ESTIMATION FOR MOUSE IN FISHEYE LENS DISTORTED MONOCULAR IMAGES**
Ghadi Salem, Jonathan Krynitsky, National Institutes of Health, United States; Monson Hayes, George Mason University, United States; Thomas Pohida, National Institutes of Health, United States; Xavier Burgos-Artizzu, Transmural Biotech, Spain

ESP-2.5 15:20 **COMPLEX INPUT CONVOLUTIONAL NEURAL NETWORKS FOR WIDE ANGLE SAR ATR**
Michael Wilmanski, University of Michigan & Integrity Applications Incorporated, United States; Chris Kreucher, Integrity Applications Incorporated, United States; Alfred Hero, University of Michigan, United States

Distributed Information Processing, Optimization, and Resource Management over Networks II

Session Chair: Wei Shi, University of Illinois at Urbana-Champaign

RMN-2.1 14:00 **TOWARDS AN ONLINE ENERGY ALLOCATION POLICY FOR DISTRIBUTED ESTIMATION WITH SENSOR COLLABORATION USING ENERGY HARVESTING SENSORS**
Sijia Liu, University of Michigan, United States; Vinod Sharma, Indian Institute of Science, India; Pramod K. Varshney, Syracuse University, United States

RMN-2.2 14:25 **A DISTRIBUTED ALGORITHM FOR DICTIONARY LEARNING OVER NETWORKS**
Mingmin Zhao, Zhejiang University, China; Qingjiang Shi, Zhejiang Sci-Tech University, China; Mingyi Hong, Iowa State University, United States

RMN-2.3 14:50 **A DATA-DRIVEN APPROACH TO STOCHASTIC NETWORK OPTIMIZATION**
Tianyi Chen, University of Minnesota, United States; Aryan Mokhtari, University of Pennsylvania, United States; Xin Wang, Fudan University, China; Alejandro Ribeiro, University of Pennsylvania, United States; Georgios B. Giannakis, University of Minnesota, United States

RMN-2.4 15:15 **DECENTRALIZED ONLINE OPTIMIZATION WITH HETEROGENEOUS DATA SOURCES**
Alec Koppel, University of Pennsylvania, United States; Brian M. Sadler, U.S. Army Research Laboratory, United States; Alejandro Ribeiro, University of Pennsylvania, United States

Optimal Power Flow and Power Markets

Session Chair: Deepa Kundur, University of Toronto

SGI-5.1 14:00 **A CONVEX-OPTIMIZATION METHOD TO PROPAGATE UNCERTAINTY IN POWER FLOW**
Hyungjin Choi, Peter Seiler, Sairaj Dhople, University of Minnesota, United States

SGI-5.2 14:20 **CONVERGENCE OF THE Z-BUS METHOD AND EXISTENCE OF UNIQUE SOLUTION IN SINGLE-PHASE DISTRIBUTION LOAD-FLOW**
Mohammadhafez Bazrafshan, Nikolaos Gatsis, University of Texas at San Antonio, United States

SGI-5.3 14:40 **MOMENT RELAXATIONS OF OPTIMAL POWER FLOW PROBLEMS: BEYOND THE CONVEX HULL**
Daniel Molzahn, Argonne National Laboratory, United States; Cédric Josz, RTE, France; Ian Hiskens, University of Michigan, United States

SGI-5.4 15:00 **SUPPLY FUNCTION EQUILIBRIUM IN POWER MARKETS: MESH NETWORKS**
Yuanzhang Xiao, Chaithanya Bandi, Ermin Wei, Northwestern University, United States

SGI-5.5 15:20 **CONTEXTUAL LEARNING FOR UNIT COMMITMENT WITH RENEWABLE ENERGY SOURCES**
Hyun-Suk Lee, Yonsei University, Korea (South); Cem Tekin, Bilkent University, Turkey; Mihaela van der Schaar, University of California, Los Angeles, United States; Jang-Won Lee, Yonsei University, Korea (South)

Signal and Information Processing Over Networks II

Session Chair: Michael Rabbat, McGill University

SPN-2.1 14:00 **LOCALIZATION BOUNDS FOR THE GRAPH TRANSLATION**
Benjamin Girault, University of Southern California, United States; Paulo Gonçalves, Inria, United States; Shrikanth S. Narayanan, Antonio Ortega, University of Southern California, United States

SPN-2.2 14:20 **CENTER-WEIGHTED MEDIAN GRAPH FILTERS**
Santiago Segarra, University of Pennsylvania, United States; Antonio Garcia Marques, King Juan Carlos University, Spain; Gonzalo Arce, University of Delaware, United States; Alejandro Ribeiro, University of Pennsylvania, United States

SPN-2.3 14:40 **EGONET TENSOR DECOMPOSITION FOR COMMUNITY IDENTIFICATION**
Fatemeh Sheikholeslami, Brian Baingana, Georgios B. Giannakis, Nicholas D. Sidiropoulos, University of Minnesota, United States

SPN-2.4 15:00 **FREQUENCY ANALYSIS OF TIME-VARYING GRAPH SIGNALS**
Andreas Loukas, Damien Foucard, Technical University of Berlin, Switzerland

SPN-2.5 15:20 **TRACKING TIME-VERTEX PROPAGATION USING DYNAMIC GRAPH WAVELETS**
Francesco Grassi, Politecnico di Torino, Italy; Nathanaël Perraudin, Benjamin Ricaud, Ecole Polytechnique Fédérale de Lausanne, Switzerland

Sparse Signal Processing for Communications I

Session Chair: Farokh Marvasti, Sharif University of Technology

SSPC-1.1 14:00 **APPLICATIONS OF SPARSE SIGNAL PROCESSING**
Masoumeh Azghani, Sahand University of Technology, Iran; Farokh Marvasti, Sharif University of Technology, Iran

SSPC-1.2 14:20 **DECENTRALIZED JOINT SPARSITY PATTERN RECOVERY USING 1-BIT COMPRESSIVE SENSING**
Swatantra Kafle, Bhavya Kailkhura, Thakshila Wimalajeewa, Pramod K. Varshney, Syracuse University, United States

SSPC-1.3 14:40 **FAST COMPUTATIONS FOR APPROXIMATION AND COMPRESSION IN SLEPIAN SPACES**
Santhosh Karnik, Georgia Institute of Technology, United States; Zhihui Zhu, Michael Wakin, Colorado School of Mines, United States; Justin Romberg, Mark Davenport, Georgia Institute of Technology, United States

SSPC-1.4 15:00 **NONNEGATIVE GRIDLESS COMPRESSIVE SENSING FOR CO-PRIME ARRAYS**
Heeseong Yang, KAIST, Korea (South); Haris Vikalo, The University of Texas at Austin, United States; Joohwan Chun, KAIST, Korea (South)

SSPC-1.5 15:20 **ON THE EARTH MOVER'S DISTANCE AS A PERFORMANCE METRIC FOR SPARSE SUPPORT RECOVERY**
Anastasia Lavrenko, Florian Römer, Technische Universität Ilmenau, Germany; Giovanni Del Galdo, Fraunhofer Institute for Integrated Circuits, Germany; Reiner Thomä, Technische Universität Ilmenau, Germany

Compressed Sensing, Deep Learning Poster I

CSDL-P1.1 MINIMUM-VOLUME-REGULARIZED WEIGHTED SYMMETRIC NONNEGATIVE MATRIX FACTORIZATION FOR CLUSTERING
Tianxiang Gao, Sigurdur Olafsson, Songtao Lu, Iowa State University, United States

CSDL-P1.2 BEST BASIS SELECTION USING SPARSITY DRIVEN MULTI-FAMILY WAVELET TRANSFORM
Romain Cosentino, Randall Balestriero, Ecole Normale Superieure & RICE University, United States; Behnaam Aazhang, Rice University, United States

CSDL-P1.3 DEFENDING ACTIVE LEARNING AGAINST ADVERSARIAL INPUTS IN AUTOMATED DOCUMENT CLASSIFICATION
Lei Pi, University of Memphis, United States; Zhuo Lu, University of South Florida, United States; Yalin Sagduyu, Intelligent Automation Inc., United States; Su Chen, University of Memphis, United States

CSDL-P1.4 SPARSE RECONSTRUCTION FOR FLUORESCENCE LIFETIME IMAGING MICROSCOPY WITH POISSON NOISE
Lasith Adhikari, Arnold Kim, Roummel Marcia, University of California, Merced, United States

CSDL-P1.5 D-OAMP: A DENOISING-BASED SIGNAL RECOVERY ALGORITHM FOR COMPRESSED SENSING
Zhipeng Xue, ShanghaiTech University, China; Junjie Ma, City University of Hong Kong, China; Xiaojun Yuan, ShanghaiTech University, China

General Symposium Poster: Signal Decomposition

Session Chair: Phillip Regalia, Catholic University of America

GS-P2.1 CONSTRUCTION OF COMPLEMENTARY SETS OF SEQUENCES WITH LOW APERIODIC CORRELATION AND COMPLEMENTARY CORRELATION
Israel Alejandro Arriaga-Trejo, CONACYT-Autonomous University of Zacatecas, Mexico

GS-P2.2 EMPIRICAL MODE DECOMPOSITION ANALYSIS OF ALCOHOL WITHDRAWAL TREMOR SIGNALS
Narges Norouzi, Parham Aarabi, University of Toronto, Canada; Taylor Dear, Sally Carver, Schwartz/Reisman Emergency Medicine Institute, Mount Sinai Hospital, Canada; Simon Bromberg, University of Toronto, Canada; Mel Kahan, Department of Family and Community Medicine, Women's College Hospital, Canada; Sara Gray, Emergency Medicine and Critical Care, St. Michael's Hospital, Canada; Bjug Borgundvaag, Schwartz/Reisman Emergency Medicine Institute, Mount Sinai Hospital, Canada

GS-P2.3 OPTIMAL EXPERIMENTAL DESIGN IN CANONICAL EXPANSIONS WITH APPLICATIONS TO SIGNAL COMPRESSION
Roozbeh Dehghannasiri, Xiaoning Qian, Edward Dougherty, Texas A&M University, United States

GS-P2.4 IMPROVED REMOTE ESTIMATION OF HEART RATE IN FACE VIDEOS
Alain Malacarne, Mattia Bonomi, Cecilia Pasquini, Giulia Boato, University of Trento, Italy

GS-P2.5 QUALITY FACTOR ESTIMATION OF JPEG COMPRESSED IMAGES
Thi Ngoc Canh Doan, Florent Retraint, Thanh Hai Thai, University of Technology of Troyes, France; Cathel Zitzmann, EPF Graduate School of Engineering, France

Data-Driven Analysis of Medical Imaging Data: Overview, Challenges, and Prospects

Tulay Adali, University of Maryland, Baltimore County

Data-driven methods such as independent component analysis (ICA) have proven quite effective for the analysis of functional magnetic resonance (fMRI) data and for discovering associations between fMRI and other medical imaging data types such as electroencephalography (EEG) and structural MRI data. Without imposing strong modeling assumptions, these methods effectively take advantage of the multivariate nature of fMRI data and are particularly attractive for use in cognitive paradigms where detailed a priori models of brain activity are not available.

This talk reviews major data-driven methods that have been successfully applied to fMRI analysis, presents recent examples of their application for studying the brain function, and addresses current challenges and prospects.

Big Data Analysis and Challenges in Medical Imaging II

Session Chair: Selin Aviyente, Michigan State University

BDMI-K2 16:10 **Keynote: DATA-DRIVEN ANALYSIS OF MEDICAL IMAGING DATA: OVERVIEW, CHALLENGES, AND PROSPECTS**
Tulay Adali, University of Maryland, Baltimore County, United States

BDMI-2.3 16:50 **COMMUNITY DETECTION FROM GENOMIC DATASETS ACROSS HUMAN CANCERS**
Nandinee Haq, Z. Jane Wang, University of British Columbia, Canada

BDMI-2.4 17:10 **CLOUD-BASED DEEP LEARNING OF BIG EEG DATA FOR EPILEPTIC SEIZURE PREDICTION**
Mohammad-Parsa Hosseini, Rutgers University, United States; Hamid Soltanian-Zadeh, Henry Ford Health System, United States; Kost V Elisevich, Michigan State University, United States; Dario Pompili, Rutgers University, The State University of New Jersey, United States

Thursday, December 8 16:10 - 17:30

Lecture Session CSDL-5 Salon B

Compressed Sensing, Deep Learning V

Session Chair: Seung-Jun Kim, University of Maryland, Baltimore County

CSDL-5.1 16:10 **ONSAGER-CORRECTED DEEP LEARNING FOR SPARSE LINEAR INVERSE PROBLEMS**
Mark Borgerding, Philip Schniter, The Ohio State University, United States

CSDL-5.2 16:30 **IMAGE AESTHETIC ASSESSMENT VIA DEEP SEMANTIC AGGREGATION**
Kung-Hung Lu, Kuang-Yu Chang, Chu-Song Chen, Institute of Information Science, Academia Sinica, Taiwan

CSDL-5.3 16:50 **DEEP LEARNING BASED IMAGE SUPER-RESOLUTION WITH COUPLED BACKPROPAGATION**
Tiantong Guo, Hojjat Seyed Mousavi, Vishal Monga, The Pennsylvania State University, United States

CSDL-5.4 17:10 **RECURRENT NEURAL NETWORK FOR SPECTRAL MAPPING IN SPEECH BANDWIDTH EXTENSION**
Yingxue Wang, Shenghui Zhao, Beijing Institute of Technology, United States; Jianxin Li, Beihang University, China; Jingming Kuang, Beijing Institute of Technology, China; Qiang Zhu, University of Maryland, United States

Thursday, December 8 16:10 - 17:30

Lecture Session DT5G-3 Salon C

Cellular 5G Systems

Session Chair: Yuan-Hao Huang, National Tsing Hua University

DT5G-3.1 16:10 **ENERGY EFFICIENT MULTI-HOP WIRELESS BACKHAUL IN HETEROGENEOUS CELLULAR NETWORKS**
Yuan Liang, Tianlong Song, Tongtong Li, Michigan State University, United States

DT5G-3.2 16:30 **JOINT UL/DL MODE SELECTION AND TRANSCEIVER DESIGN FOR DYNAMIC TDD SYSTEMS**
Antti Tolli, Jarkko Kaleva, Ganesh Venkatraman, University of Oulu, Finland; David Gesbert, EURECOM, France

DT5G-3.3 16:50 **FAST-CONVOLUTION FILTERED OFDM WAVEFORMS WITH ADJUSTABLE CP LENGTH**
Markku Renfors, Juha Yli-Kaakinen, Toni Levanen, Mikko Valkama, Tampere University of Technology, Finland

DT5G-3.4 17:10 **TRANSMIT BEAMFORMER AND QUANTIZATION DESIGN FOR MULTI-CARRIER CRAN COMP**
Ganesh Venkatraman, Antti Tolli, Jarkko Kaleva, Markku Juntti, University of Oulu, Finland

Sparse Signal Processing for Communications II

Session Chair: Farokh Marvasti, Sharif University of Technology

SSPC-2.1 16:10 **IMAGE COMPRESSION VIA MULTIPLE LEARNED GEOMETRIC DICTIONARIES**
Danlan Huang, Xiaoming Tao, Tsinghua University, China; Mai Xu, Beihang University, China; Shenghua Gao, ShanghaiTech University, China; Jianhua Lu, Tsinghua University, China

SSPC-2.2 16:30 **AUTONOMOUS COMPRESSIVE SPECTRUM SENSING APPROACH FOR 3.5 GHZ SHARED SPECTRUM**
Xingjian Zhang, Yuan Ma, Yue Gao, Queen Mary University of London, United Kingdom

SSPC-2.3 16:50 **OPTIMAL STOCHASTIC POWER CONTROL WITH COMPRESSIVE CSI ACQUISITION FOR CLOUD-RAN**
Fnu Suya, Arizona State University, United States; Yuanming Shi, ShanghaiTech University, China; Bo Bai, Wei Chen, Tsinghua University, China; Jun Zhang, Khaled Letaief, The Hong Kong University of Science and Technology, China; Shidong Zhou, Tsinghua University, China

SSPC-2.4 17:10 **DETERMINISTIC MEASUREMENT PROCEDURES FOR DIAGNOSIS OF MASSIVE UNIFORM LINEAR ANTENNA ARRAYS**
Mohamed Mokhtar Awadin, Ridha Hamila, Qatar University, Qatar; Waheed Bajwa, Rutgers University, The State University of New Jersey, United States; Naofal Al-Dhahir, University of Texas at Dallas, United States

Transceivers and Signal Processing for 5G Wireless Systems

Session Chair: Chaitali Chakrabarti, Arizona State University

DT5G-P1.1 **STALL PATTERN AVOIDANCE IN POLYNOMIAL PRODUCT CODES**
Carlo Condo, Francois Leduc-Primeau, Gabi Sarkis, Pascal Giard, Warren J. Gross, McGill University, Canada

DT5G-P1.2 **SPECTRAL- AND ENERGY-EFFICIENT TRANSMISSION WITH JOINT BANDWIDTH ASSIGNMENT AND TRANSMIT POWER ALLOCATION**
Liang Dong, Baylor University, United States

DT5G-P1.3 **A LOW-RANK APPROACH FOR INTERFERENCE MANAGEMENT IN DENSE WIRELESS NETWORKS**
Kai Yang, Yuanming Shi, ShanghaiTech University, China; Jun Zhang, Hong Kong University of Science and Technology, China; Zhi Ding, University of California, Davis, United States; Khaled Letaief, Hong Kong University of Science and Technology, China

DT5G-P1.4 **CACHING POLICY OPTIMIZATION FOR RATE ADAPTIVE VIDEO STREAMING**
Huiting Su, Shengqian Han, Chenyang Yang, Beihang University, China

DT5G-P1.5 **ENERGY EFFICIENCY MAXIMIZATION FOR HETEROGENEOUS NETWORKS: A JOINT LINEAR PRECODER DESIGN AND SMALL-CELL SWITCHING-OFF APPROACH**
Long D. Nguyen, Trung Q. Duong, Queen's University Belfast, United Kingdom; Diep N. Nguyen, University of Technology Sydney, Australia; Le-Nam Tran, Maynooth University, Ireland

DT5G-P1.6 **NOVEL EXTENDED MODIFIED TWIN TEST BASED SENSING FOR COOPERATIVE COMMUNICATION UNDER NOISE UNCERTAINTY**
Antonio Tedeschi, Roma TRE University, Italy; Sener Dikmese, Tampere University of Technology, Finland; Francesco Benedetto, Roma TRE University, Italy; Markku Renfors, Tampere University of Technology, Finland; Gaetano Giunta, Roma TRE University, Italy

DT5G-P1.7 **LOW POWER BASEBAND PROCESSOR FOR IOT TERMINALS WITH LONG RANGE WIRELESS COMMUNICATIONS**
Shunyao Wu, Arizona State University, United States; Sungmoon Kang, Kwangwoon University, Korea (South); Chaitali Chakrabarti, Arizona State University, United States; Hyunseok Lee, Kwangwoon University, Korea (South)

DT5G-P1.8 **SOFTWARE DEFINED RADIO IMPLEMENTATION OF ADAPTIVE NONLINEAR DIGITAL SELF-INTERFERENCE CANCELLATION FOR MOBILE INBAND FULL-DUPLEX RADIO**
Mona Aghababaeetafreshi, Matias Koskela, Dani Korpi, Pekka Jääskeläinen, Mikko Valkama, Jarmo Takala, Tampere University of Technology, Finland

Emerging Signal Processing Applications Poster

Session Chair: Mazin Gilbert, AT&T Labs

ESP-P1.1 HIERARCHICAL ACTIVITY CLUSTERING ANALYSIS FOR ROBUST GRAPHICAL STRUCTURE RECOVERY
Namita Lokare, Daniel Benavides, Sahil Juneja, Edgar Lobaton, North Carolina State University, United States

ESP-P1.2 SHARING FOR SAFETY: THE BANDWIDTH ALLOCATION AMONG AUTOMOTIVE RADARS
Hang Ruan, Yimin Liu, Tsinghua University, China; Huadong Meng, University of California, Berkeley, United States; Xiqin Wang, Tsinghua University, China

ESP-P1.3 ON THE TRADEOFF BETWEEN RESOLUTION AND AMBIGUITIES FOR NON-UNIFORM LINEAR ARRAYS
Francois Vincent, Olivier Besson, University of Toulouse, France; Souleymane Abakar-Issakha, Frantz Bodereau, Autocruise, France; Laurent Ferro-Famil, University of Rennes 1, France

ESP-P1.4 CONTROL LOOP AUTOMATION MANAGEMENT PLATFORM (CLAMP)
Mazin Gilbert, Rittwik Jana, Eric Noel, Vijay Gopalakrishnan, AT&T Labs, United States

ESP-P1.5 MULTI-PERSON BREATHING RATE ESTIMATION USING TIME-REVERSAL ON WIFI PLATFORMS
Chen Chen, Yi Han, University of Maryland College Park, United States; Yan Chen, School of Electronic Engineering, University of Electronic Science and Technology of China, China; K.J. Ray Liu, University of Maryland College Park, United States

ESP-P1.6 AUTONOMOUS SERVICES COMPOSITION IN DOMAIN 2
Mazin Gilbert, Anwar Syed Aftab, Farheen Cefalu, Pamela Dragosh, Rittwik Jana, Serban Jora, Thomas Kirk, John Lucas, Arthur Martella, John Murray, Sundar Ramalingam, Christopher A Rath, Shu Shi, Rich Wright, Avi Zahavi, AT&T Labs, United States

ESP-P1.7 RADIO SHOT: THROUGH-THE-WALL HUMAN RECOGNITION
Qinyi Xu, University of Maryland College Park, United States; Yan Chen, University of Electronic Science and Technology of China, China; Beibei Wang, K.J. Ray Liu, University of Maryland College Park, United States

ESP-P1.8 LOW COMPLEXITY ALGORITHMS TO INDEPENDENTLY AND JOINTLY ESTIMATE THE LOCATION AND RANGE OF TARGETS USING FMCW
Sajid Ahmed, Seifallah Jardak, Mohamed-Slim Alouini, King Abdullah University of Science and Technology, Saudi Arabia

General Symposium Poster: Detection and Tracking

Session Chair: Phillip Regalia, Catholic University of America

GS-P3.1 POLYLINE-DRIVEN STOP SIGN DETECTION
Qi Li, Western Kentucky University, United States; Yongyi Gong, Guangdong University of Foreign Studies, China

GS-P3.2 RECOVERY FROM TRACKING FAILURE
Ke He, Ningning Li, Borui Mo, Bo Yang, Aidong Men, Beijing University of Posts and Telecommunications, China

GS-P3.3 FACE SPOOFING ATTACK DETECTION BASED ON THE BEHAVIOR OF NOISES
Hoai Phuong Nguyen, Université de Reims Champagne-Ardenne, France; Florent Retraint, Université de Technologie de Troyes, France; Frédéric Morain-Nicolier, Agnès Delahaies, Université de Reims Champagne-Ardenne, France

GS-P3.4 ROBUST ONLINE MULTI-OBJECT TRACKING BASED ON KCF TRACKERS AND REASSIGNMENT
Huiling Wu, Weihai Li, the University of Science and Technology of China, China

GS-P3.5 SIMULTANEOUS DISTRIBUTED BEAMFORMING AND NULLFORMING WITH ADAPTIVE POSITIONING
Shahab Farazi, Kim Chinkidjakarn, D. Richard Brown III, Worcester Polytechnic Institute, United States

Storage Management and Demand Response

Session Chair: Vassilis Kekatos, Virginia Tech

SGI-P1.1 REAL-TIME OPERATION OF HETEROGENEOUS ENERGY STORAGE UNITS
Sarthak Gupta, Vassilis Kekatos, Virginia Tech, United States

SGI-P1.2 DEMAND RESPONSE AGGREGATORS IN MICROGRID ENERGY TRADING
Maria Gregori, Javier Matamoros, David Gregoratti, CTTC, Spain

SGI-P1.3 AGGREGATE LOAD MODELS FOR DEMAND RESPONSE: EXPLORING FLEXIBILITY
Kari Hreinsson, Anna Scaglione, Vijay Vittal, Arizona State University, United States

SGI-P1.4 ADMM APPROACH TO ASYNCHRONOUS DISTRIBUTED FREQUENCY-BASED LOAD CONTROL
Chia-Wei Wu, National Taiwan University of Science and Technology, Taiwan; Tsung-Hui Chang, The Chinese University of Hong Kong, Shenzhen, China

SGI-P1.5 DECENTRALIZED TEMPERATURE CONTROL VIA HVAC SYSTEMS IN ENERGY EFFICIENT BUILDINGS: AN APPROXIMATE SOLUTION PROCEDURE
Xuan Zhang, Wenbo Shi, Xiwang Li, Bin Yan, Ali Malkawi, Na Li, Harvard University, United States

Signal and Information Processing Over Networks Poster I

Session Chair: Benjamin Girault, University of Southern California

SPN-P1.1 RECONSTRUCTION OF EUCLIDEAN EMBEDDINGS IN DENSE NETWORKS
Sarah Costrell, Subhrajit Bhattacharya, Robert Ghrist, University of Pennsylvania, United States

SPN-P1.2 2-DIMENSIONAL FINITE IMPULSE RESPONSE GRAPH-TEMPORAL FILTERS
Elvin Isufi, Geert Leus, Paolo Banelli, TU Delft, Netherlands

SPN-P1.3 NEIGHBORHOOD-PRESERVING TRANSLATIONS ON GRAPHS
Nicolas Grelier, Bastien Pasdeloup, Jean-Charles Vialatte, Vincent Gripon, Télécom Bretagne, France

SPN-P1.4 TRUSTABLE SERVICE RATING IN SOCIAL NETWORKS: A PEER PREDICTION METHOD
Jun Du, Chunxiao Jiang, Jian Wang, Tsinghua University, China; Shui Yu, Deakin University, Australia; Yong Ren, Tsinghua University, China

SPN-P1.5 APPROXIMATION OF NETWORK LINEAR OPERATORS USING SIMILARITY SHIFT FILTERS
Cassiano Becker, Sergio Pequito, George Pappas, Victor Preciado, University of Pennsylvania, United States

SPN-P1.6 CONSENSUS AND MULTIPLEX APPROACH FOR COMMUNITY DETECTION IN ATTRIBUTED NETWORKS
Yuming Huang, Han Wang, North Carolina State University, United States

SPN-P1.7 GREEDY APPROACHES TO FINDING A SPARSE COVER IN A SENSOR NETWORK WITHOUT LOCATION INFORMATION
Terrence Moore, U.S. Army Research Lab, United States

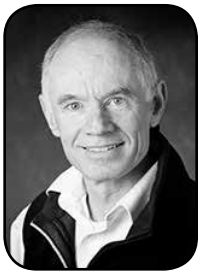
SPN-P1.8 A SCALABLE SMOOTH GRAPH LEARNING METHOD BASED ON BERNOULLI-GAUSSIAN MODEL
Jun Sun, Zaiyue Yang, Xiufang Shi, Zhejiang University, China

Friday, December 9 **10:00 - 11:00**

Keynote Session **BDMI-K3** **Salon J**

Adventures in Learning and Sparse Modeling for Bio-imaging

Yoram Bresler, University of Illinois, Urbana-Champaign



Adapting sparse image modeling to the data has been shown to provide improved image reconstruction in several imaging modalities. However, synthesis or analysis dictionary learning involves approximations of NP-hard sparse coding, and expensive learning steps. Recently, sparsifying transform learning (STL) received interest for its cheap and exact closed-form solutions to iteration steps. We describe the evolution of this framework and several variations as applied to biomedical imaging, including online STL for dynamic and big data; learning a union of transforms model for greater representation power; and a filter bank STL that provides more degrees of freedom in modeling by acting on entire images rather than on patches.

Friday, December 9 **10:00 - 10:40**

Keynote Session **CCR-K2** **Salon H**

Decentralized Probabilistic Learning for Sensor Network

Sejong Yoon, The College of New Jersey

Distributed machine learning and large scale optimization methods are starting to play an increasing central role in wireless sensors networks and particularly in data-adaptive and data-driven contexts such as the cognitive radio. In this work we present a review of state-of-the-art machine learning techniques used in sensor network. In particular, we focus on distributed and decentralized machine learning and optimization methods for wireless sensor network and cognitive radio devices. We also introduce a series of recent developments and applications of the alternating direction method of multipliers (ADMM) approaches on the decentralized machine learning problems that can potentially be used for related cognitive radio problems.

Massive MIMO: It Really Works!

Thomas L. Marzetta, Nokia Bell Labs

Recent Massive MIMO experiments have convincingly demonstrated the soundness of the underlying concept. Massive MIMO is poised to deliver spectacular improvements over 4G wireless technologies.

Massive MIMO creates virtual parallel circuits, each occupying the full spectral bandwidth, between a multiplicity of single-antenna terminals and an array of individually controlled antennas. Area spectral efficiency improvements over 4G technologies may range from ten to one-thousand, depending on the mobility of the terminals. Other benefits include energy efficiency gains in excess of one-thousand, and simple and effective power control that yields uniformly great service throughout the cell.

Cellular deployment of Massive MIMO in the prime sub-5GHz bands will be both hugely beneficial and highly disruptive, requiring either new TDD spectrum, or the reassignment of existing FDD spectrum, and the replacement of all base station and user equipment. There are less disruptive, but still exciting, applications of Massive MIMO, including small cell backhaul and fixed wireless access to homes, for which there are no back compatibility issues.

Non-commutativity in Signal Processing

Al Hero, University of Michigan

Non-commutativity arises in many places in statistical signal processing including information fusion, graphical models and distributed estimation. Any problem where the model or the processing lacks symmetry, permutation invariance or revocable actions will have non-commutativity. This talk will discuss several signal processing areas where non-commutativity is manifested and some challenges and opportunities.

Statistical Signal Processing on Graphs

Alejandro Ribeiro, University of Pennsylvania

A network can be understood as a complex system formed by multiple nodes, where global network behavior arises from local interactions between connected nodes. Often, networks have intrinsic value and are themselves the object of study. In other occasions, the network defines an underlying notion of proximity or dependence, but the object of interest is a signal defined on top of the graph. This is the matter addressed in the field of graph signal processing (GSP). Graph-supported signals appear in many engineering and science fields such as gene expression patterns defined on top of gene networks and the spread of epidemics over social networks. Transversal to the particular application, the philosophy behind GSP is to advance the understanding of network data by redesigning traditional tools originally conceived to study signals defined on regular domains and extend them to analyze signals on the more complex graph domain. In this talk, we will introduce the main building blocks of GSP and illustrate the utility of these concepts through real-world applications. Our focus will be on the definition of stationary graph signals and the inference of underlying graph structures from graph signal observations.

Sparsity and Low Rank for Inference of Cognitive Network States

Georgios B. Giannakis, University of Minnesota

Viewed through a statistical inference lens, many network analytics challenges boil down to (non-) parametric regression and classification, dimensionality reduction, or clustering. Adopting such a vantage point, this keynote presentation will put forth novel learning approaches for comprehensive situation awareness of cognitive radio (CR) networks that includes spatio-temporal sensing via RF spectrum and channel gain cartography, flagging of network anomalies, prediction of network processes, and dynamic topology inference. Key emphasis will be placed on parsimonious models leveraging sparsity, low-rank or low-dimensional manifolds, attributes that are instrumental for complexity reduction.

Big Data Analysis and Challenges in Medical Imaging III

Session Chair: Anubha Gupta, IIIT-Delhi

BDMI-3.1 11:00 **ERROR PROBABILITY ANALYSIS FOR LDA-BAYESIAN BASED CLASSIFICATION OF ALZHEIMER'S DISEASE AND NORMAL CONTROL SUBJECTS**
Zhe Wang, Tianlong Song, Yuan Liang, Tongtong Li, Michigan State University, United States

BDMI-3.2 11:20 **EPILEPTOGENIC BRAIN CONNECTIVITY PATTERNS USING SCALP EEG**
Panuwat Janwattanapong, Mercedes Cabrerizo, Hoda Rajaei, Florida International University, United States; Alberto Pinzon-Ardila, Baptist Hospital of Miami, United States; Sergio Gonzalez-Arias, Malek Adjouadi, Florida International University, United States

BDMI-3.3 11:40 **SUPERVISED HEART RATE TRACKING USING WRIST-TYPE PHOTOPLETHYSMOGRAPHIC (PPG) SIGNALS DURING PHYSICAL EXERCISE WITHOUT SIMULTANEOUS ACCELERATION SIGNALS**
Mahmoud Essalat, Mahdi Boloursaz Mashhadi, Farokh Marvasti, Advanced Communications Research Institute (ACRI), Iran

Machine Learning for Characterization of Cognitive Communications and Radar II

Session Chair: Silvija Kokalj-Filipovic, Naval Research Laboratory

CCR-2.1 11:00 **LEARNING STRUCTURAL PROPERTIES OF WIRELESS AD-HOC NETWORKS NON-PARAMETRICALLY FROM SPECTRAL ACTIVITY SAMPLES**
Silvija Kokalj-Filipovic, Michael Pepe, Crystal Bertoncini Acosta, Naval Research Laboratory, United States

CCR-2.2 11:20 **A ROBUST APPLICATION DETECTOR FOR INTELLIGENT WIRELESS COLLABORATION**
Kevin Pietsch, Sean Mason, Lockheed Martin, United States

CCR-2.3 11:40 **LEARNING EQUILIBRIA FOR POWER ALLOCATION GAMES IN COGNITIVE RADIO NETWORKS WITH A JAMMER**
Raghed El-Bardan, Syracuse University, United States; Vinod Sharma, Indian Institute of Science, India; Pramod K. Varshney, Syracuse University, United States

Friday, December 9 | 11:00 - 12:20

Lecture Session | DT5G-4 | Salon B

Transceiver Algorithms

Session Chair: Ville Syrjälä, Tampere University of Technology

DT5G-4.1 11:00 **PILOT DECONTAMINATION VIA DOPPLER PSD ALIGNMENT**
Xiliang Luo, Xiaoyu Zhang, Penghao Cai, Fuqian Yang, ShanghaiTech University, China

DT5G-4.2 11:20 **BLIND DIGITAL MODULATION CLASSIFICATION BASED ON M-TH POWER NONLINEAR TRANSFORMATION**
Vincent Gouldieff, Jacques Palicot, CentraleSupelec/IETR, France; Steredenn Daumont, Zodiac Data Systems, France

DT5G-4.3 11:40 **EFFICIENT TIME-DOMAIN PHASE NOISE MITIGATION IN CM-WAVE WIRELESS COMMUNICATIONS**
Ville Syrjälä, Toni Levanen, Mikko Valkama, Tampere University of Technology, Finland; Eeva Lähetkangas, Nokia Bell Labs, Finland

DT5G-4.4 12:00 **METHODS FOR PHASE NOISE MITIGATION FOR DFT-S-OFDM WAVEFORMS**
Ville Syrjälä, Toni Levanen, Mikko Valkama, Tampere University of Technology, Finland

Friday, December 9 | 11:00 - 12:20

Lecture Session | GS-2 | Salon K

General Symposium: Statistical Signal Processing and Estimation

Session Chair: Hang Liu, Catholic University of America

GS-2.1 11:00 **MAXIMUM-LIKELIHOOD CHANNEL ESTIMATION IN PRESENCE OF IMPULSIVE NOISE FOR PLC SYSTEMS**
Deep Shrestha, Xavier Mestre, Miquel Payaro, Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain

GS-2.2 11:20 **ON THE SUM OF GAMMA-GAMMA VARIATES WITH APPLICATION TO THE FAST OUTAGE PROBABILITY EVALUATION OVER FADING CHANNELS**
Chaouki Ben Issaid, Nadhir Ben Rached, Abla Kammoun, Mohamed-Slim Alouini, Raul Tempone, King Abdullah University of Science and Technology, Saudi Arabia

GS-2.3 11:40 **SIGNAL PROCESSING ENABLES THE FIRST LOCALIZATION OF GAMMA RAYS FROM SUPERMASSIVE BLACK HOLES**
Anna Barnacka, Harvard University, United States

GS-2.4 12:00 **OPTIMAL BAYESIAN FEATURE SELECTION WITH MISSING DATA**
Ali Foroughi Pour, Lori Dalton, The Ohio State University, United States

Power Line and Smart Grid Communications

Session Chair: Nikolaos Gatsis, University of Texas at San Antonio

SGI-6.1 11:00 **POWER LINE DETECTION VIA BACKGROUND NOISE REMOVAL**
Chaofeng Pan, Xianbin Cao, Beihang University, China; Dapeng Wu, University of Florida, United States

SGI-6.2 11:20 **DIFFERENTIAL MODULATION DIVERSITY COMBINING FOR HYBRID NARROWBAND-POWERLINE/WIRELESS SMART GRID COMMUNICATIONS**
Mostafa Sayed, Naofal Al-Dhahir, University of Texas at Dallas, United States

SGI-6.3 11:40 **A FREQUENCY-SHIFT-FILTERING APPROACH TO CYCLOSTATIONARY NOISE MODELING IN MIMO NB-PLC**
Mahmoud Elgenedy, Mostafa Sayed, Naofal Al-Dhahir, University of Texas at Dallas, United States

SGI-6.4 12:00 **TRANSMISSION TIME MINIMIZATION OF AN ENERGY HARVESTING COGNITIVE RADIO SYSTEM**
Peter He, Lian Zhao, Xavier Fernando, Ryerson University, Canada

Signal and Information Processing Over Networks III

Session Chair: Gonzalo Mateos, University of Rochester

SPN-3.1 11:00 **GRAPH TOPOLOGY INFERENCE BASED ON TRANSFORM LEARNING**
Stefania Sardellitti, Sergio Barbarossa, Sapienza University of Rome, Italy; Paolo Di Lorenzo, University of Perugia, Italy

SPN-3.2 11:20 **MORPHOLOGICAL PDES ON GRAPHS FOR ANALYZING UNORGANIZED DATA IN 3D AND HIGHER**
Abderrahim Elmoataz, University of Caen Normandy, GREYC Laboratory, Image Team / Université de Paris-Est Marne-La-Valée, Laboratoire LIGIM, France; François Lozes, University of Caen Normandy, GREYC Laboratory, Image Team, France; Hugues Talbot, Groupe ESIEE Paris, laboratoire A2SI, France

SPN-3.3 11:40 **INTERSECTION AND CONVEX COMBINATION IN MULTI-SOURCE SPECTRAL PLANTED CLUSTER DETECTION**
Benjamin Miller, Rajmonda Caceres, Steven Smith, MIT Lincoln Laboratory, United States

SPN-3.4 12:00 **SPECTRAL RADIUS AND NETWORK PROCESSES WITH SPONTANEOUS INFECTION/FAILURE RATE**
June Zhang, Centers for Disease Control and Prevention, United States; José M.F. Moura, Carnegie Mellon University, United States

Machine Learning for Characterization of Cognitive Communications and Radar III

Session Chair: George Stantchev, Naval Research Laboratory

CCR-3.1 14:00 **BLIND CHANNEL GAIN CARTOGRAPHY**
Daniel Romero, Donghoon Lee, Georgios B. Giannakis, University of Minnesota, United States

CCR-3.2 14:20 **USING DEPENDENT COMPONENT ANALYSIS FOR BLIND CHANNEL ESTIMATION IN DISTRIBUTED ANTENNA SYSTEMS**
Janis Nötzel, Universitat Autònoma de Barcelona, Spain; Christian Arendt, BMW Group, Germany

CCR-3.3 14:40 **SENSITIVITY OF L-1 REGULARIZATION ON SUBSPACE-BASED SIMO BLIND CHANNEL IDENTIFICATION IN SAMPLE CHANNEL MEASUREMENTS**
Kareem Bonna, Predrag Spasojevic, Rutgers University, United States

CCR-3.4 15:00 **A SEQUENTIAL DETECTION APPROACH TO INDOOR POSITIONING USING RSS-BASED FINGERPRINTING**
Negar Etemadyrad, Jill K. Nelson, George Mason University, United States

Massive MIMO Systems

Session Chair: Antti Tölli, University of Oulu

DT5G-5.1 14:00 **DOWNLINK PERFORMANCE OF SUPERIMPOSED PILOTS IN MASSIVE MIMO SYSTEMS IN THE PRESENCE OF PILOT CONTAMINATION**
Karthik Upadhya, Sergiy Vorobyov, Aalto University, Finland; Mikko Vehkapera, The University of Sheffield, United Kingdom

DT5G-5.2 14:20 **LOW-DENSITY SPATIAL RS DESIGN AND CHANNEL ESTIMATION FOR FDD MASSIVE FULL-DIMENSIONAL MIMO SYSTEMS**
Wendong Liu, Zhaocheng Wang, Xudong Zhu, Tsinghua University, China

DT5G-5.3 14:40 **LOW COMPLEXITY MRC AND EGC BASED RECEIVERS FOR SC-FDE MODULATIONS WITH MASSIVE MIMO SCHEMES**
David Borges, Paulo Montezuma, Rui Dinis, FCT-UNL, Portugal

General Symposium: Speech Processing

Session Chair: Phillip Regalia, Catholic University of America

GS-3.1 14:00 **A QUANTITATIVE ANALYSIS OF HANDS-FREE SPEECH ENHANCEMENT USING REAL AUTOMOBILE DATA**
Sam Tabaja, Sai-Prithvi Gadde, Nabih Jaber, Philip Olivier, Lawrence Technological University, United States; Mahdi Ali, Rakan Chabaan, Scott Bone, Hyundai America Technical Center Incorporated, United States

GS-3.2 14:20 **DETECTION OF SPOKEN WORDS IN NOISE: COMPARISON OF HUMAN PERFORMANCE TO MAXIMUM LIKELIHOOD DETECTION**
Mohsen Zareian Jahromi, Jan Østergaard, Jesper Jensen, Aalborg university, Denmark

GS-3.3 14:40 **SPEAKER SIMILARITY SCORE BASED FAST PHONEME CLASSIFICATION BY USING NEIGHBORHOOD COMPONENTS ANALYSIS**
Muhammad Rizwan, David V. Anderson, Georgia Institute of Technology, United States

GS-3.4 15:00 **IDENTIFYING RALE SOUNDS IN CHICKENS USING AUDIO SIGNALS FOR EARLY DISEASE DETECTION IN POULTRY**
Muhammad Rizwan, Brandon T. Carroll, David V. Anderson, Georgia Institute of Technology, United States; Wayne Daley, Simeon Harbert, Douglas F. Britton, Georgia Tech Research Institute, United States; Mark W. Jackwood, University of Georgia, Athens, United States

GS-3.5 15:20 **A LANDMARK-BASED APPROACH TO AUTOMATIC VOICE ONSET TIME ESTIMATION IN STOP-VOWEL SEQUENCES**
Stephan R. Kuberski, Stephen J. Tobin, Adamantios I. Gafos, University of Potsdam, Germany

Non-Commutative Theory and Applications I

Session Chair: Negar Kivayash, University of Illinois Urbana-Champaign

NCTA-1.1 14:00 **GRAPH-BASED ACTIVE LEARNING: A NEW LOOK AT EXPECTED ERROR MINIMIZATION**
Kwang-Sung Jun, Robert Nowak, University of Wisconsin-Madison, United States

NCTA-1.2 14:20 **ACTIVE INFORMATION AQUISITION AND SENSORY AUGMENTATION**
Sung-En Chiu, Tara Javidi, University of California, San Diego, United States

NCTA-1.3 14:40 **DIFFEOMORPHISM LEARNING VIA RELATIVE ENTROPY CONSTRAINED OPTIMAL TRANSPORT**
Todd Coleman, Justin Tantiongloc, Alexis Allegra, Diego Mesa, Dae Kang, Marcela Mendoza, University of California, San Diego, United States

Electric Vehicles

Session Chair: Meng Wang, Rensselaer Polytechnic Institute

SGI-7.1 14:00 **ADAPTIVE CHARGING NETWORK FOR ELECTRIC VEHICLES**
George Lee, PowerFlex Systems, United States; Ted Lee, California Institute of Technology, United States; Zhi Low, Cornell University, United States; Steven Low, Christine Ortega, California Institute of Technology, United States

SGI-7.2 14:20 **DISTRIBUTED COOPERATIVE CHARGING FOR PLUG-IN ELECTRIC VEHICLES: A CONSENSUS+INNOVATIONS APPROACH**
Javad Mohammadi, Soummya Kar, Carnegie Mellon University, United States; Gabriela Hug, ETH Zurich, United States

SGI-7.3 14:40 **IMPACT OF CHARGING INTERRUPTIONS IN COORDINATED ELECTRIC VEHICLE CHARGING**
Akshay Malhotra, Nuh Erdogan, University of Texas at Arlington, United States; Giulio Binetti, Polytechnic University of Bari, United States; Ioannis Schizas, Ali Davoudi, University of Texas at Arlington, United States

SGI-7.4 15:00 **ELECTRIC VEHICLE CONSUMPTION MARKETS: AN ECONOMIC ANALYSIS**
Mohammad Sadegh Nourbakhsh, Mohammad Hossein Manshaei, Isfahan University of Technology, Iran; Mohammad Ashiqur Rahman, Tennessee Tech, United States; Walid Saad, Virginia Tech, United States

SGI-7.5 15:20 **A DISTRIBUTED SMART PEV CHARGING ALGORITHM BASED ON FORECASTED MOBILITY ENERGY DEMAND**
Mithat Kisacikoglu, University of Alabama, United States; Fatih Erden, Atilim University, Turkey; Nuh Erdogan, University of Texas at Arlington, United States

Signal and Information Processing Over Networks IV

Session Chair: Antonio G. Marques, King Juan Carlos University

SPN-4.1 14:00 **TRACKING DYNAMIC PIECEWISE-CONSTANT NETWORK TOPOLOGIES VIA ADAPTIVE TENSOR FACTORIZATION**
Yanning Shen, Brian Baingana, Georgios B. Giannakis, University of Minnesota, United States

SPN-4.2 14:20 **ESTIMATING THE NUMBER OF INFECTION SOURCES IN A TREE**
Feng Ji, Wee Peng Tay, Nanyang Technological University, Singapore; Lav R. Varshney, University of Illinois at Urbana-Champaign, United States

SPN-4.3 14:40 **LINEAR SYSTEMS ON GRAPHS**
Oguzhan Teke, P. P. Vaidyanathan, California Institute of Technology, United States

SPN-4.4 15:00 **RETHINKING SKETCHING AS SAMPLING: EFFICIENT APPROXIMATE SOLUTION TO LINEAR INVERSE PROBLEMS**
Fernando Gama, University of Pennsylvania, United States; Antonio Marques, King Juan Carlos University, Spain; Gonzalo Mateos, University of Rochester, United States; Alejandro Ribeiro, University of Pennsylvania, United States

SPN-4.5 15:20 **SIGNAL DETECTION ON GRAPHS: BERNOULLI NOISE MODEL**
Siheng Chen, Yaoqing Yang, Aarti Singh, Jelena Kovacevic, Carnegie Mellon University, United States

Compressed Sensing, Deep Learning Poster II

CSDL-P2.1 LOW-LATENCY SOUND SOURCE SEPARATION USING DEEP NEURAL NETWORKS
Gaurav Naithani, Giambattista Parascandolo, Tom Barker, Tampere University of Technology, Finland; Niels Henrik Pontoppidan, Oticon A/S, Denmark; Tuomas Virtanen, Tampere University of Technology, Finland

CSDL-P2.2 END-TO-END RADIO TRAFFIC SEQUENCE RECOGNITION WITH RECURRENT NEURAL NETWORKS
Timothy J. O'Shea, Seth Hitefield, Virginia Tech, United States; Johnathan Corgan, Corgan Labs, United States

CSDL-P2.3 ATOMIC NORM MINIMIZATION BASED RANGE-DIRECTION INDICATION FOR FREQUENCY DIVERSE ARRAY: A MATRIX COMPLETION PERSPECTIVE
Lei Wang, Yimin Liu, Tsinghua University, China

CSDL-P2.4 SPARSE RECOVERY IN WIGNER-D BASIS EXPANSION
Arya Bangun, Arash Behboodi, Rudolf Mathar, RWTH Aachen University, Germany

CSDL-P2.5 DICTIONARY LEARNING FOR SPARSE REPRESENTATION USING WEIGHTED L1-NORM
Haoli Zhao, Shuxue Ding, Yujie Li, Zhenni Li, Xiang Li, Benying Tan, School of Computer Science and Engineering, Japan

Massive MIMO and mmWave

Session Chair: Yuan-Hao Huang, National Tsing Hua University

DT5G-P2.1 A PROBABILISTIC INTERFERENCE DISTRIBUTION MODEL ENCOMPASSING CELLULAR LOS AND NLOS MMWAVE PROPAGATION
Hussain Elkotby, Mai Vu, Tufts University, United States

DT5G-P2.2 BEAM TRACKING FOR MOBILE MILLIMETER WAVE COMMUNICATION SYSTEMS
Vutha Va, Haris Vikalo, Robert W. Heath Jr., The University of Texas at Austin, United States

DT5G-P2.3 A LOW-COMPLEXITY PARTIALLY UPDATED BEAM TRACKING ALGORITHM FOR MMWAVE MIMO SYSTEMS
Che-Chuan Yeh, Kai-Neng Hsu, Yuan-Hao Huang, National Tsing Hua University, Taiwan

DT5G-P2.4 IMPACT OF TRAINING ON MMWAVE MULTI-USER MIMO DOWNLINK
Gilwon Lee, Jungho So, Youngchul Sung, KAIST, Korea (South)

DT5G-P2.5 THIRD DIMENSION FOR MEASUREMENT OF MULTI USER MASSIVE MIMO CHANNELS BASED ON LTE ADVANCED DOWNLINK
Saeid Aghaeinezhadfirouzja, Hui Liu, Bin Xia, Shanghai Jiao Tong University, China; Qun Luo, Weibin Guo, Shenzhen Institute of Radio Testing, China

DT5G-P2.6 ENERGY-EFFICIENT JOINT TRANSMIT BEAMFORMING AND SUBARRAY SELECTION WITH NON-LINEAR POWER AMPLIFIER EFFICIENCY
Oskari Tervo, University of Oulu, Finland; Le-Nam Tran, Maynooth University, Ireland; Markku Juntti, University of Oulu, Finland

DT5G-P2.7 ACHIEVING HIGH THROUGHPUT WITH PREDICTIVE RESOURCE ALLOCATION
Chuting Yao, Jia Guo, Chenyang Yang, Beihang University, China

Sparse Signal Processing for Communications Poster I

Session Chair: Farokh Marvasti, Sharif University of Technology

SSPC-P1.1 ON A MUTUAL COUPLING AGNOSTIC MAXIMUM LIKELIHOOD ANGLE OF ARRIVAL ESTIMATOR BY ALTERNATING PROJECTION
Ahmad Bazzi, EURECOM / RW-CEVA, France; Dirk Slock, EURECOM, France; Lisa Meilhac, RW-CEVA, France

SSPC-P1.2 A MUTUAL COUPLING RESILIENT ALGORITHM FOR JOINT ANGLE AND DELAY ESTIMATION
Ahmad Bazzi, EURECOM / RW-CEVA, France; Dirk Slock, EURECOM, France; Lisa Meilhac, RW-CEVA, France

SSPC-P1.3 FAST METHODS FOR RECOVERING SPARSE PARAMETERS IN LINEAR LOW RANK MODELS
Ashkan Esmaeili, Arash Amini, Farokh Marvasti, Sharif University of Technology, Iran

SSPC-P1.4 A STUDY ON MIXING SEQUENCES IN MODULATED WIDEBAND CONVERTERS
Jehyuk Jang, Nam Yul Yu, Heung-No Lee, Gwangju Institute of Science and Technology, Korea (South)

SSPC-P1.5 A FAST CHANNEL ESTIMATION APPROACH FOR MILLIMETER-WAVE MASSIVE MIMO SYSTEMS
Yue Wang, Hisilicon Technologies Co. Ltd., United States; Zhi Tian, George Mason University, United States; Shulan Feng, Philipp Zhang, Hisilicon Technologies Co. Ltd., China

SSPC-P1.6 REGULARIZED VSSNLMS-BASED ITERATIVE CHANNEL ESTIMATION FOR MC-IDMA SYSTEMS
Olutayo Oyeyemi Oyerinde, University of the Witwatersrand, South Africa

SSPC-P1.7 OVERSAMPLING-BASED ALGORITHM FOR EFFICIENT RF INTERFERENCE EXCISION IN SIMO SYSTEMS
Tilahun Melkamu Getu, École de Technologie Supérieure (ÉTS) and Université du Québec À Montréal (UQÀM), Canada; Wessam Ajib, Université du Québec À Montréal (UQÀM), Canada; René Jr. Landry, École de Technologie Supérieure (ÉTS), Montréal, QC, Canada, Canada

SSPC-P1.8 GENERALIZED APPROXIMATE MESSAGE PASSING FOR ONE-BIT COMPRESSED SENSING WITH AWGN
Osman Musa, Gabor Hannak, Norbert Goertz, Technische Univesitaet Wien, Austria

Big Data Analysis and Challenges in Medical Imaging IV

Session Chair: Ramy Hussein, University of British Columbia

BDMI-4.1 L1-REGULARIZATION BASED EEG FEATURE LEARNING FOR DETECTING EPILEPTIC SEIZURE
16:10
Ramy Hussein, Z. Jane Wang, Rabab Ward, University of British Columbia, Canada

BDMI-4.2 EFFICIENT ESTIMATION OF COMPRESSIBLE STATE-SPACE MODELS WITH APPLICATION TO CALCIUM SIGNAL DECONVOLUTION
16:30
Abbas Kazemipour, Ji Liu, Patrick Kanold, Min Wu, Behtash Babadi, University of Maryland, United States

Full Duplex, Transceiver and RF Technologies

Session Chair: Lauri Anttila, Tampere University of Technology

DT5G-6.1 16:10 **LOCATION-BASED BIDIRECTIONAL USER SCHEDULING AND MODE SELECTION IN FULL-DUPLEX SYSTEM**
Jing Zhao, Shengqian Han, Chenyang Yang, Beihang University, China; Yong Teng, Naizheng Zheng, Nokia Networks, China

DT5G-6.2 16:30 **REFERENCE RECEIVER ENABLED DIGITAL CANCELLATION OF NONLINEAR OUT-OF-BAND BLOCKER DISTORTION IN WIDEBAND RECEIVERS**
Jaakko Marttila, Markus Allén, Tampere University of Technology, Finland; Marko Kosunen, Kari Stadius, Jussi Ryynänen, Aalto University School of Electrical Engineering, Finland; Mikko Valkama, Tampere University of Technology, Finland

DT5G-6.3 16:50 **ACTIVE RF CANCELLATION OF NONLINEAR TX LEAKAGE IN FDD TRANSCEIVERS**
Adnan Kiayani, Lauri Anttila, Mikko Valkama, Tampere University of Technology, Finland

DT5G-6.4 17:10 **DIGITAL PREDISTORTION FOR MITIGATING TRANSMITTER-INDUCED RECEIVER DESENSITIZATION IN CARRIER AGGREGATION FDD TRANSCEIVERS**
Mahmoud Abdelaziz, Lauri Anttila, Mikko Valkama, Tampere University of Technology, Finland

Non-Commutative Theory and Applications II

Session Chair: Negar Kivayash, University of Illinois Urbana-Champaign

NCTA-2.1 16:10 **ANALYSIS OF A PRIVACY-PRESERVING PCA ALGORITHM USING RANDOM MATRIX THEORY**
Lu Wei, University of Michigan-Dearborn, United States; Anand Sarwate, Rutgers University, United States; Jukka Corander, University of Oslo, Norway; Alfred Hero, University of Michigan, Ann Arbor, United States; Vahid Tarokh, Harvard University, United States

NCTA-2.2 16:30 **LEARNING CAUSAL INFORMATION FLOW STRUCTURES IN MULTI-LAYER NETWORKS**
Basak Guler, Aylin Yener, The Pennsylvania State University, United States; Ananthram Swami, Army Research Laboratory, United States

NCTA-2.3 16:50 **VIDEO PROCESSING OF COMPLEX ACTIVITY DETECTION IN RESOURCE-CONSTRAINED NETWORKS**
Noor Felemban, Zongqing Lu, Tom La Porta, The Pennsylvania State University, United States; Kevin Chan, U.S. Army Research Laboratory, United States

Compressed Sensing, Deep Learning Poster III

Session Chair: Yuantao Gu, Tsinghua University

CSDL-P3.1 SPACEBORNE SAR ANTENNA SIZE REDUCTION ENABLED BY COMPRESSIVE SAMPLING
Xiaqing Yang, Vishal M. Patel, Athina P. Petropulu, Rutgers University, United States

CSDL-P3.2 SPARSE REPRESENTATION OF HUMAN AUDITORY SYSTEM
Mohammad Edalatian, Ali Asghar Soltani, Neda Faraji, Imam Khomeini International University, Iran

CSDL-P3.3 OUT-OF-LABEL SUPPRESSION DICTIONARY LEARNING WITH CLUSTER REGULARIZATION
Xiudong Wang, Yuantao Gu, Tsinghua University, China

General Symposium Poster: Signal Processing for Communications

Session Chair: Phillip Regalia, Catholic University of America

GS-P4.1 NON-COHERENT SYMBOL-BY-SYMBOL DETECTION OF MSK SIGNALS UNDER IMPULSIVE NOISE
Guosheng Yang, Jun Wang, Guangrong Yue, Shaoqian Li, University of Electronic Science and Technology of China, China

GS-P4.2 COHERENT SEQUENCE DETECTION OF MSK SIGNALS UNDER IMPULSIVE NOISE
Guosheng Yang, Jun Wang, Guangrong Yue, Shaoqian Li, University of Electronic Science and Technology of China, China

GS-P4.3 DETECTION DIVERSITY OF SPATIO-TEMPORAL DATA USING PITMAN'S EFFICIENCY FOR LOW SNR REGIMES
Prashant Khanduri, Syracuse University, United States; Vinod Sharma, Indian Institute of Science, India; Pramod K. Varshney, Syracuse University, United States

Signal and Information Processing Over Networks Poster II

Session Chair: Alejandro Ribeiro, University of Pennsylvania

SPN-P2.1 A NEW PERSPECTIVE ON RANDOMIZED GOSSIP ALGORITHMS
Nicolas Loizou, Peter Richtarik, The University of Edinburgh, United Kingdom

SPN-P2.2 GRAPH TRANSFORMATION FOR KEYPOINT TRAJECTORY CODING
Dong Tian, Huifang Sun, Anthony Vetro, Mitsubishi Electric Research Labs, United States

SPN-P2.4 A SPECTRAL GRAPH WIENER FILTER IN GRAPH FOURIER DOMAIN FOR IMPROVED IMAGE DENOISING
Ali Can Yagan, Mehmet Tankut Ozgen, Anadolu University, Turkey

SPN-P2.5 IMPROVED ZERO-FORCING LINEAR PRECODER THROUGH TONE SUPPRESSION
Shailendra Singh, Qualcomm Atheros Inc, United States; Surendra Prasad, IIT Delhi, India, India

SPN-P2.6 DISTRIBUTED INTERFERENCE ALIGNMENT FOR MIMO CELLULAR NETWORK VIA CONSENSUS ADMM
Sandeep Kumar, Ketan Rajawat, Indian Institute of Technology Kanpur, India

SPN-P2.7 OUTAGE BOTTLENECK FOR RELIABLE MOBILE COMPUTATION OFFLOADING: TRANSMISSION OR COMPUTATION?
Di Han, Bo Bai, Wei Chen, Tsinghua University, China

SPN-P2.8 THE VALUE STRENGTH AIDED INFORMATION DIFFUSION IN ONLINE SOCIAL NETWORKS
Jingjing Wang, Chunxiao Jiang, Tsinghua University, China; Tony Q. S. Quek, Singapore University of Technology and Design, Singapore; Yong Ren, Tsinghua University, China

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

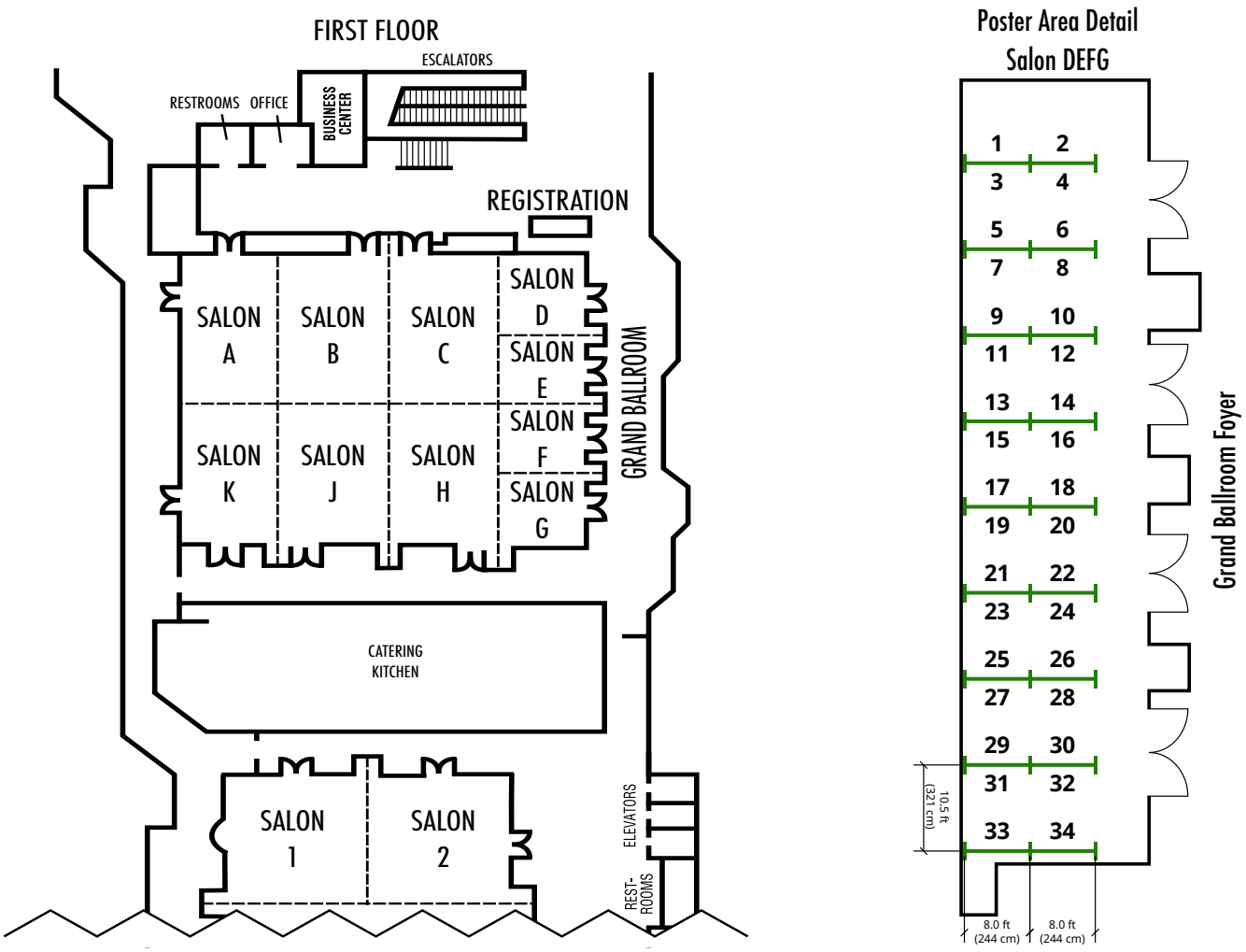
W

X

Y

Z

Crystal Gateway Marriott Floorplan



***Second Floor contains Rosslyn I & II**

Symposia Guide

GS	General Symposium
CSDL	Symposium on Compressed Sensing, Deep Learning
SPN	Symposium on Signal and Information Processing Over Networks
RMN	Symposium on Distributed Information Processing, Optimization, and Resource Management over Networks
DT5G	Symposium on Transceivers and Signal Processing for 5G Wireless and mm-Wave Systems
SGI	Symposium on Signal and Information Processing for Smart Grid Infrastructures
ITSP	Symposium on Information Theoretic Approaches to Security and Privacy
ESP	Symposium on Emerging Signal Processing Applications
CCR	Symposium on Machine Learning for Characterization of Cognitive Communications and Radar
BDMI	Symposium on Big Data Analysis and Challenges in Medical Imaging
UCD	Symposium on Signal Processing for Understanding Crowd Dynamics
SPBD	Symposium on Signal Processing of Big Data
NCTA	Symposium on Non-Commutative Theory and Applications
SSPC	Symposium on Sparse Signal Processing for Communications