

2022 IEEE 12th Sensor Array and Multichannel Signal Processing Workshop (SAM 2022)

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Tuesday, June 21 9:00 - 10:00

P1: Signal Processing, Waveform Optimization and Reinforcement Learning for Integrated Sensing and Communication Systems

Integrated Sensing and Communications Systems (ISAC) sense radio frequency spectrum and transfer wireless data jointly. They operate in a shared and congested, possibly even contested-spectrum with the goal of improving both communications and radar performances. We are considering ISAC systems that cooperate or are co-designed for mutual benefits. Co-designed systems may share waveforms, hardware, and antenna resources. Moreover, awareness about channel state and interference is typically exchanged. The ISAC systems have a number of degrees of freedom (DoF) and operational parameters that can be selected or adjusted to optimize their performance either by using structured optimization or machine learning. Examples of such parameters are frequency band, beampatterns, antenna selection, the modulation method, precoder-decoder designs, and power allocation. We focus on multicarrier waveforms used by most current and emerging wireless communication systems. Similarly, multicarrier waveforms have been employed for radar purposes. Radars have a variety of tasks such as target detection, tracking, parameter estimation and recognition with different objectives. We will present waveform optimization, reinforcement learning, interference management and signal processing methods for co-designed ISAC systems that share channel and interference awareness. Model-based reinforcement learning approach is taken to exploit the rich structural knowledge of man-made communication and sensing systems and radio wave propagation. Optimizing operational parameters can be modeled as a radar-centric or communications-centric constrained optimization problem where the minimum desired performance levels for other sub-systems impose the constraints. The developed OFDM radar algorithms in ISAC can take advantage of nonidealities such as carrier offsets and phase noise that are commonly considered an impairment in wireless communications. We demonstrate the achieved performance gains in different sensing and communication tasks and interference management through extensive simulation and analytical results.

Tuesday, June 21 10:20 - 12:00

RS1: Regular Session 1 - Localization - Part I

DoA Estimation Performance of UCAs with Reduced Number of Sensors using Phase-Mode Transformation and Small Sample Support

Guilherme F Murrel Liali (Instituto Militar de Engenharia, Brazil); José Antonio Apolinário Jr. (IME, Brazil); Marcello Campos (Federal University of Rio de Janeiro, Brazil); Antonio L. L. Ramos (University of South-Eastern Norway, Norway)

pp. 1-5

Decentralized Online Direction-of-Arrival Estimation and Tracking

Yufan Fan (TU Darmstadt, Germany); Cemil Emre Ardic (Technische Universität Darmstadt, Germany); Minh Trinh-Hoang (TU Darmstadt, Germany); Marius Pesavento (Technische Universität Darmstadt & Merckstr. 25, Germany)

pp. 6-10

One-bit DOA Estimation Using Robust Sparse Covariance Fitting in Non-uniform Noise

Mingyang Chen, Qiang Li and Lei Huang (Shenzhen University, China)

pp. 11-15

Closed-form Two-dimensional DOA and Polarization Joint Estimation Using Parallel Non-Collocated Sparse COLD Array

Yaxing Yue (Zhejiang University & College of Information Science and Electronic Engineering, China); Zongyu Zhang, Chengwei Zhou, Fangyuan Xing and Zhiguo Shi (Zhejiang University, China)

pp. 16-20

RS3: Regular Session 3 - Reconfigurable Intelligent Surfaces

Optimal Active Elements Selection in RIS-Assisted Edge Networks for Improved QoS

Shraddha Tripathi (Indian Institute of Technology Kanpur, India); Om Jee Pandey (University of Saskatchewan, Canada); Linga Reddy Cenkeramaddi (University of Agder, Norway); Rajesh M Hegde (Indian Institute of Technology Kanpur, India)

pp. 21-25

Wireless Inference Gets Smarter: RIS-assisted Channel-Aware MIMO Decision Fusion

Nishanth Mudkey (Stevens Institute of Technology, US, USA); Domenico Ciuonzo (University of Naples Federico II, Italy); Alessio Zappone (University of Cassino and Southern Lazio, Italy); Pierluigi Salvo Rossi (Norwegian University of Science and Technology, Norway)

pp. 26-30

Sparse Channel Estimation for IRS-Aided Systems Exploiting 2-D Sparse Arrays

Mirza Asif Haider, Md. Waqeeb Chowdhury and Yimin D. Zhang (Temple University, USA)

pp. 31-35

Reflection Design Methods for Reconfigurable Intelligent Surfaces-Aided Dynamic TDD Systems

Gerald Nwalozie, Khaled Ardah and Martin Haardt (Ilmenau University of Technology, Germany)

pp. 36-40

SS2: Special Session 2 - Sensing Principles and Signal Processing to Aid Climate-Change Mitigation Solutions

Flow meter performance under CO₂ gaseous conditions

Dennis Van Putten and Mohammed Al Saleem (DNV Energy Systems, The Netherlands); Robert Kruithof (NV Nederlandse Gasunie, The Netherlands)

pp. 41-45

Decision Fusion for Carbon Dioxide Release Detection from Pressure Relief Devices

Gianluca Tabella (Norwegian University of Science and Technology, Norway); Yuri Di Martino (Italy); Domenico Ciuonzo (University of Naples Federico II, Italy); Nicola Paltrinieri (Norwegian University of Science and Technology, Norway); Xiaodong Wang (Columbia University, USA); Pierluigi Salvo Rossi (Norwegian University of Science and Technology, Norway)

pp. 46-50

Gas quality measurement of gas mixtures containing hydrogen with ultrasonic flow meters - experiences, challenges and perspectives

Falk Ullmann (SICK AG, Germany)

pp. 51-55

Imaging measurement technologies for CCS

Yessica Arellano (SINTEF Energy Research, Norway); Stian Husevik Stavland (University of Bergen, Norway); Elvia Chavez Panduro (SINTEF Energy Research, Norway); Børge Hamre and Bjørn Tore Hjertaker (University of Bergen, Norway)

pp. 56-60

SS5: Special Session 5 - Automotive Radar Array Processing

Total Variation Compressive Sensing for Extended Targets in MIMO Radar

Ignacio Roldan (Tu Delft, The Netherlands); Francesco Fioranelli and Alexander Yarovoy (TU Delft, The Netherlands)

pp. 61-65

Phased Array With Improved Beamforming Capability via Use of Double Phase Shifters

Zhaoyi Xu and Athina Petropulu (Rutgers, The State University of New Jersey, USA)

pp. 66-70

Vibrational Radar Backscatter Communication using Resonant Transponding Surfaces

Jessica Centers and Jeffrey L Krolik (Duke University, USA)

pp. 71-75

Range Estimation in Frequency-Selective Propagation Environment for Terahertz Automotive Radar

Igal Bilik (Ben Gurion University of the Negev, Israel); Joseph Tabrikian (Ben-Gurion University of the Negev, Israel)

pp. 76-80

Misspecified Cramér-Rao Bound for Multipath Model in MIMO Radar

Moshe Levy-Israel (Ben-Gurion University of the Negev, Israel); Igal Bilik (Ben Gurion University of the Negev, Israel); Joseph Tabrikian (Ben-Gurion University of the Negev, Israel)

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Tuesday, June 21 1:30 - 2:30

P2: Future 3-Dimension Communications: Array Processing for Integrated Satellite-Terrestrial Communications

How do you imagine the future communication networks? Which are going to be their enabling new technologies: holographic arrays, quantum communications? Trying to answer these and related questions, researchers worldwide have begun to study new avenues, because the future networks are expected to be a wise combination of disruptive technologies and improved existing ones in 5G. Can you imagine a user centric network that you can activate whenever and wherever you are? A network with distributed intelligence and memory, that is able to transmit at terabits per second and to carry out fast computing over the air, in order to automate decisions and to enable a sustainable and always-best-connected network? You should not think only about big cities, but also about small villages, ad-hoc communities, oceans, ... Such a vision is only possible if terrestrial and satellite communications become just one. We are most familiar with terrestrial radio communications, but what about satellite communications? When and where are they used? How do they operate? This talk brings satellite communications (satcom) closer to the audience with a combination of tutorial description and new avenues for research focused on the role of array processing at the physical and access layer. This will pave the way towards a new communication paradigm that allows terrestrial and satellite segments to better integrate into a 3D network.

Tuesday, June 21 2:50 - 4:30

RS1: Regular Session 1 - Localization - Part II

Non-Coherent Source Localization with Distributed Sensor Arrays

Zhengyu Wan and Wei Liu (University of Sheffield, United Kingdom (Great Britain)); Peter Willett (University of Connecticut, USA)

pp. 86-90

Bias Reduced Semidefinite Relaxation Method for AOA Object Localization in 3-D

Peng Xiang and Gang Wang (Ningbo University, China); Dominic K. C. Ho (University of Missouri, USA)

pp. 91-95

Exact Solution for Elliptic Localization With Imperfect Clock Synchronization

Yudong Xiao and Gang Wang (Ningbo University, China); Dominic K. C. Ho (University of Missouri, USA)

pp. 96-100

A 3D Indoor Localization Approach Based on Spherical Wave-front and Channel Spatial Geometry

Yuan Liu and Linlong Wu (University of Luxembourg, Luxembourg); Mohammad Alae-Kerahroodi (Interdisciplinary Center for Security, Reliability and Trust, Université du Luxembourg, Luxembourg); Bhavani Shankar Mysore R (Interdisciplinary Centre for Security, Reliability and Trust & University of Luxembourg, Luxembourg)

pp. 101-105

RS2: Regular Session 2 - Radar

Statistical Analyses of Measured Forward-looking Sonar Echo Data in a Shallow Water Environment

Jiajun Shen (Harbin Engineering University, China); Fulvio Gini and Maria S. Greco (University of Pisa, Italy); Tian Zhou (Harbin Engineering University, China)

pp. 106-110

Counterfactual Regret Minimization for Anti-jamming Game of Frequency Agile Radar

Huayue Li and Zhaowei Han (The Chinese University of Hong Kong, Shenzhen, China); Wenqiang Pu (Shenzhen Research Institute of Big Data & The Chinese University of Hong Kong, Shenzhen, China); Liangqi Liu (The Chinese University of Hong Kong, Shenzhen, China); Kang Li and Bo Jiu (Xidian University, China)

pp. 111-115

Robust DOD and DOA Estimation for Bistatic MIMO Radar in Unknown Mutual Coupling and Non-Uniform Noise

Wen-gen Tang, Hong Jiang and Qi Zhang (Jilin University, China)

pp. 116-120

Over-The-Air Identification of Coupled Nonlinear Distortion in a MIMO Radar

Carl Kylin (Chalmers University of Technology & Saab AB, Sweden); Thomas Eriksson (Chalmers University of Technology, Sweden); Anders Silander (Chalmers University of Technology & Saab AB,

Sweden); Tomas McKelvey (Chalmers University of Technology, Sweden)

pp. 121-125

Dual-Function Radar-Communication System Aided by Intelligent Reflecting Surfaces

Yikai Li (Southern Illinois University, Carbondale, USA); Athina Petropoulou (Rutgers, USA)

pp. 126-130

SS1: Special Session 1 - Advances in Distributed Beamforming

Dynamic TDD Enabled Distributed Antenna Array Massive MIMO System

Anubhab Chowdhury (Indian Institute of Science Bangalore, India); Chandra R Murthy (Indian Institute of Science, India); Ribhu Chopra (Indian Institute of Technology Guwahati, India)

pp. 131-135

Distributed Transmit Beamforming: Analyzing the Maximum Communication Range

Samer Hanna (University of California, Los Angeles, USA); Danijela Cabric (University of California Los Angeles, USA)

pp. 136-140

Sparsity enforcing with Toeplitz matrix reconstruction method for mmWave UL channel estimation with one-bit ADCs

Majdoddin Esfandiari and Sergiy A. Vorobyov (Aalto University, Finland); Robert Heath (North Carolina State University & The University of Texas at Austin, USA)

pp. 141-145

Electronic Countermeasure for a Multi-Antenna Jammer Against a Multi-Radar System...N/A

Anurag Gupta (Cornell University, USA); Vikram Krishnamurthy (Cornell Tech, USA)

Robustness of Distributed Multi-User Beamforming: An Experimental Evaluation

Rahman Doost-Mohammady, Mehdi Zafari and Ashutosh Sabharwal (Rice University, USA)

pp. 146-150

Distributed Beamforming for Joint Radar-Communications

Jiawei Liu (The University of Texas at Dallas, USA); Kumar Vijay Mishra (United States DEVCOM Army Research Laboratory, USA); Mohammad Saquib (UniversityTexas Dallas, USA)

pp. 151-155

UAV-Based Urban Monitoring using On-Board 802.11ad Radar

Shobha Ram (IIIT Delhi, India); Kumar Vijay Mishra (United States DEVCOM Army Research Laboratory, USA)

pp. 156-160

Wednesday, June 22 9:00 - 10:00

P3: The Twin Transition and how to address the challenge of data volume inflation

The Green Transition is the combined efforts of the global community to move towards a sustainable society and combat the effects of climate change. This will impact all facets of our society, and require bold political, societal, and technological change to succeed. The EU has responded with a "European Green Deal": a set of policy initiatives with the main goal to make EU climate neutral by 2050. To highlight the need for digital technologies, the European Commission has stated: "There is no Green Deal without digital". The strong link between the Green and Digital Transition, also called "The Twin Transition", lies at the heart of the strategy and research activities at SINTEF Digital. We conduct research and innovation in digital technologies and technology-oriented social sciences. Covering the entire digital value chain from advanced sensors to big data and AI, our strategy contains prioritized areas of research that directly addresses the challenges of the Twin Transition. In this keynote, we focus on research activities in SINTEF Digital that target the specific challenges that stem from the exponential growth of sensors, sensor data and advanced signal processing. Examples from ongoing research activities are presented along with the role of SINTEF Digital as a partner for research, development, and innovation. From local involvement with start-ups and SMEs, to international collaboration with academic peers, we strive to stay ahead in the rapidly evolving research areas of digital sciences.

Wednesday, June 22 10:20 - 12:00

RS4: Regular Session 4 - Data-Driven Methods

Deep Learning Based Non-synchronous Sequential Measurement For Speech Localization

Guitong Chen (University of Shenzhen & Shenzhen University, China); Long Chen, Weize Sun and Lei Huang (Shenzhen University, China)

pp. 161-165

Learning Minimum Variance Unbiased Estimators

Tzvi Diskin (The Hebrew University of Jerusalem, Israel); Yonina C. Eldar (Weizmann Institute of Science, Israel); Ami Wiesel (The Hebrew University of Jerusalem, Israel)

pp. 166-170

Neural Network approach to iterative optimization of compressive measurement matrix in Massive MIMO System

Saidur Pavel and Yimin D. Zhang (Temple University, USA)

pp. 171-175

A Generative Cramér-Rao Bound on Frequency Estimation with Learned Measurement Distribution

Hai Victor Habi (Tel Aviv University, Israel); Hagit Messer (Tel-Aviv University, Israel); Yoram Bresler (University of Illinois at Urbana-Champaign, USA)

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SS 9: Special Session 9 - Signal Processing for IRS-Assisted Millimeter Wave Communications

Joint Location and Channel Error Optimization for Beamforming Design for Multi-RIS Assisted MIMO

System

Zhen Chen, Jie Tang, Xiaoyu Du and Xiu Yin Zhang (South China University of Technology, China); Qingqing Wu (University of Macau, China); Kai-Kit Wong (University College London, United Kingdom (Great Britain))
pp. 181-185

Beamforming Design for Intelligent Reflecting Surface Aided Full-Duplex Relay Systems

Zijian Chen, Ming-Min Zhao, Kaidi Xu, Yunlong Cai and Minjian Zhao (Zhejiang University, China)
pp. 186-190

Two-Timescale Beamforming for IRS-Assisted Millimeter Wave Systems: A Deep Unrolling-Based Stochastic Optimization Approach

Peilan Wang, Jun Fang and Zhuoran Wu (University of Electronic Science and Technology of China, China); Hongbin Li (Stevens Institute of Technology, USA)
pp. 191-195

Channel Estimation for Intelligent Reflecting Surface Assisted MmWave Systems Using Analog Feedback

Sucheol Kim and Hyeongtaek Lee (Korea Advanced Institute of Science and Technology (KAIST), Korea (South)); Jihoon Cha and Junil Choi (KAIST, Korea (South))
pp. 196-200

Bayesian User Tracking for Reconfigurable Intelligent Surface Aided mmWave MIMO System

Boyu Teng and Xiaojun Yuan (University of Electronic Science and Technology of China, China); Rui Wang (Tongji University, China); Shi Jin (Southeast University, China)
pp. 201-205

SS6: Special Session 6 - Intelligent Signal Processing for Green Internet of Things (G-IoT)

NEMO: Internet of Things based Real-time Noise and Emissions MONitoring System for Smart Cities

Ashish Rauniyar, Truls Berge and Jan Erik Håkegård (SINTEF, Norway)
pp. 206-210

Interference Mitigation in RIS-assisted 6G Systems for Indoor Industrial IoT Networks

Naila Rubab (National University of Sciences and Technology (NUST), Pakistan); Shah Zeb (National University of Sciences and Technology, Pakistan); Aamir Mahmood (Mid Sweden University, Sweden); Syed Ali Hassan (National University of Sciences and Technology, Pakistan); Muhammad Ikram Ashraf (Centre for Wireless Communications, Finland); Mikael Gidlund (Mid Sweden University, Sweden)
pp. 211-215

COROID: A Crowdsourcing-based Companion Drones to Tackle Current and Future Pandemics

Ashish Rauniyar (SINTEF, Norway); Desta Haileselassie Hagos (KTH Royal Institute of Technology, Sweden); Debesh Jha (Northwestern University, USA); Jan Erik Håkegård (SINTEF, Norway)
pp. 216-220

Video Analytics in Elite Soccer: A Distributed Computing Perspective

Debesh Jha (Northwestern University, USA); Ashish Rauniyar (SINTEF, Norway); Håvard Johansen and Dag Johansen (UiT The Arctic University of Norway, Norway); Michael Alexander Riegler (Simula Research Laboratory, Norway); Pål Halvorsen (Simula Research Laboratory & Department of Informatics, University of Oslo, Norway); Ulas Bagci (Northwestern University, USA)

pp. 221-225

SS7: Special Session 7 - Integrated Sensing and Communication (ISAC)

Federated Channel Learning for Intelligent Reflecting Surfaces With Fewer Pilot Signals

Ahmet M Elbir (Duzce University & University of Luxembourg, Turkey); Sinem Coleri (Koc University, Turkey); Kumar Vijay Mishra (United States DEVCOM Army Research Laboratory, USA)

pp. 226-230

Dual-Function Radar-Communication Systems with Constant-Modulus and Similarity Constraints

Christos G. Tsinos (University of Luxembourg, Luxembourg); Aakash Arora (SnT, University of Luxembourg, Luxembourg); Symeon Chatzinotas and Björn Ottersten (University of Luxembourg, Luxembourg)

pp. 231-235

Simultaneous Communication and Tracking in Arbitrary Trajectories via Beam-Space Processing

Fernando Pedraza (Technische Universität Berlin, Germany); Saeid Khalili Dehkordi (TU Berlin, Germany); Mari Kobayashi (CentraleSupélec, France); Giuseppe Caire (Technische Universität Berlin, Germany)

pp. 236-240

MIMO Ambiguity Function Enhancement for Integrated OFDM Communications and Sensing

Sahan Damith Liyanaarachchi and Taneli Riihonen (Tampere University, Finland)

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Wednesday, June 22 1:30 - 2:30

P4: Ensuring Trust in the Digital Age

Wednesday, June 22 2:50 - 4:30

RS7: Regular Session 7 - Communications and Networks

Passive Angle-Doppler Profile Estimation for Narrowband Digitally Modulated Wireless Signals

Antonios Argyriou (University of Thessaly, Greece)

pp. 246-250

Performance Analysis of PRLS-based Time-Varying Sparse System Identification

Yu Wang (Southeast University, China); Zhen Qin (University of Denver, USA); Jun Tao (Southeast University, China); Le Yang (University of Canterbury, New Zealand)
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Power and Beamforming Control with Generalized Nash Game for Energy-Aware mmWave Networks

Wenbo Wang (Bar Ilan University, Israel); Amir Leshem (Bar-Ilan University, Israel)
pp. 256-260

GSP based subsampling of IoT sensor networks

Anna Sabatini (Campus Bio-Medico University of Rome, Italy); Luca Vollero (Università Campus Bio-Medico di Roma, Italy)
pp. 261-265

SS 8.I: Special Session 8 - Reconfigurable Intelligent Surfaces for Signal Processing and Communications - Part I

Joint Beamforming Design for Sub-Connected Active Reconfigurable Intelligent Surface

Qi Zhu, Ming Li, Yang Liu and Qian Liu (Dalian University of Technology, China)
pp. 266-270

Active Reconfigurable MIMO Communications: Capacity Maximization Pattern Design

Haonan Wang and Ang Li (Xi'an Jiaotong University, China); Ya-Feng Liu (Chinese Academy of Sciences, China); Qibo Qin (China); Lingyang Song (Peking University, China); Yonghui Li (University of Sydney, Australia)
pp. 271-275

How Should IRSs Scale to Harden Multi-Antenna Channels?

Ali Bereyhi and Saba Asaad (Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany); Chongjun Ouyang (Beijing University of Posts and Telecommunications, China); Ralf R. Müller (Friedrich-Alexander Universität Erlangen-Nürnberg, Germany); Rafael F. Schaefer (University of Siegen, Germany); H. Vincent Poor (Princeton University, USA)
pp. 276-280

Sacrificing CSI for a Greater Good: RIS-enabled Opportunistic Rate Splitting

Kevin Weinberger (Ruhr-Universität Bochum, Germany); Aydin Sezgin (RUB, Germany)
pp. 281-285

SS14: Special Session 14 - Advanced Signal Processing Methods in Automotive Radar Sensing for Autonomous Vehicles

IRS-Aided Radar: Enhanced Target Parameter Estimation via Intelligent Reflecting Surfaces

Zahra Esmailbeig (University of Illinois at Chicago, USA); Kumar Vijay Mishra (United States DEVCOM Army Research Laboratory, USA); Mojtaba Soltanalian (University of Illinois at Chicago, USA)
pp. 286-290

Guaranteed Deep Learning for Reliable Radar Signal Processing

Shahin Khobahi (University of Illinois at Chicago & Zadar Labs, Inc, USA); Ali Mostajeran and Mohammad Emadi (Zadar Labs, Inc, USA); Pu Wang (Mitsubishi Electric Research Laboratories (MERL), USA); Mojtaba Soltanalian (University of Illinois at Chicago, USA)
pp. 291-295

Unsupervised deep interference mitigation for automotive radar

Chenming Jiang (University Stuttgart, Germany); Bin Yang and Zhibo Zhou (University of Stuttgart, Germany)
pp. 296-300

SpectraNet: A High Resolution Imaging Radar Deep Neural Network for Autonomous Vehicles

Ruxin Zheng, Shunqiao Sun and David Scharff (The University of Alabama, USA); Teresa Wu (Arizona State University, USA)
pp. 301-305

Marker-based Localization for Automated Parking Using Automotive Radar Point Cloud

Hongyu Chen, Yuwei Cheng and Yimin Liu (Tsinghua University, China)
pp. 306-310

Spatial-Domain Interference Mitigation for Slow-Time MIMO-FMCW Automotive Radar

Sian Jin (University of Washington, USA); Pu Wang (Mitsubishi Electric Research Laboratories (MERL), USA); Petros T. Boufounos and Philip Orlik (Mitsubishi Electric Research Laboratories, USA); Ryuhei Takahashi (MitsubishiElectricCorporation, Japan); Sumit Roy (University of Washington, USA)
pp. 311-315

A Deep Reinforcement Learning Approach for Integrated Automotive Radar Sensing and Communication

Lifan Xu, Ruxin Zheng and Shunqiao Sun (The University of Alabama, USA)
pp. 316-320

Thursday, June 23 9:00 - 10:00

P5: Wideband Dual-Function Radar Communication Systems

With today's technology, radio frequency front-end architectures are very similar in radar and wireless communication systems. Further, in an effort to access more bandwidth, wireless systems have been shifting to frequency bands that have been traditionally occupied by radar systems. Given the hardware and frequency convergence, there is a lot of recent interest in the integration of the radar and communication functions in one system. Such integration will enable more efficient use of spectrum, reduce device size/cost and power consumption, and will also offer the potential for significant performance enhancement of both sensing and communication functions. Dual Function Radar-Communication (DFRC) systems is a class of integrated sensing-communication (ISC) systems that use the same waveform as well as the same hardware platform for both sensing and communication purposes. Thus, DFRC systems can achieve higher spectral efficiency than most ISC systems, require simpler transmitter hardware and a smaller, less expensive device. DFRC systems are prime candidates for autonomous driving vehicles, unmanned aerial vehicles, surveillance, search and rescue, and networked robots in advanced manufacturing applications that rely on sensing and communications.

In the talk, we will present a novel DFRC system that uses the available bandwidth efficiently for both communication as well as sensing. The system transmits wideband, orthogonal frequency division multiplexing (OFDM) waveforms and allows the transmit antennas to use

subcarriers in a shared fashion. When all subcarriers are used in a shared fashion, the proposed system achieves high communication rate, while its sensing performance is limited by the size of the receive array. By reserving some subcarriers for exclusive use by transmit antennas (private subcarriers), the communication rate can be traded off for improved sensing performance. The improvement is achieved by using the private subcarriers to construct a large virtual array that yields higher resolution angle estimates. The system is endowed with beamforming capability, via waveform precoding, where the precoding matrix is optimally designed to meet a joint sensing-communication system performance metric. We also present novel hybrid analog-digital architectures for achieving good performance with reduced hardware and energy cost via the use of double-phase shifters.

Thursday, June 23 10:20 - 12:00

SPL: Signal Processing Letters Papers

Partially Linear Bayesian Estimation Using Mixed-Resolution Data...N/A

Tirza Routtenberg and Itai Berman (Ben Gurion University of the Negev, Israel)

Clutter Edges Detection Algorithms for Structured Clutter Covariance Matrices...N/A

Tianqi Wang and Da Xu (Institute of Acoustics, Chinese Academy of Sciences & University of Chinese Academy of Sciences, China); Chengpeng Hao (Institute of Acoustics, Chinese Academy of Sciences, China); Pia Addabbo (University of Sannio, Italy); Danilo Orlando (Universita' degli Studi Niccolo' Cusano, Italy)

SS12: Special Session 12 - Signal Processing in Wireless Sensor and Robot Networks

Gradient-Descent Adaptive Filtering Using Gradient Adaptive Step-Size

Sayed Pouria Talebi and Hossein Darvishi (Norwegian University of Science and Technology (NTNU), Norway); Stefan Werner (NTNU, Norway); Pierluigi Salvo Rossi (Norwegian University of Science and Technology, Norway)
pp. 321-325

Optimal Angular Sensor Separation for DRSS Localization

Jun Li and Kutluyıl Doğançay (University of South Australia, Australia); Hatem Hmam (Cyber and Electronic Warfare Division, Defence Science & Technology Group, Australia)
pp. 326-330

Integrated Trajectory Optimization and Cubature Kalman Filter for UAV-Based Target Tracking with Unknown Initial Position

Sheng Xu (Shenzhen Institute of Advanced Technology (SIAT), Chinese Academy of Sciences (CAS), China); Linlong Wu (University of Luxembourg, Luxembourg); Bhavani Shankar Mysore R (Interdisciplinary Centre for Security, Reliability and Trust & University of Luxembourg, Luxembourg); Prabhu Babu (CARE, Indian Institute of Technology, Delhi, India)
pp. 331-335

Sparse Array Beamformer Design via ADMM

Huiping Huang (Darmstadt University of Technology, Germany); Hing Cheung So (City University of Hong Kong, Hong Kong); Abdelhak M Zoubir (Darmstadt University of Technology, Germany)

SS13: Special Session 13 - Wireless RF Sensing

Fundamental Investigation of Wi-Fi Beamforming Report Properties on Wireless Sensing

Sorachi Kato and Takuma Matsukawa (Osaka University, Japan); Tomoki Murakami (NTT Corporation, Japan); Takuya Fujihashi (Osaka University & Graduate School of Information Science and Technology, Japan); Takashi Watanabe and Shunsuke Saruwatari (Osaka University, Japan)

pp. 341-344

Gait Variability Analysis with Multi-Channel FMCW Radar for Fall Risk Assessment

Mohammad Mahbubur Rahman and Dario Martelli (The University of Alabama, USA); Sevgi Z Zubeyde Gurbuz (University of Alabama & TUBITAK Space Technologies Research Institute, USA)

pp. 345-349

Cross-modal Learning of Graph Representations using Radar Point Cloud for Long-Range Gesture Recognition

Souvik Hazra, Hao Feng and Gamze Kiprit (Infineon Technologies AG, Germany); Michael Stephan (Friedrich-Alexander-University Erlangen-Nuremberg & Infineon Technologies Ag, Germany); Lorenzo Servadei and Avik Santra (Infineon Technologies AG, Germany); Robert Wille (Technical University of Munich, Germany); Robert Weigel (Friedrich-Alexander Universität Erlangen-Nürnberg, Germany)

pp. 350-354

Joint Initial Access and Localization in Millimeter Wave Vehicular Networks: a Hybrid Model/Data Driven Approach

Yun Chen (NCSU, USA); Joan Palacios and Nuria González-Prelcic (North Carolina State University, USA); Takayuki Shimizu (Toyota Motor North America, Inc., USA); Hongsheng Lu (Toyota Motor North America InfoTech Labs, USA)

pp. 355-359

AutoQML: Automated Quantum Machine Learning for Wi-Fi Integrated Sensing and Communications

Toshiaki Koike-Akino and Pu Wang (Mitsubishi Electric Research Laboratories (MERL), USA); Ye Wang (Mitsubishi Electric Research Laboratories, USA)

pp. 360-364

SS3: Special Session 3 - Advances in Radar Signal Classification, Detection, and Estimation in Complex Scenarios

Subspace-Based Detection and Localization in Distributed MIMO Radars

Yangming Lai (University of Electronic Science and Technology of China, China); Luca Venturino (Universita' degli Studi di Cassino e del Lazio Meridionale & Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT), Italy); Emanuele Grossi (University of Cassino and Southern Lazio & Consorzio Nazionale Inter-universitario per le Telecomunicazioni (CNIT), Italy); Wei Yi (University of Electronic Science and Technology of China, China)

pp. 365-369

Adaptive Multi-Target Detection with FDA-MIMO Radar

Jingjing Zhu, Shengqi Zhu, Lan Lan and Jingwei Xu (Xidian University, China)
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A NN-based Approach to ICM Estimation and Adaptive Target Detection...N/A

Pia Addabbo (University of Sannio, Italy); Rosa Altilio and Dario Benvenuti (Elettronica SpA, Italy);
Goffredo Foglia (Elettronica S.P.A., Italy); Danilo Orlando (Universita' degli Studi Niccolo' Cusano,
Italy)

Compound Interference Suppression for Bistatic FDA-MIMO Radar based on Joint Two-Stage Processing

Wenhao Sun, Lan Lan, Guisheng Liao and Jiawei Qi (Xidian University, China)
pp. 375-379

Mainlobe Deceptive Jammer Suppression with OFDM-LFM-MIMO Radar based on Blind Source Separation

Jie Gao, Shengqi Zhu, Lan Lan and Ximin Li (Xidian University, China)
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Target Range and Velocity CRLBs for Colocated MIMO Radar in CES Disturbance

Neda Rojhani, Maria S. Greco and Fulvio Gini (University of Pisa, Italy)
pp. 385-389

Thursday, June 23 1:30 - 2:30

P6: Gridless Channel Estimation for Hybrid MIMO OFDM Systems in the Millimeter Wave Band via R-D Unitary Tensor-ESPRIT in DFT Beamspace

In this talk, we present a gridless channel estimation scheme for MIMO OFDM systems in the millimeter wave (mmWave) band that is based on R-D Unitary Tensor-ESPRIT in DFT beamspace. Compared to conventional ESPRIT based algorithms in element space, the beamspace approach can be applied to MIMO systems with hybrid architectures. Moreover, the proposed scheme significantly reduces the training overhead for communication systems operating in the mmWave band. The proposed procedure involves coarse and fine estimation steps. During the coarse estimation step, Unitary Tensor-ESPRIT in element space may be applied to the array with a reduced size aperture to obtain initial information about the directions of arrival, the directions of departure, and the propagation delays of the dominant multipath components. Based on these estimates, a more accurate estimation of the angular profiles, propagation delays, and channel gains is performed in a second step by applying 3-D Unitary Tensor-ESPRIT in DFT beamspace in the spatial domains combined with the element space version in the frequency domain. We explain how to combine the received signals from different spatial sectors of interest and how to perform joint processing. The simulation results confirm the tensor gain of the proposed procedure in addition to the improved channel estimation accuracy.

Thursday, June 23 2:50 - 4:30

RS5: Regular Session 5 - Signal Processing Methods

A Joint Particle Filter for Quaternion-Valued α -Stable Signals via the Characteristic Function

Sayed Pouria Talebi (Norwegian University of Science and Technology (NTNU), Norway); Stefan Werner (NTNU, Norway); Xia Yili (Southeast University, China); Clive Cheong Took (Royal Holloway University of London, United Kingdom (Great Britain)); Danilo Mandic (Imperial College, London, United Kingdom (Great Britain))

pp. 390-394

Symmetric Tensor Canonical Polyadic Decomposition Via Probabilistic Inference

Xinyun Hua, Siyuan Li and Lei Cheng (Zhejiang University, China)

pp. 395-399

Enhanced Computation of the Coupled Block-Term Decomposition in Multilinear Rank Terms

Ildar Safiullin and Liana Khamidullina (Ilmenau University of Technology, Germany); Alexey Korobkov (Kazan National Research Technical University n. a. A. N Tupolev-KAI, Russia); Martin Haardt (Ilmenau University of Technology, Germany)

pp. 400-404

Stochastic first-order methods over distributed data

Muhammad Ibrahim Qureshi and Usman Khan (Tufts University, USA)

pp. 405-409

RS6: Regular Session 6 - Detection

Distributed Correlation Detection in Streaming Graph Signal

Xuandi Sun, Haiyan Wang, Xiaohong Shen and Fei Hua (Northwestern Polytechnical University, China)

pp. 410-414

Detection of False Data Injection Attacks in Unobservable Power Systems by Laplacian Regularization

Lital Dabush and Tirza Routtenberg (Ben Gurion University of the Negev, Israel)

pp. 415-419

Comparison of Different Classifiers for Early Meal Detection Using Abdominal Sounds

Muhammad Asaad Cheema, Salman Siddiqui and Pierluigi Salvo Rossi (Norwegian University of Science and Technology, Norway)

pp. 420-424

RS8: Regular Session 8 - Signal Recovery

Joint Source Enumeration and Direction Finding without Eigendecomposition for Satellite Navigation Receiver

Tianyao Long (ShenZhen, China & Shenzhen University, China); Qiang Li and Lei Huang (Shenzhen

University, China)

pp. 425-429

Sparse Signal Recovery Using a Binary Program

Muhammed Rahman and Shahrokh Valaee (University of Toronto, Canada)

pp. 430-434

Blind Source Separation with Non-Coplanar Interferometric Data

Rémi Carloni Gertosio (IRFU, CEA, Université Paris-Saclay, France); Jerome Bobin (CEA, France)

pp. 435-439

A High SIR Low-overhead Implementation of Single-channel Speech Source Separation

Lawrence Nwaogo (Abo Akademi University, Finland); Jerker Björkqvist (Åbo Akademi University, Finland)

pp. 440-444

SS 8.II: Special Session 8 - Reconfigurable Intelligent Surfaces for Signal Processing and Communications - Part II

Legitimate against Illegitimate IRSs on MISO Wiretap Channels

Sepehr Rezvani (Technische Universität Braunschweig, Germany); Pin-Hsun Lin and Martin Le (TU Braunschweig, Germany); Eduard A Jorswieck (Technische Universität Braunschweig, Germany)

pp. 445-449

Joint Optimization of Reconfigurable Intelligent Surfaces and Dynamic Metasurface Antennas for Massive MIMO Communications

Xuewen Qian (CentraleSupélec, France); Marco Di Renzo (Paris-Saclay University / CNRS, France); Vincenzo Sciancalepore (NEC Laboratories Europe GmbH, Germany); Xavier Costa-Perez (ICREA and i2cat & NEC Laboratories Europe, Spain)

pp. 450-454

Exploiting Array Geometry for Reduced-Subspace Channel Estimation in RIS-Aided Communications

Özlem Tuğfe Demir and Emil Björnson (KTH Royal Institute of Technology, Sweden); Luca Sanguinetti (University of Pisa, Italy)

pp. 455-459

Near-Field Hierarchical Beam Management for RIS-Enabled Millimeter Wave Multi-Antenna Systems

George C. Alexandropoulos (University of Athens, Greece); Vahid Jamali (Technical University of Darmstadt, Germany); Robert Schober (Friedrich-Alexander University Erlangen-Nuremberg, Germany); H. Vincent Poor (Princeton University, USA)

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IRS-Aided Wideband Dual-Function Radar-Communications with Quantized Phase-Shifts

Tong Wei (Interdisciplinary Centre for Security, Reliability and Trust (SnT) & University of Luxembourg, Luxembourg); Linlong Wu (University of Luxembourg, Luxembourg); Kumar Vijay Mishra (United States DEVCOM Army Research Laboratory, USA); Bhavani Shankar Mysore R (Interdisciplinary Centre for Security, Reliability and Trust & University of Luxembourg, Luxembourg)

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