# Guest Editorial Signal Processing for Wireless Communications I

#### I. INTRODUCTION

SIGNAL processing techniques, such as equalization, detection, and fast Fourier transform, have been successfully used in communication systems to improve the quality of communications. With the recent exploding research interest in wireless communications, the application of signal processing to this area is becoming increasingly important. Indeed, it is the advances in signal processing technology that make most of today's wireless communications possible and hold the key to future services. The application of signal processing techniques to wireless communications is an emerging area that has recently achieved dramatic and important results and holds the potential for even greater results in the future as an increasing number of researchers from the signal processing and communications areas participate in this expanding field.

From an industrial viewpoint, advanced signal processing technology cannot only dramatically increase wireless system capacity, but can also improve communication quality, including the reduction of the effects of all types of interference. As an example, a recent field test by Lucent Technologies demonstrated that adaptive signal processing for antenna arrays can be effectively used in mobile communication systems to mitigate cochannel interference and increase system capacity, setting a milestone for signal processing in wireless communications.

The IEEE JOURNAL ON SILECTED AREAS IN COMMUNI-CATIONS on Signal Processing for Wireless Communications presents 43 papers, in two issues, on diversity and antenna arrays, blind techniques, orthogonal frequency division multiplexing (OFDM)-related techniques, equalization and signal detection and multiuser detection, and code division multiple access (CDMA)-related techniques. This issue contains 21 papers on the following three topics.

#### II. DIVERSITY AND ANTENNA ARRAYS

The first two papers deal with adaptive arrays. The paper by Molnar and Bottomley proposes a joint maximum likelihood sequence estimation and adaptive array receiver, while the paper by Wang and Poor investigates a robust adaptive array to improve the quality of cellular systems.

The next five papers consider the combination of antenna arrays with equalization for wireless systems with delay spread. The papers by Ng et al. and by Lee and Cox apply decisionfeedback equalization with antenna arrays. The paper by Clark proposes frequency-domain equalization with diversity reception. The papers by Martone and by Affes and Mermelstein investigate fourth-order statistics with minimum mean squared error arrays for time division multiple access (TDMA) systems and a spatial-temporal receiver for CDMA systems, respectively.

The last four papers study transmitter diversity. The paper by Narula et al. studies the use of side information to improve transmit diversity systems. The paper by Rashid-Farrokhi et al. proposes a transmitter and receiver space—time diversity approach for wireless networks. The papers by Alamouti and by Naguilb et al. study transmitter diversity using space block coding and space-time coding, respectively, for high-data-rate wireless communications.

#### III. BUND TECHNOOLES.

Blind techniques have been studied for over 20 years. Interest in these techniques for wireless systems, however, has been increasing recently. We present seven papers on this topic.

The first two papers by Boss et al. and by Ding and Li investigate blind channel estimation for TDMA systems using higher and second-order statistics, while the paper by Xavier et al. proposes a closed-form identification algorithm for SDMA systems. The papers by Chugg and by Ulukus and Yates study blind techniques for sequence and decorrelation detection, respectively. Blind techniques can also be applied to beamforming and adaptive arrays, as shown in the papers by Ghazi-Moghadam and Kaveh and by Yao et al., respectively.

#### IV. OFDM RELATED-TECHNIQUES

OFDM, i.e., multicarrier modulation, is an effective technique to combat multipath fading in wireless environments, this issue has three papers on this topic. The paper by Luise et al. applies a blind approach to equalization and detection of OFDM signals. The paper by Koxek and Molisch investigates a new set of nonorthogonal basis functions for robust and efficient multicarrier systems. The paper by Kim and Stüsber deals with intersymbol interference cancellation for OFDM systems in high-definition television broadcasting.

#### ACKNOWLEDGMENT

The Guest Editors received a very large number of submissions and many good quality papers could not be accepted. They would like to thank the authors for their submissions,

# **Wireless Communication Ieee Paper Abstract**

Roberto D. Graglia, Giuseppe Pelosi, Stefano Selleri

#### **Wireless Communication Ieee Paper Abstract:**

MIMO Communications Ahmed Kishk, Xiaoming Chen, 2023-12-20 Multiple input multiple output MIMO communication technology has become a critical enabler for high speed wireless communication systems This edited volume MIMO Communications Fundamental Theory Propagation Channels and Antenna Systems is a comprehensive resource for researchers graduate students and practicing engineers in wireless communication The volume is divided into four parts that cover the foundations of wireless communications antenna techniques channel modeling autonomous driving and radars Experts in the field have authored chapters covering various topics including capacity analysis of MIMO channels antenna array design and beamforming techniques channel modeling and estimation and the applications of autonomous driving and radars This book provides a detailed and accessible introduction to the latest research and practical applications in MIMO communication technology It is an essential resource for anyone interested in learning about MIMO communication technology or looking to deepen their understanding of existing systems **An Introduction to Optical Wireless Mobile Communication** Harald Haas, Mohamed Sufyan Islim, Cheng Chen, Hanaa Abumarshoud, 2021-09-30 The use of the optical spectrum for wireless communications has gained significant interest in recent years Applications range from low rate simplex transmission links using existing embedded CMOS cameras in smartphones referred to as optical camera communications OCC mobile light fidelity LiFi networking in homes offices urban and sub sea environments to free space gigabit interconnects in data centers and point to point long range wireless backhaul links outdoors and in space This exciting book focuses on the use of optical wireless communications OWC for mobile use cases The book discusses existing conventional radio frequency RF based wireless access technology and presents the challenges that can impact the requirements of the future wave of new wireless services in the context of artificial intelligence AI driven autonomous systems and machine type communications. The relationship between visible light communications VLC and light fidelity LiFi is explored and the major advantages of VLC and LiFi such as security and data density and discuss existing research challenges are also introduced Channel modeling techniques are provided for mobile multiuser scenarios and will introduce key building blocks to achieve LiFi cellular networks achieving orders of magnitude improvements of area spectral efficiency compared to state of the art Challenges that arise from moving from a static point to point visible light link to a LiFi network that is capable of serving hundreds of mobile and fixed nodes are discussed An overview of recent standardization activities and the commercialization challenges of this disruptive technology is also provided Spatial Resource Allocation in Massive MIMO Communications Trinh Van Chien, 2019-12-09 Massive MIMO multiple input multiple output is considered as an heir of the multi user MIMO technology and it has gained lots of attention from both academia and industry since the last decade By equipping base stations BSs with hundreds of antennas in a compact array or a distributed manner this new technology can provide very large multiplexing gains by serving many users on the same time frequency resources and

thereby bring significant improvements in spectral efficiency SE and energy efficiency EE over the current wireless networks The transmit power pilot training and spatial transmission resources need to be allocated properly to the users to achieve the highest possible performance This is called resource allocation and can be formulated as design utility optimization problems If the resource allocation in Massive MIMO is optimized the technology can handle the exponential growth in both wireless data traffic and number of wireless devices which cannot be done by the current cellular network technology In this thesis we focus on the five different resource allocation aspects in Massive MIMO communications The first part of the thesis studies if power control and advanced coordinated multipoint CoMP techniques are able to bring substantial gains to multi cell Massive MIMO systems compared to the systems without using CoMP More specifically we consider a network topology with no cell boundary where the BSs can collaborate to serve the users in the considered coverage area We focus on a downlink DL scenario in which each BS transmits different data signals to each user This scenario does not require phase synchronization between BSs and therefore has the same backhaul requirements as conventional Massive MIMO systems where each user is preassigned to only one BS The scenario where all BSs are phase synchronized to send the same data is also included for comparison We solve a total transmit power minimization problem in order to observe how much power Massive MIMO BSs consume to provide the requested quality of service QoS of each user A max min fairness optimization is also solved to provide every user with the same maximum QoS regardless of the propagation conditions The second part of the thesis considers a joint pilot design and uplink UL power control problem in multi cell Massive MIMO The main motivation for this work is that the pilot assignment and pilot power allocation is momentous in Massive MIMO since the BSs are supposed to construct linear detection and precoding vectors from the channel estimates Pilot contamination between pilot sharing users leads to more interference during data transmission. The pilot design is more difficult if the pilot signals are reused frequently in space as in Massive MIMO which leads to greater pilot contamination effects Related works have only studied either the pilot assignment or the pilot power control but not the joint optimization Furthermore the pilot assignment is usually formulated as a combinatorial problem leading to prohibitive computational complexity Therefore in the second part of this thesis a new pilot design is proposed to overcome such challenges by treating the pilot signals as continuous optimization variables We use those pilot signals to solve different max min fairness optimization problems with either ideal hardware or hardware impairments The third part of this thesis studies a two layer decoding method that mitigates inter cell interference in multi cell Massive MIMO systems In layer one each BS estimates the channels to intra cell users and uses the estimates for local decoding within the cell This is followed by a second decoding layer where the BSs cooperate to mitigate inter cell interference An UL achievable SE expression is computed for arbitrary two layer decoding schemes while a closed form expression is obtained for correlated Rayleigh fading channels maximum ratio combining MRC and largescale fading decoding LSFD in the second layer We formulate a sum SE maximization problem with both the data

power and LSFD vectors as optimization variables Since the problem is non convex we develop an algorithm based on the weighted minimum mean square error MMSE approach to obtain a stationary point with low computational complexity Motivated by recent successes of deep learning in predicting the solution to an optimization problem with low runtime the fourth part of this thesis investigates the use of deep learning for power control optimization in Massive MIMO We formulate the joint data and pilot power optimization for maximum sum SE in multi cell Massive MIMO systems which is a non convex problem We propose a new optimization algorithm inspired by the weighted MMSE approach to obtain a stationary point in polynomial time We then use this algorithm together with deep learning to train a convolutional neural network to perform the joint data and pilot power control in sub millisecond runtime The solution is suitable for online optimization Finally the fifth part of this thesis considers a large scale distributed antenna system that serves the users by coherent joint transmission called Cell free Massive MIMO For a given user set only a subset of the access points APs is likely needed to satisfy the users performance demands To find a flexible and energy efficient implementation we minimize the total power consumption at the APs in the DL considering both the hardware consumed and transmit powers where APs can be turned off to reduce the former part Even though this is a nonconvex optimization problem a globally optimal solution is obtained by solving a mixed integer second order cone program SOCP We also propose low complexity algorithms that exploit group sparsity or received power strength in the problem formulation International Workshop on Finite Elements for Microwave Engineering Roberto D. Graglia, Giuseppe Pelosi, Stefano Selleri, 2016-05-09 When Courant prepared the text of his 1942 address to the American Mathematical Society for publication he added a two page Appendix to illustrate how the variational methods first described by Lord Rayleigh could be put to wider use in potential theory Choosing piecewise linear approximants on a set of triangles which he called elements he dashed off a couple of two dimensional examples and the finite element method was born Finite element activity in electrical engineering began in earnest about 1968 1969 A paper on waveguide analysis was published in Alta Frequenza in early 1969 giving the details of a finite element formulation of the classical hollow waveguide problem It was followed by a rapid succession of papers on magnetic fields in saturable materials dielectric loaded waveguides and other well known boundary value problems of electromagnetics In the decade of the eighties finite element methods spread quickly In several technical areas they assumed a dominant role in field problems P P Silvester San Miniato PI Italy 1992 Early in the nineties the International Workshop on Finite Elements for Microwave Engineering started This volume contains the history of the Workshop and the Proceedings of the 13th edition Florence Italy 2016 The 14th Workshop Technologies Enabling Future Mobile Connectivity & Sensing Björn will be in Cartagena Colombia 2018 Debaillie, François Brunier, Dominique Morche, Erkan Nevzat Isa, Jan Craninckx, 2024-01-09 In today s connected world the demand for mobile communications and instant access to information anytime and anywhere has drastically changed the electronics landscape both consumer and industrial Novel 5G and 6G systems will enable connectivity in all forms between

humans devices machines and any objects They will provide virtually ubiquitous ultra high bandwidth and low latency network access to individual users as well as to all objects benefiting from being connected They will be the eyes and ears of Artificial Intelligence systems as it will provide real time data collection and analysis Such diversity calls for a new paradigm in terms of flexibility not only related to performance but also in terms of scalability and cost 5G and 6G communication systems imply a major stake of sovereignty and autonomy for the communication sector and digital infrastructures of the future All products related to IoT traffic and health care supported by connectivity will benefit the citizens in their daily lives to improve everything from business to private affairs Together this will influence society as much as smart phones did in the recent past It is all about communication and connectivity This book provides an overview of the latest research results in this field It is based on the close collaboration in the BEYOND5 project extended with vision and roadmap insights by European experts leading the 6G development The BEYOND5 project has built a completely European supply chain for Radio Frequency Electronics enabling new RF domains for sensing communication 5G radio infrastructure and beyond Moving forward into higher frequency bands above 100 GHz for 6G also more disruptive technologies using heterogeneous integration of CMOS SOI and III V components such as GaN or InP and advanced packaging techniques will be necessary to realize the objectives of ubiquitous ultra high bandwidth and low latency networks The book bundles the scientific content of the International Workshop on Technologies enabling future mobile connectivity sensing in Lisbon Portugal 10 September 2023 as part of the ESSCIRC ESSDERC 2023 European Solid state Circuits and Devices Conference Through articles and abstracts a combined view of experts and practitioners representing academia research and industry in the field of wireless communication systems is given They cover the topics of RF and digital SOI technology development for 5 and 6G device and substrate characterization packaging technology and the realization of full systems including power amplifiers linearization techniques beamforming transceivers access points and radar detection Proceedings of the International Conference on Information Engineering, Management and Security 2015 Vignesh Ramakrishnan, Prasanth Venugopal, Tuhin Mukherjee, 2015-08-13 ICIEMS 2015 is the conference aim is to provide a platform for researchers engineers academicians as well as industrial professionals from all over the world to present their research results and development activities in Engineering Technology Industrial Engineering Application Level Security and Management Science This conference provides opportunities for the delegates to exchange new ideas and application experiences face to face to establish business or research relations and to find global partners for future collaboration Industrial and Engineering Applications of Artificial Intelligence and Expert Systems Manton Matthews, Don Potter, Moonis Ali, 2020-01-08 This book presents the Proceedings of the Tenth International Conference on Industrial and Engineering Applications of Artificial Intelligence and Expert Systems focusing on the theoretical aspects of intelligent systems research as well as extensions of theory of intelligent thinking machines Advanced Engineering Research Apirat Siritaratiwat, Anan Kruesubthaworn, 2015-08-03

Selected peer reviewed papers from the International Electrical Engineering Congress iEECON 2015 March 18 20 2015 Phuket Thailand *Mobile Communication and Power Engineering* Vinu V Das,Yogesh Chaba,2013-01-17 This book comprises the refereed proceedings of the International Conference AIM CCPE 2012 held in Bangalore India in April 2012 The papers presented were carefully reviewed and selected from numerous submissions and focus on the various aspects of research and development activities in computer science information technology computational engineering mobile communication control and instrumentation communication system power electronics and power engineering

Proceedings of the Eleventh International Network Conference (INC 2016) Paul Dowland, Oliver Schneider, Bogdan Ghita, Sergej Alekseev, 2016 This book contains the proceedings of the Eleventh International Network Conference INC 2016 which was held in Frankfurt Germany in July 2016 A total of 30 papers were accepted for inclusion in the conference The main topics of the book include Network Technologies Mobile and Wireless Networking Security and Privacy Applications and Impacts The papers address state of the art research and applications of network technology arising from both the academic and industrial domains These proceedings should consequently be of interest to network practitioners researchers academics and technical managers involved in the design development and use of network systems

Fundamental and Supportive Technologies for 5G Mobile Networks El-Kader, Sherine Mohamed Abd, Hussein, Hanan, 2019-11-29 Mobile wireless communication systems have affected every aspect of life By providing seamless connectivity these systems enable almost all the smart devices in the world to communicate with high speed throughput and extremely low latency. The next generation of cellular mobile communications 5G aims to support the tremendous growth of interconnected things devices i e internet of things IoT using the current technologies and extending them to be used in higher frequencies to cope with the huge number of different devices In addition 5G will provide massive capacity high throughput lower end to end delay green communication cost reduction and extended coverage area Fundamental and Supportive Technologies for 5G Mobile Networks provides detailed research on technologies used in 5G their benefits practical designs and recent challenges and focuses on future applications that could exploit 5G network benefits The content within this publication examines cellular communication data transmission and high speed communication It is designed for network analysts IT specialists industry professionals software engineers researchers academicians students and scientists Electrical & Electronics Abstracts ,1997 Convergence and Hybrid Information Technology Geuk Lee, Daniel Howard, Dominik Slezak, You Sik Hong, 2012-08-21 This book constitutes the refereed proceedings of the 6th International Conference on Convergence and Hybrid Information Technology ICHIT 2012 held in Daejeon Korea in August 2012 The 102 revised full papers presented were carefully reviewed and selected from 196 submissions The papers are organized in topical sections on communications and networking soft computing and intelligent systems medical information and bioinformatics security and safety systems HCI and data mining software and hardware engineering image processing

and pattern recognition robotics and RFID technologies convergence in information technology workshop on advanced smart convergence IWASC Information Security Applications Ho-won Kim, Dooho Choi, 2016-03-23 This book constitutes the thoroughly refereed post workshop proceedings of the 16th International Workshop on Information Security Applications WISA 2015 held on Jeju Island Korea in August 2015 The 35 revised full papers presented in this volume were carefully reviewed and selected from 78 submissions. The papers are organized in topical sections such as hardware security cryptography side channel attacks and countermeasures security and threat analysis IoT security network security cryptography application security Underwater Acoustic Sensor Networks Yang Xiao, 2010-05-19 A detailed review of underwater channel characteristics Underwater Acoustic Sensor Networks investigates the fundamental aspects of underwater communication Prominent researchers from around the world consider contemporary challenges in the development of underwater acoustic sensor networks UW ASNs and introduce a cross layer approach for effec Systems Aarne Mämmelä, 2025-04-29 Interdisciplinary systems thinking is complementary but does not replace conventional disciplinary analytical thinking The book is valuable for researchers their advisors and other thinkers interested in deep knowledge of science Interdisciplinary systems thinking is valuable for three reasons. The goal of all science is a unified view of the world we cannot solve the significant problems of our time without interdisciplinary collaboration and general theories of systems and system archetypes support the solution to those problems System archetypes are generic system models that have stood the test of time As specialists within a discipline we must be able to communicate between disciplines Interdisciplinary generalists can offer us reliable visions and relevant research problems The goal of interdisciplinary research is to find unified solutions to those problems The book provides a lot of information from over a thousand sources in a structured manner to help the reader The book includes a comprehensive chronology vocabulary and bibliography The author has been a research professor in information engineering for over 25 years During his career he became interested in systems thinking which is closely related to the philosophy and history of science **Proceeding of International** Conference on Intelligent Communication, Control and Devices Rajesh Singh, Sushabhan Choudhury, 2016-09-17 The book presents high quality research papers presented at the first international conference ICICCD 2016 organised by the Department of Electronics Instrumentation and Control Engineering of University of Petroleum and Energy Studies Dehradun on 2nd and 3rd April 2016 The book is broadly divided into three sections Intelligent Communication Intelligent Control and Intelligent Devices The areas covered under these sections are wireless communication and radio technologies optical communication communication hardware evolution machine to machine communication networks routing techniques network analytics network applications and services satellite and space communications technologies for e communication wireless Ad Hoc and sensor networks communications and information security signal processing for communications communication software microwave informatics robotics and automation optimization techniques and algorithms intelligent

transport mechatronics system guidance and navigation algorithms linear non linear control home automation sensors smart cities control systems high performance computing cognition control adaptive control distributed control prediction models hybrid control system control applications power system manufacturing agriculture cyber physical system network control system genetic control based wearable devices nano devices MEMS bio inspired computing embedded and real time software VLSI and embedded systems FPGA digital system and logic design image and video processing machine vision medical imaging and reconfigurable computing systems The International Conference on Health Informatics Yuan-Ting Zhang, 2013-11-20 This volume presents the proceedings of the International Conference on Health Informatics ICHI The conference was a new special topic conference initiative by the International Federation of Medical and Biological Engineering IFMBE held in Vilamoura Portugal on 7 9 November 2013 The main theme of the ICHI2013 was Integrating Information and Communication Technologies with Biomedicine for Global Health The proceedings offer a unique forum to examine enabling technologies of sensors devices and systems that optimize the acquisition transmission processing storage retrieval of biomedical and health information as well as to report novel clinical applications of health information systems and the deployment of m Health e Health u Health p Health and Telemedicine *Innovative Algorithms and Techniques in* Automation, Industrial Electronics and Telecommunications Tarek Sobh, Khaled Elleithy, Ausif Mahmood, Mohamed Karim, 2007-09-04 Innovative Algorithms and Techniques in Automation Industrial Electronics and Telecommunications includes a set of rigorously reviewed world class manuscripts addressing and detailing state of the art research projects in the areas of Industrial Electronics Technology not only the reviewing submissions and registration processes but also the actual conference Conference participants authors presenters and attendees only needed an internet connection and sound available on their computers in order to be able to contribute and participate in this international ground breaking conference The on line structure of this high quality event allowed academic professionals and industry participants to contribute work and attend world class technical presentations based on rigorously refereed submissions live without the need for investing significant travel funds or time out of the office Suffice to say that CISSE received submissions from more than 70 countries for whose researchers this opportunity presented a much more affordable dynamic and well planned event to attend and submit their work to versus a classic on the ground conference The CISSE conference audio room provided superb audio even over low speed internet connections the ability to display PowerPoint presentations and cross platform compatibility the conferencing softwareruns on Windows Mac and any other operating system that supports Java In addition the conferencing system allowed for an unlimited number of participants which in turn granted CISSE the opportunity to allow all participants to attend all presentations as opposed to limiting the number of available seats for each session

<u>Smart Cities</u> Alex Khang, Shashi Kant Gupta, Sita Rani, Dimitrios A. Karras, 2023-11-30 This book discusses the basic principles of sustainable development in a smart city ecosystem to better serve the life of citizens It examines smart city

systems driven by emerging IoT powered technologies and the other dependent platforms Smart Cities AI IoT Technologies Big Data Solutions Cloud Platforms and Cybersecurity Techniques discusses the design and implementation of the core components of the smart city ecosystem The editors discuss the effective management and development of smart city infrastructures starting with planning and integrating complex models and diverse frameworks into an ecosystem Specifically the chapters examine the core infrastructure elements including activities of the public and private services as well as innovative ICT solutions computer vision IoT technologies data tools cloud services AR VR technologies cybersecurity techniques treatment solution of the environmental water pollution and other intelligent devices for supporting sustainable living in the smart environment The chapters also discuss machine vision models and implementation as well as real time robotic applications Upon reading the book users will be able to handle the challenges and improvements of security for smart systems and will have the know how to analyze and visualize data using big data tools and visualization applications. The book will provide the technologies solutions as well as designs of smart cities with advanced tools and techniques for students researchers engineers and academics

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